BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
STANDARD FOR THE DISPOSAL OF COAL COMBUSTION RESIDUALS IN SURFACE IMPOUNDMENTS: PROPOSED NEW 35 ILL. ADMIN. CODE 845	)	PCB 2020-019 (Rulemaking - Land)
	)	

NOTICE OF ELECTRONIC FILING

To: Attached Service List

PLEASE TAKE NOTICE that on October 30, 2020, I electronically filed with the Clerk of the Illinois Pollution Control Board ("Board") the **ENVIRONMENTAL LAW & POLICY CENTER, PRAIRIE RIVER NETWORK, SIERRA CLUB, AND LITTLE VILLAGE ENVIRONMENTAL JUSTICE ORGANIZATION'S FINAL POST-HEARING COMMENTS**, copies of which are served on you along with this notice. Attachments to the Comments will be sent in separate filings.

Dated: October 30, 2020

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FINAL POST-HEARING COMMENTS

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Introduction

The Environmental Law & Policy Center ("ELPC"), Prairie Rivers Network ("PRN"), Sierra Club, and Little Village Environmental Justice Organization ("LVEJO") (collectively, "Commenters"), hereby submit these final post-hearing comments on the draft rules proposed by the Illinois Environmental Protection Agency ("the Agency") in the above-referenced docket.

The proposed rules at issue here are the direct result of, and mandated by, the Coal Ash Pollution Prevention Act, Public Act 101-171. The Coal Ash Pollution Prevention Act was adopted last year with the express purpose of "promot[ing] a healthful environment, including clean water, air, and land, meaningful public involvement, and the responsible disposal and storage of coal [ash], so as to protect public health and to prevent pollution of the environment of this State."[1] The proposed rules, unfortunately, fall short of achieving those fundamental goals.

First, they fail to ensure permanent protection of Illinois communities and waters from coal ash pollution. The evidence is abundant that, if left exposed to or in contact with water, coal combustion residuals ("coal ash" or "CCR") will continue to leach dangerous contaminants into that water for the foreseeable future. Unlike multiple other states, Illinois' proposed rules fail to make it crystal clear that Illinois will protect our communities for the long haul by barring the abandonment of coal ash that is, or may be, in contact with water. The rules likewise do not explicitly prohibit leaving coal ash in place in floodplains and other locations that do not meet the location restrictions included in US EPA's federal coal ash regulations codified at 40 C.F.R. Part 257 (the "federal coal ash rule" or "federal CCR rule"). Similarly, the rules do not set out protections against pollution from coal ash landfills or fill which, the evidence shows, are major sources of contaminants rendering our groundwater unusable and, in some places, unsafe.

Second, the rules offer inadequate protections to communities and workers against other dangers posed by coal ash, including exposure to coal ash dust and pollution resulting from the transport of coal ash. Coal ash dust has proven to be the cause of serious harm to workers and others subject to prolonged exposure to it. Illinois communities and workers must be ensured proper protections to safeguard their health and wellbeing. Yet the proposed rules fail to require use of readily available air monitors or specific, well-known dust control measures. They fail to set out understandable worker protections. And they fail to explicitly require consideration and use of less-polluting, potentially-less-disruptive transportation alternatives for the transport of coal ash, including rail, barge, and zero- or low-pollution trucks.

Third, the proposed rules do not provide the Agency or public oversight necessary to ensure adequate protection against the significant risks posed by coal ash impoundments. Under the Agency's proposal, the structural stability of coal ash impoundments – the collapse of which

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[1] 415 ILCS 5/22.59(a).

we have seen multiple devastating times in the U.S.[2] – is left entirely in the hands of third parties, with no review of underlying documentation by Agency staff or the public. The adequacy of emergency action plans, fugitive dust controls, flood controls, and safety and health plans, among other assessments fundamental to the safety of coal ash ponds, is – with little exception – also left wholly to industry-hired third parties, with no provision for agency approval or public input. The public is offered no opportunity to weigh in on whether the coal ash pond is, in fact, the source of groundwater contamination. These rules, in short, represent – in far too many ways – an abdication of the Agency's duty to protect Illinois' environment and a door shut in the face of community members affected by polluting coal ash ponds.

But it does not have to be so. The Board has the opportunity to protect Illinois communities by keeping coal ash out of water and unsafe locations, mandating robust air monitoring and dust protections, and ensuring comprehensive, meaningful Agency oversight and public participation, consistent with the mandates of the Coal Ash Pollution Prevention Act. Commenters' recommendations are set out in detail in the pages that follow. We ask that the Board please take this opportunity to make Illinoisans proud of our commitment to the environment and to them by promoting a healthful environment, ensuring meaningful public involvement, and furthering the responsible disposal and cleanup of coal ash.

I. Legal Framework

Commenters incorporate as if fully set forth herein Section I of the Initial Public Comments of ELPC, Prairie Rivers Network, and Sierra Club (June 15, 2020) (hereinafter "Envtl. Groups Initial Comments").

II. Factual Background

The concerns raised by Environmental Groups in this proceeding are very real. Coal ash contains heavy metals and other constituents, including but not limited to arsenic, boron, cadmium, chromium, cobalt, iron, lead, lithium, manganese, mercury, molybdenum, radium, selenium, thallium, and vanadium.[3] At elevated concentrations, these constituents render

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[2] *See* Exhibit 5, U.S. Envt'l Prot. Agency, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities 80 Fed. Reg. 21,302, at 21,457 (Apr. 17, 2015) (discussing the failures of coal ash impoundments in Virginia, North Carolina, Tennessee, Pennsylvania, and Indiana, and harms associated therewith).

[3] *See* IEPA, PCB R2020-19, Statement of Reasons at 3-4 and Attach. C at 4-5 (Mar. 30, 2020) [hereinafter "IEPA Statement of Reasons"]; Ex. 14, Prefiled Testimony of Mark Hutson at 14 (Aug. 27, 2020) (hereinafter "Hutson Test."); USEPA, *Human and Ecological Risk Assessment of Coal Combustion Residuals (Final)* at ES-5 – ES-7 (Dec., 2014) (Excerpt provided as Ex. 27) [hereinafter "USEPA Risk Assessment"]; Ex. 18, Prairie Rivers Network et al., *Cap and Run: Toxic Coal Ash Left Behind by Big Polluters Threatens Illinois Water* at 6 (Nov. 2018) [hereinafter "*Cap and Run"*].

groundwater unsafe for drinking and other uses,[4] and also can put surface waters such as rivers and lakes – often adjacent to coal ash disposal sites because of coal-fired power plants' need for large volumes of water[5] – at risk.[6] Because the metals in coal ash do not degrade, they can leach into water "at any time in the present or in the future for as long as the soluble metals in the ash are allowed to come into contact with water,"[7] and the leaching can continue for hundreds of years, if not more.[8]

Once coal ash contaminants get into groundwater, it can take decades – sometimes hundreds of years – to reduce concentrations to safe levels.[9] Notably, safe levels are not reached at the same time throughout the plume of contamination: when groundwater monitoring wells at the waste boundary[10] show safe concentrations, the plume of contamination that has moved away from the impoundment may still contain concentrations that exceed groundwater protection

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[4] *See* IEPA Statement of Reasons at 3-4 and Attach. C, pp. 4-5; Ex. 14, Hutson Test. at 14; Ex. 27, USEPA Risk Assessment at ES-5 – ES-7; Ex. 18, *Cap and Run* at 6.

[5] Ex. 14, Hutson Test. at 6; *see also* Ex. 35, Prefiled Answers of David Hagen at 22-23 (Sept. 24, 2020) (hereinafter "Hagen Answers") (specifying measurements between 9 coal ash impoundments in Illinois and rivers, 8 of which were less than 1,000 feet from a river and 6 of which were less than 500 feet from a river); Ex. 18, *Cap and Run* at 4.

[6] *See* IEPA Statement of Reasons, Attach. C at 6-7; Ex. 14, Hutson Test. at 4-5, 10-16; Ex. 18, *Cap and Run* at 4-5.

[7] Ex. 14, Hutson Test. at 4; *see also* Ex. 37, Prefiled Testimony of Andrew Bittner at 9 (Aug. 27, 2020) (hereinafter "Bittner Testimony") ("[Surface impoundments] that are constructed with intersecting groundwater conditions (i.e., the base of the impoundment is below the natural groundwater elevation) are often of particular concern due to the potential for CCR constituent mass to continue leaching into groundwater even after closure is completed").

[8] *See* Ex. 16, Prefiled Testimony of Andrew Rehn, Attach. 20(b) at Figure 17 (Aug. 27, 2020) (hereinafter "Rehn Test.") (showing modeled boron concentrations of "no action" scenario at Vermilion coal ash ponds); Ex. 14, Hutson Test. at 24-25.

[9] *See* Tr. Sept. 29, 2020 229:9-231:7 (David Hagen testimony that "it probably wouldn't surprise him" if the timeline to clean up groundwater varied on the order of 100 years, and that "[g]roundwater contaminant travel times can be quite slow"); Ex. 35, Hagen Answers at 3 ("…many groundwater remedies will likely require decades to meet the GWPS…."); *see also* Ex. 18, *Cap and Run* at 6 ("…once [coal ash contaminants] leach into groundwater the harmful pollutants do not go away or degrade over time").

[10] Under Proposed Section 845.120, the "Waste boundary" is "the "vertical surface located at the hydraulically downgradient limit of the CCR surface impoundment [which] extends down into the uppermost aquifer."

standards.[11] In some instances, it may not be possible to fully remediate the contaminated groundwater.[12]

Even where concentrations of pollutants in groundwater do not exceed safe levels, the risks posed by coal ash pollutants are not fully abated. If the groundwater discharges into surface water – as is often the case, given the proximity of coal ash ponds to rivers and lakes and hydrogeologic connection between groundwater and surface waters[13] – the contaminants can accumulate in sediments and sediment pore-water at extremely high levels,[14] potentially posing a risk to aquatic life and fish-consuming communities.

Groundwater contamination from coal ash in Illinois is well-documented and is compounded by ash in contact with groundwater, flooding and unlined impoundments.[15] Coal ash fill and coal ash piles that would go unaddressed by the rules as proposed is also contributing to groundwater contamination in the State. Finally, structural stability concerns add to the threat posed by coal ash impoundments in Illinois.

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[11] *See* Ex. 35, Hagen Answers at 3-4 ("[T]he GWPS in many instances may be met sooner at the waste boundary than points down gradient of the surface impoundment…").

[12] *See* IEPA Statement of Reasons, Attach. C at 7 ("[US]EPA has acknowledged that it 'will not always be possible' to restore groundwater or surface water to background conditions after a contamination event"); Ex. 14, Hutson Test. at 4 (quoting USEPA guidance that "Cleaning up contaminated ground water is a long and costly process and in some cases may not be totally successful"); *Id*., Attach. 1.

[13] *See* Ex. 14, Hutson Test. at 6; Ex. 18, *Cap and Run* at 4-5; Tr. Aug. 13, 2020 18:17-19 (Dunaway) ("[G]roundwater typically has some degree of connection to surface water. However, that varies from site to site").

[14] *See* Ex. 15, Prefiled Answers of Mark Hutson at 1 (Sept. 24, 2020) (hereinafter "Hutson Answers") (explaining that even if groundwater protection standards are not exceeded, "[l]ow concentration groundwater contaminants can accumulate to elevated levels in sediments…"); *id.* at 29-30 (referencing sampling that found arsenic in sediments from river adjacent to impoundment "at concentrations up to… 8.2 mg/l." and explaining that "buried sediments below the bottom of a river can be mobile or may be stationary for long periods between high water events."); *id*., Attach. 1 at 67840, 67873-74; Tr. Sept. 29, 2020 44:9-45:5 (Hutson) ("Q. Is it possible that groundwater seepage into a stream could be at a rate slow enough that the water quality standards in the stream are not exceeded? A. That is very often the case and it's also the case that we've seen cases where the slow migration of groundwater carrying contaminants into the surface water actually leads to build up of high concentrations in sediments at the bottom of the river or the groundwater discharges into the sediments even though you can't detect contaminants in the surface water. Q. If water quality standards in the stream are not exceeded, would aquatic life be protected? A. I think that would really be a better question for a biologist, but, again, I think there are certain aquatic creates that get exposed to bottom sediments that could be affected.")

[15] Ex. 16, Rehn Test. at 5; Ex. 2, First Set of IEPA Prefiled Answers at 18-82 (Aug. 3, 2020) (hereinafter "IEPA Answers"); Tr. Aug. 12, 2020 139:23-140:6 (Buscher); Ex. 18, *Cap and Run*.

Many impoundments are already polluting groundwater at levels exceeding groundwater protection standards, Illinois groundwater quality standards, or other thresholds for safe concentrations. The Agency acknowledges that many existing CCR impoundments in Illinois are causing groundwater contamination.[16] Hearing witness Andrew Rehn testified about gathering data for a report on "groundwater quality at coal ash sites near 24 power plants in Illinois, and found that 22 of the 24 coal ash sites had pollutants above health-based thresholds, namely EPA's presumptive groundwater protection standards and Illinois's Class I groundwater quality standards, which apply to potential drinking water. We found that industry's own reporting showed that coal ash impoundments in Illinois were leaking pollutants like arsenic, boron, cadmium, cobalt, lead, selenium, and thallium at unsafe levels."[17]

At many coal ash ponds in Illinois, available evidence is clear that coal ash is in contact with groundwater.[18] "Documents that I have reviewed when gathering data about coal ash impoundments in Illinois make clear that groundwater is contacting coal ash at many of the coal ash impoundments in Illinois."[19] These include, but are not limited to, coal ash pond(s) at the Joliet 9/Lincoln Stone Quarry,[20] Hennepin,[21] Meredosia,[22] Wood River,[23] Venice,[24] and Vermilion sites.[25] At other coal ash ponds, the base of the pond sits less than five feet above the underlying aquifer,[26] suggesting that – particularly if they are unlined, which the vast majority of

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[16] Tr. Aug. 12, 2020 Tr. 139:23-140:6 (Buscher).
[17] Ex. 16, Rehn Test. at 5.
[18] *See*, *e.g.*, Ex. 16, Rehn Test. at 11; Ex. 18, *Cap and Run* at 22, 40.
[19] Ex. 16, Rehn Test. at 11; Attachs. 24-33.
[20] *See* Ex. 16, Rehn Test., at 11; *Id*., Attach. 24 ("The base of the quarry is elevation 501 ft amsl and the upper limit groundwater elevation is 555.35 ft amsl"); *see also id*., Attach. 14; *Id*., Attach. 15; Ex. 17, Prefiled Answers of Andrew Rehn at pdf 44-45 (Sept. 24, 2020) (hereinafter "Rehn Answers").
[21] *See* Ex. 19, Prefiled Testimony of Scott Payne and Ian Magruder, at 6 (Sept. 24, 2020) (hereinafter "Payne & Magruder Test.") (at Hennepin, "in reality, the water table separation is typically less than 4' below the base of the CCR unit, the long-term trend in the water table is rising (Appendix 1), and the CCR is periodically inundated by rising groundwater"); *see also* Ex. 16, Rehn Test., Attach. 31 (Hennepin East Ash Pond Location Restriction Demonstration).
[22] *See* Ex. 19, Payne & Magruder Test. at 6 (at Meredosia, "the groundwater is typically less than 5' below the base of the CCR unit and the CCR is inundated on close to an annual basis by rising groundwater during elevated stage of the Illinois River").
[23] *See id.*
[24] *See* Ex. 16, Rehn Test., Attach. 21 at slide 4; *Id*., Attach. 22 at 5.
[25] *See id*., Attach. 20(a) pdf 10.
[26] *See* Ex. 16, Rehn Test., Attachs. 25 (Coffeen Ash Pond No. 1); 26 (Coffeen GMF Gypsum Stack Pond), 27 (Coffeen GMF Recycle Pond), 28 (Dallman and Lakeside coal ash ponds), 29 (E.D. Edwards Ash Pond), 30 (Havana East Ash Pond), 32 (Kincaid Ash Pond), 33 (Will County South Ash Ponds 2S and 3S).

Illinois coal ash ponds are[27] – the coal ash is in contact with groundwater at least intermittently. In light of the hydrogeologic connection between groundwater and surface water,[28] the increasing severity and frequency of floods in the state,[29] and the rising water levels in water bodies such as Lake Michigan,[30] coal ash that is currently above the water table may not stay dry for long.

Evidence is likewise clear that many CCR surface impoundments in Illinois are located immediately adjacent to flood-prone rivers and lakes. Floodplain maps show that Dallman, Grand Tower, Hennepin, Hutsonville, Meredosia, Pearl Station, and Vermilion would all be inundated partially or completely according to the FEMA 100-year floodplain maps.[31] Washout of waste is not the only risk posed by flooding. Unlined or poorly lined ponds and landfills are at risk of groundwater coming into contact with coal ash when groundwater rises as a result of flooding. In addition, as expert witness Mark Hutson pointed out, "[t]here are … examples of sites that have had floodwaters rise well up the side of their containment berms, such as the Springfield CWLP Dallman impoundments, where flooding along Sugar Creek caused berm erosion and damage to monitoring wells."[32] The risk of flooding at all of these sites will likely only increase with time as heavy precipitation events increase in Illinois.[33]

Most impoundments in Illinois are unlined, which the DC Circuit determined pose enough of a risk that they need to be closed as soon as feasible.[34]

> The record shows . . . that the vast majority of existing impoundments are unlined, that unlined impoundments have a 36.2 to 57 percent chance of leakage at a harmfully contaminating level during their foreseeable use, and that the threat of contamination from unlined units . . . generally will be considered to pose a substantial present or potential hazard to human health and the environment."[35]

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[27] *See* Ex. 2, IEPA Answers at 26 ("To the best of the Agency's knowledge and belief, the following CCR surface impoundments have a Part 257 compliant liner: Duck Creek GMF Pond, Duck Creek GMF Recycle Pond, Duck Creek Bottom Ash Pond, Hennepin New East Pond, Wood River West Pond 2E and Wood River New East Pond"). Illinois EPA proposes to consider impoundments that lack of Part 257 compliant liner as unlined for purposes of these rules. *See* Proposed Section 845.400.
[28] *See* Tr. Aug. 13, 2020 18:17-19 (Dunaway) ("[G]roundwater typically has some degree of connection to surface water. However, that varies from site to site").
[29] *See* Ex. 16, Rehn Test. at 12; *Id.*, Attachs. 16 and 17; Ex. 15, Hutson Answers at 51.
[30] *See* Ex. 16, Rehn Test., Attach. 41 at 1-4.
[31] Ex. 16, Rehn Test. at 12; *Id.*, Attach. 34-40.
[32] Ex. 15, Hutson Answers at 26; *see also* Tr. Sept. 29, 2020 30:24-32:20.
[33] *See* Ex. 16, Rehn Test., Attachs. 41, 42; *see also* Ex. 15, Hutson Answers at 51.
[34] *Util. Solid Waste Activities Grp. v. EPA*, 901 F.3d 414 (D.C. Cir. 2018) ("*USWAG*"), Attach C. to IEPA Statement of Reasons.
[35] *Id.* at 18.

Most Illinois coal ash impoundments submitting reports do not have liners that meet federal requirements, and many of the impoundments that did not report are also unlined.[36] Of seventy-four impoundments in Illinois identified by IEPA, only six have liners that meet the requirements of the Federal CCR rule.[37] In August 2018, the D.C. Circuit held, among other things, that the US EPA violated RCRA and acted arbitrarily and capriciously in failing to require the closure of unlined surface impoundments, without regard to whether they were already leaking.[38]

CCR landfills and CCR fill are also contributing to the contamination of Illinois' air and water. CCR landfills or "fill" areas in Illinois are causing groundwater contamination and fugitive dust from CCR areas are impacting neighboring properties or individuals.[39] One year ago in June of 2019, the Illinois Pollution Control Board ("Board") found that a combination of CCR fill and old coal ash landfills at Midwest Generation's Waukegan, Will County, Joliet 29, and Powerton coal plants were causing or contributing to water pollution and/or violations of Illinois groundwater standards at those sites.[40]

CCR piles are also causing contamination in the State. The Board held that a CCR pile at the Powerton coal plant site here in Illinois contributed to exceedances of Class I Groundwater Quality Standards for arsenic, boron, sulfate, and total dissolved solids, as well as boron and sulfate pollution in excess of background levels.[41] The Board likewise concluded that the temporary coal ash pile constituted a "water pollution hazard."[42]

All of these concerns are compounded by structural stability concerns at a number of impoundments in Illinois. A number of Illinois CCR impoundments were very close to failing their safety factor assessment.[43]

> Ash Pond No. 1 at Coffeen met the minimum long-term loading safety factor (1.50) exactly, and other ponds, such as the East Ash Pond at Joppa and the Ash Pond at Edwards, were just a small fraction above the minimum requirements. Both Edwards and Joppa were rated as high hazard potential impoundments, which means that a loss of life is likely in the case of failure. Overall, the industry reports

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[36] Ex. 16, Rehn Test. at 5.
[37] Ex. 2, IEPA Answers at 26, 181-82.
[38] IEPA Statements of Reasons, Attach. C (*USWAG* decision) at 62.
[39] *See* Ex. 16, Rehn Test. at 5; Ex. 18, *Cap and Run* at 13-16, 20, 25-26, 37, 39-40 (discussing unsafe and elevated concentrations of CCR constituents found in groundwater adjacent to numerous CCR landfills).
[40] *See* Ex. 9, *Sierra Club v. Midwest Generation, LLC*, PCB 13-15, Interim Board Order and Opinion at 92-93 (June 20, 2019) (hereinafter "PCB 13-15, Interim Order").
[41] *See* Ex. 9, PCB 13-15, Interim Order at 42, 48-51, 86 (June 20, 2019).
[42] *Id.* at 86.
[43] 40 C.F.R. § 257.73.

I reviewed showed ash ponds at Coffeen, Dallman, Edwards, Joliet 29, Joppa, Kincaid, Newton, and Waukegan to be within 10% of the minimum required safety factor for one or more loading conditions.[44]

Safety factor analyses alone do not account for all structural stability risks at coal ash impoundments. "For example, at the Vermilion site, coal ash sits on banks of the Middle Fork and the river is eroding those banks. Likewise, at Vermilion and other coal ash ponds in Illinois, there are old coal mine shafts located below, or near, the impoundments which could collapse, destabilizing the impoundment."[45]

In summary, coal ash impoundments and fill pose a significant risk to Illinois' environment and communities. With dozens of impoundments in the state already fouling groundwater, rivers, and lakes with harmful pollution, and more that threaten further contamination or in some cases, physical failure, these rules must be as protective as possible.

III. The Rules Must Ensure Long-Term Protection of Illinois' Waters and Environment.

A. Coal Ash Must Not Be Left in Contact with Water.

1. *Removal is the Only Closure Method that Offers Permanent Protection When Coal Ash is in Contact with Water.*

Because the metals in coal ash do not degrade, they can leach into water "at any time in the present or in the future for as long as the soluble metals in the ash are allowed to come into contact with water,"[46] and the leaching can continue for hundreds of years, if not more.[47] The only method of closing coal ash ponds that protects human health and the environment over the long term is, thus, one that permanently separates coal ash from water.[48]

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[44] Ex. 16, Rehn Test. at 6; *Id.*, Attachs. 1-8

[45] *Id.* at 6.

[46] Ex. 14, Hutson Test. at 4; *see also* Exhibit 37, Prefiled Testimony of Andrew Bittner at 9 (Aug. 27, 2020) ("[Surface impoundments] that are constructed with intersecting groundwater conditions (i.e., the base of the impoundment is below the natural groundwater elevation) are often of particular concern due to the potential for CCR constituent mass to continue leaching into groundwater even after closure is completed").

[47] *See* Exhibit 16, Prefiled Testimony of Andrew Rehn, Attach. 20(b) at Figure 17 (Aug. 27, 2020) (showing modeled boron concentrations of "no action" scenario at Vermilion coal ash ponds); Ex. 14, Hutson Testimony at 24.

[48] *See* Ex. 14, Hutson Test. at 4, 6-9; Exhibit 15, Hutson Answers at 43.

For the many coal ash ponds in Illinois where coal ash is in contact with water,[49] the only closure method that permanently separates coal ash from water is removal. As hydrogeologist Mark Hutson described, closure in place does not provide necessary protection because "[c]onstruction of even the best cap over the waste will not control formation and downgradient migration of leachate in CCR wastes that are continuously or intermittently submerged in groundwater."[50] "Capping," Mr. Hutson explains, "interrupts vertical percolation of water into the waste from the surface. It does nothing however to prevent shallow groundwater from migrating laterally through waste placed below the water table in an unlined landfill or impoundment."[51]

Moreover, caps do not perform as intended in perpetuity. Caps require ongoing inspection and maintenance. According to Dynegy expert David Hagen, inspection of the soil layers of a cap is "common" in order "to confirm that vegetative cover exists. . . and [to] identif[y] signs of erosion . . . to confirm the effectiveness of a cover soil layer. . . ."[52] Absent such inspections and maintenance, Mr. Hagen conceded, caps degrade and may no longer prevent water from infiltrating down into the ash.[53] As Mr. Hutson explains,

> Even the best caps will not last indefinitely. A cap can begin to leak through natural processes such as erosion, cap penetrations by vegetation and/or animals, or simply as the cap degrades with UV exposure and age. Damage to a cap can also happen

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[49] *See supra* Section II, Factual Background (discussing evidence that coal ash is in contact with water in CCR impoundments located at the Joliet 9/Lincoln Stone Quarry, Hennepin, Meredosia, Wood River, Vermilion, Coffeen, Dallman, Lakeside, E.D. Edwards, Havana, Kincaid, and Will County sites).

[50] Ex. 14, Hutson Test. at 18.

[51] *Id.* at 7. *See also* Tr. Aug. 13, 2020 205:9-206:12 (Testimony of Amy Zimmer) ("MS. ZIMMER: Amy Zimmer here. In the case where there is not a corrective action, I believe the Agency would view the effectiveness of the closure message based upon the final cover system minimizing infiltration into the impoundment and that would also gradually lower the hydraulic head within the impoundment. So it would be basically getting – let water in and also gradually over time there would be less water – the water – the water level in the impoundment would lower. So it would be draining over time. MS. BUGEL: Would that be true if the bottom of the impoundment were in contact with the water table? MS. ZIMMER: Yes, it would still be true. It would still drain and if you have a higher – sorry. This is Amy Zimmer. If you have higher water level in the impoundment compared to what is outside the impoundment, it would still drain, yes. MS. BUGEL: Would it stop draining when the water level in the impoundment reached the same level as the water table? MS. ZIMMER: Well, it's a little more complicated, but basically kind of. Until the pressures equalize within the impoundment and outside the impoundment"); Ex. 15, Hutson Answers at 48.

[52] Ex. 35, Hagen Answers at 51-52; *see also id.* ("Maintenance during post closure care of identified conditions is also common").

[53] *See id.* at 52 ("Cover soil layers serve the purpose of providing protection for the underlying soil liner. If the cover soil layers are not inspected or maintained during the post-closure care period, they may not serve their purpose of protecting the soil liner").

through human activities, such as when people in pick-up trucks or dirt bikes decide to turn the 'big hill out where the old plant used to be' into a playground.[54]

Mr. Hutson's personal experience as a geologist for Illinois EPA years ago makes clear that such damage by humans is a realistic threat. He describes inspecting closed landfills in the state and observing "tracks and ruts in the cover produced by vehicles, [] gullies eroded into the cover in areas used for vehicle access," and portions of landfills used "as a backstop for target practice."[55] Mr. Hutson also notes that closed sites can be "popular locations for dirt bike enthusiasts to ride," and opines that "[a]ny or all of these activities have the potential to shorten the effective lifespan of a cap and are difficult to avoid once a site is no longer staffed."[56] In short, over the long term, caps cannot be relied upon to prevent coal ash from being in contact with water.[57]

Other mechanisms used to limit groundwater contamination similarly require active intervention to continue working as intended. For example, as explained in detail by Mr. Hagen, pumping and treatment of groundwater requires operation, maintenance, replacement of components, and sometimes replacement of entire wells to be effective.[58] Mr. Hagen confirmed that it would not be "prudent to set up a system of groundwater extraction wells that does not anticipate the need for future operation, maintenance, inspection, and/or replacement of those wells," given that "the operations and maintenance of groundwater extraction well systems are an integral part of such systems and their performance. . . ."[59] Without operation and maintenance, Mr. Hagen and Mr. Hutson opine, the performance of such wells declines and they will not function properly.[60]

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[54] Ex. 14, Hutson Test. at 24; *see also id.* at 18 ("Synthetic cover systems left on the surface are subject to deterioration from exposure to sunlight and physical damage from storms, animals, vegetation; and, unfortunately, from humans who decades in the future will have forgotten or never known that driving a jeep up the big artificial-grass covered hill down by the river is not allowed").
[55] Ex. 15, Hutson Answers at 10; *see also id.* at 47-48.
[56] *Id.* at 10.
[57] *See* Ex. 15, Hutson Answers at 15 ("Simply placing a cap over CCR, with groundwater continuing to flow through waste containing soluble constituents, should not be assumed to be protective of groundwater quality");
[58] *See* Ex. 35, Hagen Answers at 8 (groundwater extraction wells need to be maintained; "[t]wo common maintenance activities are replacing mechanical pumps and cleaning wells screens," and if maintenance is not provided, he would "expect declining extraction efficiency over time"); *id.* at 27-29; Ex. 15, Hutson Answers at 15 (Techniques including wells or drains "could be effective, depending on site-specific conditions. Many of these techniques, however, require regular monitoring and maintenance to continue proper function.")
[59] Ex. 35, Hagen Answers at 10.
[60] *Id.* at 8 (if maintenance of groundwater extraction wells is not provided, Mr. Hagen would "expect declining extraction efficiency over time"); *see also* Ex. 15, Hutson Answers at 15.

Similarly, sheet pile walls, slurry walls, and permeable reactive barriers are susceptible to erosion, oxidation, and other phenomena that decrease their efficiency[61] and require monitoring and maintenance in order to remain effective.[62] Sheet pile walls, for example, should be inspected for continued integrity "on the order of every half year or so" according to Mr. Hagen,[63] while groundwater monitoring is the mechanism for determining if the effectiveness of a permeable reactive barrier has decreased.[64] Without continued inspections, monitoring, and maintenance, problems could go unnoticed, potentially leading to increased pollution of groundwater and/or greater extension of the plume of contamination.

In some cases, remedial measures such as groundwater extraction wells, slurry walls, sheet pile walls, and permeable reactive barriers may not fully protect against groundwater contamination even when they are inspected and maintained. For example, functioning slurry walls may allow some contaminants to pass through them via dispersion and diffusion,[65] and offsite activity that changes the rate or direction of groundwater flow may render ineffective an otherwise well-functioning barrier wall meant to contain polluted groundwater.[66] Such offsite

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[61] *See* Tr. Sept. 29, 2020 236:16-19 (Testimony of D. Hagen) ("Q. Could a slurry wall be compromised by erosion? A. I suppose it could. If there were erosive forces on the slurry wall, it's possible . . ."); *Id.* at 247:19-248:14 ("[I]t's possible that their effectiveness [of permeable reactive barriers] could change over time" because "the geochemistry would change;" and whether such barriers could become non-permeable "really depends on the formation and the geochemistry and all those sorts of things"); Ex. 15, Hutson Answers at 15.

[62] *See* Ex. 35, Hagen Answers at 32 (Answering the question, "Would it be prudent to put in place a sheet pile wall without anticipating the need for future operation, maintenance, inspection and/or parts replacement?" with "No, and because of prudence, the maintenance of sheet pile walls are an integral part of such systems and their performance…"); Ex. 15, Hutson Answers at 15.

[63] *See* Tr. Sept. 29, 2020 244:6-245:12 ((Testimony of D. Hagen).

[64] *See* Tr. Sept. 29, 2020 249:10-250:16 (Testimony of D. Hagen).

[65] *See* Tr. Sept. 29, 2020 265:23-266:16 (Testimony of D. Hagen) ("BY MS. DIERS: Q. Mr. Hagen, do contaminates [should be "contaminants;" *see* Environmental Groups' Motion to Correct Transcript dated Oct. 30. 2020] pass through slurry walls by dispersion? A. That's an interesting question. To the extent that there is groundwater flow through a slurry wall, which is very minimal, it's the purpose of the slurry wall, any of that minimal groundwater flow would also have a component of dispersion because all groundwater flow has an element of dispersion." Q. Do they pass by diffusion? A. The answer to that is, yes, diffusion is, again, a very slow process and particularly with respect to groundwater velocity and contaminant transport the fusion [should be "diffusion;" *see* Environmental Groups' Motion to Correct Transcript dated Oct. 30. 2020] would be far slower, but the answer is, yes, it can – the fusion [should be "diffusion;" *see* Environmental Groups' Motion to Correct Transcript dated Oct. 30. 2020] can be a process by which contaminants go through a slurry wall").

[66] *See* Ex. 35, Hagen Answers at 9-10 (contaminant plumes can at times move in multiple directions, migrate in unanticipated directions, migrate at unanticipated speeds, and groundwater extraction wells sometimes need to be added in order to capture contaminant plumes that migrated in a different direction or speed than anticipated); Tr. Sept. 29, 2020, 239:4-239:13 (Testimony of D. Hagen) ("Q. So if a slurry

activity is no hypothetical; in fact, as Mr. Hutson explains, offsite activity changed the direction of groundwater flow at Lincoln Stone Quarry.[67] Specifically, "the direction of groundwater flow at LSQ was altered by off-site pumping of groundwater associated with development of a nearby quarry. In that circumstance, offsite development caused concern for potential receptors that needed to be addressed to prevent exposures."[68]

Changes in the local environment, such as erosion or changes in flood severity or frequency, also may decrease a control measure's effectiveness.[69] With regard to groundwater extraction wells, for example, Mr. Hagen explains that changes in environmental conditions, including increased severity and frequency of storms or floods, increased drought, changes in groundwater elevation, groundwater flow direction, or groundwater flow rate "may cause changes in local hydrogeology, which in turn could affect well performance."[70] Such environmental changes are also a real threat: for example, erosion is a longstanding, ongoing concern at the Vermilion coal ash ponds,[71] while the high surface water elevations of Lake Michigan that have persisted over the last several years have pushed groundwater elevations at the Waukegan ash ponds higher than previous measurements.[72]

"Passive" groundwater remediation measures, such as monitored natural attenuation ("MNA"), likewise do not provide permanent protection of human health and the environment. Most importantly, MNA does not stop coal ash from leaching if it is in contact with water. Further, MNA is inappropriate at many sites in Illinois where contaminated groundwater from

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wall was placed between, for example, an impoundment in [should be "and;" *see* Environmental Groups' Motion to Correct Transcript dated Oct. 30. 2020] a river and the groundwater flow from the impoundment moved in the other direction, would a slurry wall continue to work to block contamination from the moving offsite? A. Its function as a barrier to contamination given the fact that the groundwater flow direction changed would – would not be the same"); Tr. Sept. 29, 2020 203:20-204:23 (Testimony of Melinda Hahn) (recognizing that "the factor that could change this assessment is the – some of the manmade interventions of extraction wells"); Ex. 15, Hutson Answers at 42; Tr. Sept. 30, 2020, 182:21-183:2 (Testimony of Richard Gnat) (Q "Off-site pumping can have an effect on groundwater elevations at a site; is that right? A. That is correct. Q. So could a change in off-site pumping lead to a change in groundwater elevations at a site? 2 A. Yes, it can").

[67] *See* Ex. 15, Hutson Answers at 43; *see also id.* at 45.

[68] *See* Ex. 15, Hutson Answers at 43.

[69] *See* Ex. 35, Hagen Answers at 32; *see also id.* at 32-34 (changes in environmental conditions, including increased severity and frequency of storms or floods, increased drought, changes in groundwater elevation, groundwater flow direction, or groundwater flow rate may affect the performance of in-situ treatments); Tr. Sept. 29, 2020 236:16-19 (Testimony of D. Hagen) ("Q. Could a slurry wall be compromised by erosion? A. I suppose it could. If there were erosive forces on the slurry wall, it's possible . . .").

[70] Ex.35, Hagen Answers at 9; *see also id*. at 34.

[71] *See* Ex. 16, Rehn Test. at 8-9.

[72] *See id.*, Attach. 16 at 9-13.

the ash ponds is in close proximity to rivers or lakes that are located, in many cases, less than 1000 feet from the impoundment.[73] USEPA has made clear that MNA is not appropriate where there is a "confirmed discharge to surface water bodies or potential human or ecological risk exposure."[74] Even in instances where MNA might be appropriate, it does not work for the common coal ash contaminant boron, which Mr. Hagen notes is "found in most [coal ash] and…does not readily sorb to natural solids."[75] Moreover, Mr. Hagen explains, sorption – a primary mechanism for MNA – "does not immobilize contaminants, it simply slows contaminant migration."[76]

Finally, "institutional controls" such as deed notations similarly do not ensure long-term protection of human health and the environment. As Mr. Hutson explains, "[U]nfortunately we cannot see into the future and know how future land use might change. For instance, the direction of groundwater flow at the Lincoln Stone Quarry was altered by off-site pumping of groundwater associated with development of a nearby quarry. . . . Institutional controls might prevent exposure to receptors under then-current conditions but be ineffective at controlling contaminants under new conditions."[77] Testimony from Dynegy witness Melinda Hahn similarly acknowledges that people "can draw groundwater in a different direction other than natural direction on flow" and that it may not be possible to predict when such actions might occur.[78]

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[73] *See* Ex. 35, Hagen Answers at 22-23 (Q. "Have you measured the distance between CCR surface impoundments and surface water bodies in Illinois? If so, please provide those distances. RESPONSE: Yes, as follows (measured to rivers consistent with the models in my testimony): Hennepin West: 100 feet, Hennepin East: 200 feet, Havana South: 900 feet, Hudsonville [sic]: 50 feet; Venice: 350 feet, Baldwin: 1,600 feet; Coffeen: 900 feet; Kincaid: 100 feet; Newton: 350 feet…"); Ex. 15, Hutson Answers at 32 (noting that USEPA's 2015 guidance clarifies that MNA is not appropriate where there is a "confirmed discharge to surface water bodies or potential human or ecological risk exposure"); *Id.* at 31-32(noting that EPA's 2015 guidance document states that "'dilution and dispersion generally are not appropriate as primary MNA mechanisms because they reduce concentration through dispersal of contaminant mass rather than destruction or immobilization of contaminant mass'"); *id.*, Attach. 4 at 14, 18

[74] Ex. 15, Hutson Answers, Attach. 4 at 14; *see also* Ex. 15, Hutson Answers at 31-32.

[75] Ex. 35, Hagen Answers at 15.

[76] Ex. 35, Hagen Answers at 39; *see also id.* (agreeing that "arsenic can be remobilized in water under certain conditions").

[77] *See* Ex. 15, Hutson Answers at 43.

[78] Tr. Sept. 29, 2020 204:15-205:4 (Testimony of Melinda Hahn) ("So the extent to which a well could be impacted depends on the location, the depth, the pumping rate of the extraction well. So in the sense that it is possible, you can draw groundwater in a different direction other than natural direction on flow. I would say that's the factor that could change this assessment is the -- some of the manmade interventions of extraction wells. Q. Did the report take into consideration the potential for those manmade changes? A. I'm not sure it's possible to predict, you know . . .").

The need for an effective cap or other pollution control measures does not disappear once the groundwater protection standards have been achieved and the post-closure care period comes to a close. Rather, because the metals in coal ash can continue to leach into groundwater for hundreds of years, caps and other control measures must prevent leaching for hundreds of years. Even if groundwater protection standards can be met when caps and/or control measures are properly functioning, expert testimony – including that of Mark Hutson and Dynegy expert David Hagen – makes clear that pollutant concentrations can rise and exceed the standards once the effectiveness of the cap or other controls diminishes.[79] As Mr. Hutson explains, "CCR waste that is Capped-In-Place will remain in the unit and be capable of leaching contaminants into the groundwater at any time in the distant future that the cap begins to leak."[80]

Under the proposed rules, however, the vast majority of requirements cease once groundwater protection standards have been met and the post-closure periods ends.[81] Owners and operators are no longer required to maintain or repair the cap or leachate collection system.[82] Groundwater monitoring and corrective action requirements are halted.[83] Financial assurance

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[79] *See* Tr. Sept. 29, 2020 239:21-240:9 (Testimony of D. Hagen) ("Q. So if a slurry wall were compromised, whether that is by change in the underlying geology, erosion or some other issue . . . – could that result in exceedances of groundwater protection standards even if the [GWPS] previously had been achieved when the slurry wall was fully functioning and intact? A. It's possible. Again, site specific conditions would dictate and frankly you'd have monitoring systems that would know, that would be in place when that would be occurring. That would be an important part of your operations."); *id*. at 240:20-23 (Testimony of Hagen) ("Q. But compromises to a slurry wall could occur after that [postclosure] period is completed, couldn't they? A. I guess it's possible"); *id.* at 245:13-22 (Testimony of Hagen) (stating that whether the failure to inspect sheet pile walls could result in exceedances of [GWPS] even if the [GWPS] had previously been achieved while the sheet pile walls were maintained "depends on site specific conditions"); *id.* at 234:7-16 (Testimony of Hagen) (acknowledging that "it's possible" that "the failure to operate and maintain groundwater extraction wells" could "result in exceedances of [GWPS] even if the [GWPS] had previously been achieved while those wells were operated and maintained."); *see also* Ex. 14, Hutson Test. at 24; Ex. 2, IEPA Answers at 60 (recognizing that, unless active remedial activities have stopped, whether achievement of groundwater protection standards is sustainable is not certain).

[80] Ex. 14, Hutson Test. at 24.

[81] *See* Proposed Sections 845.200(a)(5) (requiring owners/operators of coal ash impoundments to maintain an operating permit until the completion of post-closure care or the completion of groundwater monitoring if closure is by removal); Tr. Aug. 12, 2020 121:24-122:4 (Testimony of D. LeCrone) ("Kind of our charge is regulating these through postclosure care, whatever time that would be based on the site specific circumstances, and we don't have any hard timeframes or deadlines beyond that"); *Id.* at 133:9-17 (Testimony of W. Buscher) ("Once postclosure care is completed and they are meeting groundwater protection standards, that is basically the end of our regulating those, but they – at that point, they're still subject to 620, Part 620.")

[82] *See* proposed 35 Ill. Adm. Code §§ 845.780(b), (c).

[83] *Id.*

requirements end and financial assurance is returned to the owner/operator.[84] For closed impoundments, only a deed notation – which, as explained above, is not effective at controlling groundwater pollution – remains.[85]

Thereafter, without inspection or maintenance, the effectiveness of the cap and any other controls will decrease, and contamination may again seep through the unlined coal ash.[86] Without groundwater monitoring, the impact of coal ash left in place on groundwater likely will be undetected and unknown.[87] As Mark Hutson explains, "[c]apping CCR waste in place is essentially a process of shifting forward the environmental remediation costs associated with electricity production during our lifetimes to be paid by our grandchildren."[88]

2. *Other States Recognize that Removal is the Most Protective Closure Method when Coal Ash is in Contact with Water.*

When other states have faced this same quandary – that is, whether to leave coal ash in place and thereby risk heavy metals leaching into groundwater and surface waters for generations – they have often come to the conclusion that the risk is too large. Virginia, for example, passed legislation requiring the removal of coal ash from multiple impoundments in its watersheds.[89] Indiana's Utility Regulatory Commission approved agreements providing for closure by removal of a coal ash pond at Vectren's A.B. Brown station, and "recognize[d] the . . . environmental advantages of the [Closure By Removal] approach to achieving CCR compliance,

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[84] *See* proposed 35 Ill. Adm. Code §§ 845.920(a)(2), (b)(2).
[85] *See id.* §§ 845.760(h)(2) (requiring, following completion of closure, a notation on the deed which must "*in perpetuity* notify any potential purchaser of the property" that the land was used as a CCR surface impoundment and it is subject to the post-closure care requirements of Section 845.780(d)(1)(c) or the groundwater monitoring requirements of Section 845.740(b)) (emphasis added).
[86] A capped-in-place unlined coal ash impoundment is not, as some testimony and questions suggest, equivalent to a Municipal Solid Waste Landfill since "for many years, solid waste landfills in Illinois have been required to be lined and have leachate drainage and collection systems designed to prevent such a release." Ex. 15, Hutson Answers at 20. While a closed new landfill could also "be used inappropriately after post-closure care has been completed," Tr. Sept. 29, 2020 43:18-22, such landfill would be required to meet location restrictions, liner requirements, and leachate collection requirements, *see* 40 C.F.R. §§ 257.60-64, 257.70(a)(1), protections that are not present for existing coal ash ponds. *See* Ex. 15, Hutson Answers at 20.
[87] *See* Tr. Sept. 29, 2020 239:21-240:9 (Testimony of D. Hagen).
[88] Ex. 14, Hutson Test. at 24; *see also id.* at 19 ("Disposal of CCR must be treated as a permanent problem deserving a permanent remedy, not a remedy that relies on continuing intervention to contain contamination to the disposal site"); *id.* at 24-25 (discussing continued leaching of unsafe levels of contamination out of closed coal ash disposal sites in Town of Pines, Indiana.)
[89] *See* Exhibit 44, Senate Bill 1355, 2019 Gen. Assemb. (Va. 2019) and Exhibit 45, H.R. 443, 2020 Gen. Assemb. (Va. 2020).

. . . including long term mitigation of risk to the extent a [Closure In Place] approach would expose Petitioner to future additional remediation requirements at the pond."[90]

North Carolina reviewed the risks of leaving coal ash in place at impoundments throughout the state and, for many ash ponds – including many containing well over 3 million cubic yards of coal ash[91] – decided that "'excavation [is] the only way to protect public health and the environment.'"[92] A North Carolina court later approved a Consent Order providing for closure by removal at the ash ponds at those sites, which collectively span thousands of acres and contain well over 85,000,000 tons of coal ash.[93] Finally, Montana's Department of Environmental Quality ("MDEQ"), noting that "groundwater is protected in the State of Montana," expressed concerns about the degradation of a liner with a "36 to 400 year lifespan" that would "eventually" leave coal ash in contact with groundwater.[94] MDEQ repeatedly made it clear to owners of coal ash ponds that it "will not accept a remedy that leaves a long-term source in place if it is in contact with groundwater."[95]

3. *Closure by Removal Dramatically Improves Groundwater Quality.*

Where closure by removal has been implemented, the evidence is clear that it dramatically improves groundwater quality. Removal has resulted in rapid, major reductions in groundwater pollution at sites where it has been undertaken, even when it was not complete.[96] In South Carolina, when removal was only partially completed at coal ash impoundments at the Wateree coal plant, arsenic levels in two monitoring wells declined by 90 percent;[97] at the

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[90] Exhibit 46, Order, *Verified Pet. Southern Indiana Gas & Elec. Co. re "Brown County Pond*," IURC, Case No. 45280 (May 13, 2020) at 17.
[91] *See* Tr. Sept. 30, 2020 25:10-14 (Testimony of M. Rokoff in reference to Ex. 47) ("Q. I believe I asked does this consent decree refer to a number of impoundments that were over or, in some cases, well over 3 million cubic yards of coal ash? A. And the answer is yes").
[92] *See* Exhibit 48, NCDEQ, *DEQ Orders Duke Energy to Excavate Coal Ash at Six Remaining Sites* (Apr. 1, 2019) (also stating that, "[a]fter conducting a rigorous scientific review of Duke Energy's proposals for Allen, Belew's, Cliffside/Rogers, Marshall, Mayo and Roxboro facilities, and conducting public listening sessions in impacted communities," the North Carolina Department of Environmental Quality "has determined excavation of all six sites is the only closure option that meets the requirements of [the] Coal Ash Management Act to best protect public health").
[93] *See* Exhibit 47, Consent Order, *North Carolina ex rel. North Carolina Dep't of Envtl. Div. of Water Resources v. Roanoke River Basin Ass'n*, Case No. 13-CVS-11032 (Feb. 5, 2020) at 6-9.
[94] *See* Ex. 19, Payne & Magruder Test., Attach. 19 at 1-3.
[95] *See* Ex. 19, Payne & Magruder Test., at 32-33 ("Other states such as Montana (Montana DEQ 2019, Montana DEQ 2020) have required owner/operators to remove CCR that is in contact with groundwater where it is causing exceedances of water quality standards and the owner/operator has not provided an alternative remedy capable of eliminating long-term leaching of the CCR."); *id.,* Attachs. 18 and 19.
[96] *See* Ex. 14, Hutson Test. at 22-23; Ex. 15, Hutson Answers at 46-47.
[97] *See* Ex. 14, Hutson Test. at 22-23 and Attach. 9a; Ex. 15, Hutson Answers at 46-47.

Grainger coal ash pond, arsenic levels dropped between 60 and 90 percent at several wells when not quite half of the ash had been removed.[98] Although variations in groundwater concentrations are to be expected during removal, "the trend over time in improvements in groundwater quality in locations near areas excavated to date at these facilities provide real-world confirmation . . . that excavation and beneficial re-use and/or landfilling of ash will decrease contaminant concentrations."[99]

4. *Consistent with Illinois' Longstanding Policy Requiring Protection of Groundwater, These Rules Should Require Closure by Removal when Coal Ash is in Contact with Water.*

Like in Montana and elsewhere, groundwater is recognized as a precious resource in Illinois. In the Illinois Groundwater Protection Act, 415 ILCS 55/1-10 et seq., the Illinois legislature declared that "a large portion of Illinois' citizens rely on groundwater for personal consumption, and industries use a significant amount of groundwater;" "contamination of Illinois groundwater will adversely impact the health and welfare of its citizens and adversely impact the economic viability of the State;" "contamination of Illinois' groundwater is occurring;" and "protection of groundwater is a necessity for future economic development in this State." 415 ILCS 55/2(a). In the Coal Ash Pollution Prevention Act, which last year amended the Illinois Environmental Protection Act to direct the Board to adopt the rules at issue here, the legislature reiterated that "the State of Illinois has a long-standing policy to restore, protect, and enhance the environment, including the purity of the air, land, and waters, including groundwaters, of this State." 415 ILCS 5/22.59(a)(1).

Recognizing these fundamental aims, the Illinois Supreme Court has clarified that groundwater pollution – prohibited by the Environmental Protection Act – includes not only pollution that causes actual harm, but also any pollution that would render the water harmful if it were used. See Cent. Ill. Pub. Serv. Co. v. Pollution Control Bd., 116 Ill. 2d 397, 409-10 (1987) ("CIPSCO") (denying a coal generator's request for site-specific groundwater standards at its plant and holding that water pollution is present not only when actual harm has occurred or will occur, but rather whenever "harm would occur if the contaminated water were to be used")

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[98] *See* Ex. 14, Hutson Test. at 22-23 and Attach. 9b; Ex. 15, Hutson Answers at 46-47.

[99] Ex. 14, Hutson Test. at 23. The trend Mr. Hutson identifies is consistent with modeling performed for the Vermilion site, which projected achievement of Illinois' Class I standard for boron in a closure by removal scenario, *see* Ex. 16, Rehn Test., Attach. 20a at 6 and Attach. 20b at Figure 19 (pdf p. 24), whereas for all closure-in-place scenarios, the modeling projects that the Class I standard for boron is not achieved over the entire 160 years over closure and the concentrations appear to plateau above the standard at one or two monitoring wells. *See id.*, Attach. 20a at 6 and Attach. 20b at Figures 18, 20-22 (pdf pp. 23, 25-27).

(emphasis in original). The CIPSCO Court agreed with the Board that "any contamination which prevents the State's water resources from being usable . . . constitute[s] pollution."[100]

In line with Illinois' policy of protecting groundwater for future generations, and in light of the unavoidable fact that we can neither predict the future nor fully protect against actions or changes that could re-expose coal ash to groundwater or redirect polluted groundwater toward receptors,[101] the Board should take this opportunity to prevent the risk of further pollution before it happens.[102] In keeping with the purpose of the Coal Ash Pollution Prevention Act,[103] the Board should go above and beyond the federal coal ash rule's mandates and explicitly prohibit coal ash from being closed in place where it is currently, or will likely be, in contact with groundwater.[104]

B. The Rules Must Not Allow Groundwater to Remain Contaminated.

1. *Owners/Operators of Coal Ash Impoundments Must Not Improperly Evade Cleanup By Siting "Background" Wells in CCR-Polluted Groundwater.*

As explained in our initial comments, the groundwater monitoring system is designed so that the public, the Agency, and operators gain an understanding of how much pollution is in groundwater that has not been contaminated by coal ash – that is, the "background" levels of contamination.[105] If those background concentrations are higher than the numeric groundwater

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100 *Id.* at 410. *See also* Ex. 9, PCB 13-15, Interim Order at 85 (finding water pollution at coal ash disposal sites where groundwater pollution levels "'have potential to degrade water and threaten/preclude its use'").

101 *See* Ex. 15, Hutson Answers at 42; Tr. Sept. 29, 2020 204:15-205:4 (Testimony of Melinda Hahn).

102 *See* Ex. 14, Hutson Test. at 1 ("A central tenet of responsible waste management is that it be prevention-based"); Ex. 19, Payne & Magruder Test., at 32 ("The safest method available to avoid long-term water quality exceedances, risks to human health, and institutional control requirements for CCR impoundments which are regularly in contact with groundwater is to excavate and remove the CCR to a landfill compliant with current federal regulations (40 CFR Subpart D)").

103 415 Ill. Comp Stat. 5/22.59(a): "The purpose of this Section is to promote a healthful environment, including clean water, air, and land, meaningful public involvement, and the responsible disposal and storage of coal combustion residuals, so as to protect public health and to prevent pollution of the environment of this State. The provisions of this Section shall be liberally construed to carry out the purposes of this Section."

104 The Board can do so in a number of ways, including by adopting Mr. Hutson's recommendations and making approval of corrective action construction permits and closure construction contingent on a demonstration that coal ash will not be in intermittent, recurring, or sustained contact with water. *See* Ex. 14 Huston Test. at 9 (recommendations for modifications to Section 845.220(c)(2)(A), 845.220(d)(1)(A), and 845.750).

105 *See* Ex. 14, Hutson Test. at 13-14 ("Unimpacted water quality must be identified so that the effects of unknown source areas and general operations on water quality can be evaluated. Accurate characterization of unimpacted groundwater quality is also needed to distinguish the location of the

protection standards the Agency has set, the background levels become the groundwater protection standards applicable at the site[106] and cleanup requirements are triggered only if concentrations of pollutants in downgradient groundwater (groundwater that has passed through or under the coal ash pond) are determined to be statistically significantly higher than background levels.[107] Accordingly, background concentrations strongly influence when clean-up is required and how thoroughly groundwater must be remediated.[108] If background is improperly determined – for example, if purported "background" actually reflects coal ash contamination in groundwater – then cleanup requirements may never be triggered or, even if triggered, the corrective action may leave potentially unsafe levels[109] of pollution in groundwater in perpetuity.

Purported "background" concentrations can reflect coal ash contamination in a number of circumstances. First, "background" wells may be affected by "local flow out of the CCR unit."[110]

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leading edge of any downgradient contaminant plume"); Ex. 15, Hutson Answers at 38 (defining "background" as "[g]roundwater quality that is unimpacted by CCR storage or disposal"); Tr. Aug. 13, 2020 95:11-97:3 (Testimony of L. Dunaway) (explaining that the groundwater monitoring system requires "background wells that are not affected by a CCR surface impoundment or landfill containing CCR").

[106] *See* Proposed 35 I.A.C. § 845.600(a)(2); *see also id.* § 845.600(b) (for new surface impoundments, the Agency proposes that the groundwater protection standard would be background).

[107] *See* Proposed 35 I.A.C. §§ 845.120, 845.600(a), 845.650(d)(1).

[108] *See* Proposed 35 I.A.C. § 845.670(c)(2, (d)(2) (requiring any selected remedy to achieve the groundwater protection standards); 40 C.F.R. § 257.102(c) (providing that closure by removal is not complete until "constituent concentrations . . . . have been removed and groundwater monitoring concentrations do not exceed the groundwater protection standard[s] . . .").

[109] The numeric groundwater protection standards are based, in part, on the standards set by USEPA in the federal coal ash rule. For most "Appendix IV" constituents, that standard is based on the Maximum Contaminant Levels (MCLs) for drinking water. *See* Exhibit 1, Prefiled Testimony of L. Dunaway at 3 (June 2020) ("For the Appendix IV parameters that don't have an MCL (i.e. Cobalt, Lithium, Molybdenum and Lead), USEPA adopted health-based values, and in the instance of Lead used the drinking water action level as the GWPS"). For those constituents that do not have MCLs or other USEPA-set standards, IEPA utilized Illinois' groundwater quality standard as the groundwater protection standard. *Id.* at 4 ("The parameter concentrations proposed in Part 845.600(a) are the lower of the numerical concentrations adopted in Part 257 or the existing Class I GWQS for that parameter").

Like the MCLs, Illinois' groundwater quality standards are health-based; exceedances of those standards, accordingly, pose risks to health. *See* Ex. 9, PCB 13-15, Interim Order at 83-84 ("The Board promulgated [groundwater quality standards] under Section 8 of the Illinois Groundwater Protection Act (IGPA) to protect groundwater from 'those contaminants which have been found in the groundwaters of the State and which are known to cause, or are suspected of causing, cancer, birth defects, or any other adverse effects on human health according to nationally accepted guidelines'").

[110] Ex. 14, Hutson Test. at 12 ("Monitoring wells originally considered as upgradient or background monitoring locations can in fact be impacted by local flow out of the CCR unit"); *id.* at 13 ("Improper or ambiguous background values can be caused by a variety of issues including local flow out of the impoundment . . . ").

As Mark Hutson explained, some unlined impoundments "have maintained high hydrostatic head for several decades,"[111] and "[i]n some cases, mounding associated with leakage out of an impoundment can caused assumed upgradient monitoring wells to be impacted by unidentified flow from the CCR unit."[112]

To avoid a circumstance where mounding or radial flow from a coal ash pond goes undetected and a "background" well is in fact affected by leachate from the coal ash impoundment, as the Agency recognizes, it is critical that the elevation of water within the impoundment be periodically measured.[113] Measuring the elevation of water within the impoundment is feasible, as Mr. Hutson, Mr. Payne and Mr. Magruder explain.[114] Accordingly,

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[111] Ex. 14, Hutson Test. at 12.
[112] Ex. 15, Hutson Answers at 3.
[113] *See* Tr. Aug. 13, 2020 82:13-84:23 (Amy Zimmer explaining that measuring the elevation of water in impoundments is "necessary for all" impoundments; "In order to have a full characterization, you need that information to evaluate [numerous factors] in relation to the water level in the surface impoundment, in relation to all those other issues"); Ex. 14, Hutson Test. at 12 (explaining that the elevation of liquid/porewater inside impoundments "must be reliably and regularly measured" in order "to obtain an accurate approximation of the direction of groundwater flow in the immediate vicinity of unlined units and assist with leak detection in lined units"); Tr. Sept. 30, 2020 183:10-20 (Testimony of R. Gnat) (Q "Can groundwater elevations be affected by liquid escaping a pond? A. If I heard you right, you're asking can groundwater elevations be affected by liquid escaping a pond? Q. Yes. A. They may be. Q. So if there were damage to a liner such that you had a leaky liner, that could affect groundwater elevations; is that right? A. It may affect groundwater elevations…"); *see also* Tr. Aug. 13, 2020 20:20-22 (Testimony of L. Dunaway): "The groundwater would typically --will flow from a higher elevation to a lower elevation").
[114] *See* Ex. 15, Hutson Answers at 50 ("Measurement of the elevation of standing water in an impoundment is readily accomplished by establishing a staff gauge in the facility. Measurement of the elevation of porewater within an impoundment need be nothing more that [sic] constructing a piezometer, or piezometers within the waste for measuring subsurface water elevation"); Tr. Sept. 29, 2020 38:14-39:7 (Testimony of M. Hutson): ("Q: If [the piezometer] was put in after [receipt of the CCR], could you describe the process you envisioned for the installation of the piezometer in standing water over saturated CCR? A. You – I've not seen it – I've not seen anybody attempt to do it in the standing water where they put the piezometers in at other sites, they have gone on to – basically, its on the ash delta that builds up on the edge of the impoundment. If they lower the water a little bit during [should be "in"; *see* Environmental Groups' Motion to Correct Transcript dated Oct. 30. 2020] the impoundment, they can dry it out sufficiently to get a geo-probe or some similar flotation equipment out there to let them install a piezometer through the soft sediments without sinking. It's – it's a –you have to think about how you're going to do it before you just drive out there and try to install a piezometer"); *see also* Ex. 15, Hutson Answers, Attach. 7 (showing monitoring wells installed within an impoundment); Tr. Sept. 29. 2020 91:17-92:6 (Testimony of S. Payne) ("As an engineering company, we've actually done a lot of sludge testing on wastewater ponds. We use both. And under soft sediment conditions, there are definitely easy hand-operated sampling equipment that can be used to collect, at depth, you know, the sludge material that is semiliquid, semisolid and have that tested. So my point is that every site is characterized based on

the rules should require that the elevation of water in the impoundment be measured, as the Agency suggests, every time groundwater elevations are measured.[115]

For similar reasons, in order to determine what elevation of porewater within the impoundment is expected, given precipitation, flooding, or other factors that may affect the volume of water in the impoundment, the Agency should have a good understanding of the hydraulic characteristics of the CCR itself.[116] To ensure adequate information is provided to the Agency and the public, the rules should require that the hydraulic characteristics of the source materials be described in the hydrogeologic site characterization.[117]

Alleged "background" concentrations can also reflect coal ash contamination if the background well is located in, or affected by, coal ash outside of the impoundment. Proposed Section 845.630(a)(1) provides that the owner or operator of CCR impoundments "must install a groundwater monitoring system that . . . yield[s] groundwater samples that: [a]ccurately represent the quality of background groundwater that has not been affected by leakage from a landfill containing CCR or CCR surface impoundment" (emphasis added). However, the term "landfill containing CCR" is not defined in the rules or the Illinois Environmental Protection Act. There is consequently a risk of inconsistent interpretations of that term,[118] creating potential legal battles later on as to its meaning.

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the best type of technology to collect data and just because you don't have a solid access for direct push technology does not mean you cannot determine a fairly simple way to collect leachate data").

[115] *See* IEPA post-hearing comments, Attach. 2, at 1-2 (if Board wants to require such measurement, IEPA proposes to require measurement of elevation of water in impoundment each time groundwater elevations are measured); *See also* Ex. 15, Hutson Answers at 27 (collection of porewater elevation "needs to be evaluated and potentially incorporated into water table maps in order to provide a better indication of local groundwater flow directions.")

[116] *See* Ex. 14, Hutson Test. at 12 (explaining that "[u]nexpected changes in liquid head inside lined CCR impoundments and landfills can provide an initial warning of unwanted changes. Unwanted decreases in liquid head might indicate increase leakage out of a unit, while unexplained increases in liquid elevation might indicate increased infiltration through a cap or inward leakage of groundwater into the unit").

[117] *See id.* at 13 (recommending "characterization of the hydraulic characteristics . . . of the source materials").

[118] The potential ambiguity of the term "landfill containing CCR" is reflected in the objection from Dynegy's counsel, Mr. More, at the hearing on August 13th, 2020. *See* Tr. Aug. 13, 2020 95:11-96:14 (MS. CASSEL: "So my question is even if there were or are multiple CCR impoundments, you wouldn't be able to tell whether any of those CCR surface impoundments were affecting groundwater quality without knowing what the natural variations in groundwater quality that are not affected by CCR are, is that correct? MR. DUNAWAY: Lynn Dunaway. In addition to the natural variation, there may be anthropogenic sources of some contaminants that would also have to be recognized and accounted for. MS. CASSEL: So you would need wells that establish non-CCR levels of contaminants – I'm sorry. Levels of contaminants that are not coming from CCR leachate whether it's anthropogenic or their natural

Rather than leaving that potential ambiguity and risking CCR-contaminated groundwater being deemed "background" – leading to corrective action never being triggered or, if triggered, requiring the groundwater be restored only to already-polluted levels – the Board should amend proposed Section 845.630(a)(1) to provide that **background wells must represent the quality of background groundwater "that has not been affected by CCR."** The Board should also modify proposed Section 845.630(c)(2), which sets out requirements for additional groundwater monitoring wells – beyond the minimum one upgradient and three downgradient monitoring wells – to provide that those additional wells must "accurately represent the quality of background groundwater that has not been affected by CCR," rather than the current proposed language that such wells must "accurately represent the quality of background groundwater that has not been affected by leakage from the CCR surface impoundment. . . . "

Finally, "background" concentrations can also be tainted by coal ash pollution where there are multiple coal ash ponds, including at least one ash pond upgradient of the other. At such sites, the testimony of Lynn Dunaway indicates that the Agency will determine "background" for the downgradient impoundment based on monitoring wells located between the upgradient impoundment and the downgradient impoundment.[119] This proposal risks contamination from the second, downgradient impoundment never being cleaned up. This is because the monitoring wells between the two impoundments will likely reflect contamination from the first impoundment, so concentrations may exceed the numeric groundwater protection standards, and only if the second impoundment is polluting more than the first impoundment will clean-up be triggered through the "statistically significant increase" analysis. Moreover, even if corrective action is triggered, groundwater from the downgradient ash pond might only be required to be remediated to the already-polluted "background" levels of the impacted wells between the two coal ash ponds.

To ensure remediation is triggered and groundwater is restored to safe levels, the rules must make clear that the "background" concentration used to determine the applicable groundwater protection standards must reflect the quality of groundwater not affected by CCR.

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variation – MR. MORE: I'm going to object to that question. MS. CASSEL: – Is that correct? [H.O.] HORTON: [noting objection]. MR. MORE: There is some ambiguity as to CCR leachate. The witness has testified prior that the objective is to avoid impact from a CCR surface impoundment and landfill containing CCR. So I'm not sure what you mean by CCR leachate here").

[119] *See* Tr. Aug. 13, 2020 97:7-98:3 (Testimony of L. Dunaway) ("Q. . . . So to determine whether there is an SSI over background, again, which type of, quote, background well would down gradient monitoring well results be compared? Would it be against the background well that establishes natural variations in groundwater quality and/or other sources of contamination that are not from the CCR surface impoundment or landfill containing CCR or would it be from the background well that is used to distinguish between groundwater quality potentially impacted by a different CCR impoundment? MR. DUNAWAY: Lynn Dunaway. It depends on which CCR surface impoundment you're evaluating. The – if you have – for example, if we have two CCR surface impoundments, one down gradient of the other, the first CCR surface impoundment would be relying on those most up gradient wells. The second CCR surface impoundment would be relying on those wells lined between the two CCR surface impoundments").

Specifically, in addition to the change recommended above, Section 845.600(a)(2) should be amended to provide that, "For constituents with a background concentration, as determined by the background wells required by subsection (a)(1) of Section 845.630(a)(1), higher than the levels identified under subsection (a)(1) of this Section, the background concentration shall be the groundwater protection standard" (proposed additions in italics).

2. *Owners/Operators of Coal Ash Impoundments Must Not Improperly Evade Cleanup by Using "Intrawell" Statistical Analyses.*

Another method by which cleanup can be circumvented is if owners/operators use "intrawell" statistical analysis, comparing samples from a monitoring well to later samples from the same well. While statistical analysis will only be used to trigger corrective action if "background" is higher than the numeric groundwater protection standards, the Board should ensure that, where statistical analysis is used, it is done properly. As Mark Hutson explains, "Comparisons of downgradient water quality to 'background' concentration using intra-well analyses are not effective in monitoring an existing facility since intra-well tests do not compare each well against 'background.' An intra-well analysis compares each well to itself over time."[120] As Mr. Hutson explains,

> intra-well statistics are designed to detect changes from past to present, and the initial (past) concentrations in the water were already impacted, intra-well testing will indicate that there is no statistically significant change in water quality. Use of intra-well testing to identify statistically significant changes in water quality after the groundwater has already been impacted is not a reliable testing protocol.[121]

Even though intra-well analysis is not specifically authorized in proposed Part 845, it likewise is not explicitly provided for in the federal coal ash rule, but owners/operators have improperly utilized intra-well analysis nonetheless.[122] Accordingly, to avoid such improper

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[120] Ex. 14, Hutson Test. at 14.

[121] Ex. 15, Hutson Answers at 38; *see also id.* at 7 ("There are only a few circumstances in which intra-well analysis should be used, as USEPA explains in the preamble to its Part A rule, including where the groundwater gradient is unstable or unknown, but only in locations thought to be uncontaminated"); *id.*, Attach. 2 at 53,543.

[122] Ex. 15, Hutson Answers at 7 ("Part 845 appears to use the same language as the federal coal ash rule with regard to statistical analysis of groundwater samples, and I am aware that facilities have used intra-well analysis for compliance with the federal rule. This is a concern because I have seen a number of instances where intra-well analysis was used improperly . . . . The improper use of intra-well analysis that I observe most often is use of this test on a monitoring well completed in impacted groundwater, and Part 845 should bar such uses.")

analyses, the Board should explicitly prohibit use of intra-well analysis in groundwater monitoring wells completed in coal-ash impacted groundwater.[123]

3. *Iron, Manganese, and Vanadium Should Be Added to the List of Coal Ash Constituents That Trigger Cleanup.*

Another way by which owners/operators of coal ash ponds may, under the proposed rules, avoid complete cleanup of groundwater is by failing to monitor for or remediate groundwater with elevated concentrations of iron, vanadium, and manganese – a known neurotoxin.[124] Iron, vanadium, and manganese are all coal ash constituents.[125] All three constituents have groundwater quality standards under Part 620,[126] which standards were set "under the principle that groundwaters that are naturally potable should be available for drinking water supply without treatment."[127] As Mr. Hutson explained, groundwater protection standards should be added for these constituents "to eliminate confusion about which parameters must be included on the list of analytes for monitoring at a CCR unit, as well as to help clarify the corrective action requirements that apply for those analytes."[128]

4. *An Alternate Source Demonstrations Must Not Be Approved Unless It Is Robust and Subject to Public Participation.*

Once an exceedance of the groundwater protection standards is identified, under both the federal coal ash rule and proposed Part 845, owners/operators of coal ash ponds can use the "alternate source demonstration" provisions as an off-ramp to avoid cleanup. If an owner/operator of a coal ash pond can make a successful alternate source demonstration – meaning that they establish that contamination measured in groundwater came from some other source, rather than the coal ash pond – they need not proceed to corrective action.[129] As such, it

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[123] *See* Ex. 15, Hutson Answers at 7.
[124] *See* Ex. 18, *Cap and Run* at 6.
[125] *See* Ex. 15, Hutson Answers at 28 (Mr. Hutson "frequently see[s] these constituents in elevated concentration in and around some CCR disposal sites . . . "); *id.* at 39 (noting that iron, manganese, and vanadium are "common constituents and a quick check of my records confirms that manganese is routinely detected . . . at . . . Dallman Ash Ponds in concentrations above the Class I Standard").
[126] 35 Ill. Adm. Code 620.410(a).
[127] PCB R89-14(b), Order, Nov. 7, 1991; *See also* Ex. 15, Hutson Answers at 28-29, 39-40.
[128] Ex. 15, Hutson Answers at 8. The fact that iron and manganese are sensitive to oxidation and reduction conditions in groundwater, *see id.*, is not a reason to exclude them; the same is true of arsenic and selenium, *id.*, for which groundwater protection standards were set in both the federal coal ash rule and Part 845.
[129] *See* Proposed § 845.650(d)(4); 40 C.F.R. §§ 257.94(e)(2), 257.95(g)(3)(ii); Tr. Aug. 13, 2020 133:20-134:6 (MS. CASSEL: " . . . if an exceedance of a groundwater protection standard is detected and confirmed, whether corrective action will be required under the proposal depends on the success or failure

is critical that alternate source demonstrations be well-supported and comprehensive. While the proposal in Section 845.650(d)(4) is a fair start, additional specifications, together with opportunities for public input, must be added to ensure cleanup is not being improperly sidestepped and communities are not left with unsafe water.

First, to understand whether the groundwater pollution at issue may be coming from the coal ash pond, it is critical to understand the chemistry of both the coal ash in the pond and the porewater in the pond. "Knowledge of the chemical composition of leachate is needed to identify CCR constituents associated with each impoundment or landfill," Mr. Hutson explains; [130] and "[a]dequate characterization of porewater chemistry is . . . often needed to evaluate the validity of alternative source demonstrations."[131]

The chemical composition of coal ash is highly variable, both between and within coal ash ponds.[132] The constituents that leach from coal ash, and the concentrations or rates at which they leach, accordingly vary as well.[133] As discussed in the testimony of Dynegy expert Andrew Bittner, leachate concentrations can differ based on the source of the coal and the type of CCR (fly ash, bottom ash, flue gas desulfurization waste) at issue.[134] The variation increases when the source of the coal burned at the plant has changed,[135] the type of coal ash deposited in the impoundment has changed,[136] or other processes at the plant change – as they commonly do –

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of any alternate source demonstration, is that right? MR. DUNAWAY: Yes, corrective action will be required if – if an owner or operator is not successful in their demonstration of an alternative source").
[130] Ex. 14, Hutson Test. at 12.
[131] Ex. 15, Hutson Answers at 27.
[132] *See* Ex. 14, Hutson Test. at 16 (the chemical composition of coal ash impoundments "is highly variable" between locations and depths sampled); Ex. 19, Payne & Magruder Test., Attach. 27; Ex. 15, Hutson Answers at 41-42; *Id.*, Attach. 5.
[133] *See* Ex. 14, Hutson Test. at 16 (the variability of CCR between locations and depths sampled within impoundments "requires that multiple samples of disposed CCR be analyzed in order to determine the range of constituent concentrations within the waste"); *id.* at 17 ("[p]orewater within a CCR disposal unit is horizontally and vertically variable"); Ex. 19. Payne & Magruder Test., Attach. 27; Exhibit 37, Bittner Test. at 30, n.8.
[134] Exhibit 37, Bittner Test. at 30, n.8 ("If the consolidated CCRs were generated by the combustion of coal sourced from a different location or is a different type of CCR (i.e., bottom ash, fly ash, or flue-gas desulfurization waste) compared to the original impounded CCRs, there may be differences in the associated leachate concentrations").
[135] *See id.*; *see also* Ex. 19, Payne & Magruder Test., Attach. 27.
[136] *See* Ex. 15, Hutson Answers at 41 ("The assumptions of same coal mine, coal burned in the same plant, using the same process should tend to limit the range of CCR chemistry, however one example is . . . Lincoln Stone Quarry. If I recall correctly, there are some portions of the quarry that contain buried fly ash that was placed in the quarry prior to the time that it was used for bottom ash disposal. The presence of the buried fly ash in portions of the quarry created leachate with variably elevated boron, arsenic, and Total Dissolved Solids (TDS). Changes in operations such as this are common over the

over time.[137] In Mr. Hutson's words, "[t]he chemical composition of leachate and porewater in landfills or impoundments evolves over time as feedstock coal sources, plant processes, sluice volumes, precipitation volumes, waste/water contact time, etc. all change."[138]

Illinois coal ash ponds are no exception. Dynegy witness Cynthia Vodopivec and Midwest Generation witness Sharene Shealey confirm that the source of coal burned at many Illinois coal plants has changed over time[139] and air pollution control devices have been added,[140] while Mr. Hutson testifies to operational changes at an Illinois coal ash impoundment that resulted in different types of coal ash in the same impoundment.[141] These changes collectively render the coal ash and porewater chemistry in Illinois coal ash ponds variable, both between ash ponds and within a given ash pond.[142] Accordingly, to ensure that sufficient information is available to determine if a coal ash impoundment may have contributed to groundwater pollution, the rules should require owners/operators to take multiple samples of coal ash from different areas of each impoundment,[143] as well as to take samples of porewater in each

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extended time periods that these facilities operated. Changes to how and where wastes were disposed over time are an important factor driving porewater chemistry variability").

[137] *See* Ex. 14, Hutson Test. at 12-13; Ex. 15, Hutson Answers at 41; *see also* Ex. 50, Prefiled Answers for S. Shealey, R. Gnat, and D. Nielson (Sept. 10, 2020) at 32 (Pre-filed Answers of R. Gnat) ("Further . . . if there is a change in items such as coal feedstock, combustion processes and/or CCR material handling, then the monitoring program would need to be re-evaluated to take any potential changes in chemistry into account within the monitoring system").

[138] Ex. 14, Hutson Test. at 12-13.

[139] *See* Tr. Sept. 30, 2020 at 53:13-19 (Testimony of Sharene Shealey) (Q. And I realize that this was probably before you were working in your current position, but Midwest Generation switched from high-sulfur coal to low-sulfur coal at its plants in Illinois; is that correct? A. That's my understanding. That predates me, but that is my understanding"); Exhibit 22, Prefiled Answers of C. Vodopivec, at 18-19 (Sept. 24, 2020) (explaining that, while "[a]ll of the coal currently purchased for use at Dynegy's operating plants is sourced from the Powder River Basin in Wyoming," Dynegy "has historically used coal from other locations, including, but not limited to the Illinois basin;" and that "[s]ome impoundments may contain CCR that was placed more than two decades ago as well as ash placed less than two decades ago").

[140] *See* Exhibit 22, Vodopivec Answers at 19 (explaining that "[s]ome CCR surface impoundments at Dynegy's facilities may contain byproducts from air pollution control devices"); Tr. Sept. 29, 2020 135:24-136:4 (Testimony of C. Vodopivec) ("To clarify, there are impoundments at Dynegy sites that contain both CCR that predates the use of DSI as well as CCR generated after DSI use began, correct? A. That's correct"); Tr. Sept. 30, 2020 52:6-53:9 (Testimony of Sharene Shealey).

[141] *See* Ex. 15, Hutson Answers at 41.

[142] *See id.*; Tr. Sept. 29, 2020 at 135:24-136:4 (Testimony of C. Vodopivec).

[143] *See* Ex. 14, Hutson Test. at 16-18.

impoundment "from multiple locations near the bottom" of each coal ash impoundment.[144] Such sampling is feasible[145] and essential.

Second, as noted in our Initial Public Comments, Section 845.650(d) must be modified so that it does not allow owner/operators to evade cleanup with an alternate source demonstration that is not allowed by the federal CCR rule. Specifically, the proposed rule would allow owners of CCR surface impoundments to submit a demonstration that a statistically-significant increase in the concentration of a coal ash contaminant resulted from "a change in the potentiometric surface and groundwater flow direction." The federal rule contains no such allowance. The parallel federal provision, 40 C.F.R. § 257.94(e)(ii), provides that an owner of a CCR surface may "[d]emonstrate that . . . the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality," without more.[146] Under the Coal Ash Pollution Prevention Act, any provision, such as this one, that is less protective than the federal rules is not allowed in Illinois rules and must be removed.[147]

Third, the rules for alternate source demonstrations also should make clear that simply sampling surface water from the impoundment or pore water from near the top of the coal ash is inadequate to make a successful alternate source demonstration. Companies, including in Illinois, have attempted to use such samples as evidence that the impoundment at issue could not be the source of identified groundwater pollution,[148] but such sources are unreliable because "samples of impoundment water collected from open water areas of an impoundment or of porewater from the upper portion of the waste column often show lower concentrations of CCR-associated metals than samples collected from deeper in the accumulated waste."[149]

Fourth, as discussed further in Section VI of these comments, it is likewise critical that the rules for alternate source demonstrations provide for public review and comment, and that public comments be taken into account by the Agency before it decides whether to approve the demonstration. The Agency acknowledges that, as proposed, there are no opportunities for public

[144] Ex. 14, Hutson Test. at 13.
[145] *See* Ex. 15, Hutson Answers at 50 (explaining that "[m]easurement of the chemistry of leachate in an impoundment is readily accomplished by constructing a piezometer or monitoring well in the filled areas of the impoundment"); *Id.*, Attach. 7; Tr. Sept. 29. 2020 91:17-92:6 (Testimony of S. Payne).
[146] *See also* 40 C.F.R. § 257.95(g)(3)(ii) (same).
[147] *See* 415 ILCS 5/22.59(g)(1) (requiring rules "at least as protective and comprehensive as" the federal CCR rule).
[148] *See* Ex. 14, Hutson Test. at 17; *Id.*, Attach. 5; Ex. 15, Hutson Answers at 42.
[149] Ex. 14, Hutson Test. at 17.

review or comment on alternate source demonstrations before the Agency determines whether that demonstration is successful.[150]

Members of the public can provide important information both about coal ash ponds as well as adjacent industries that might, in some cases, cause or contribute to contamination found in groundwater. As Scott Payne and Ian Magruder explained in their testimony, "Members of the public often have irreplaceable knowledge of local hydrogeology, soil, geology/seismic, and climatic conditions which are relevant to site characterization and modeling. It is our professional experience that state natural resource agencies and geologic surveys and researchers at nearby colleges and universities often have the most accurate and in-depth knowledge of these site-specific conditions."[151] Public input can include valuable analysis and review from experienced consultants such as Mr. Payne, Mr. Magruder, or Mr. Hutson,[152] or critical site-specific information from workers, former workers, or members of the public who frequent affected areas.[153] Even experienced professionals can make mistakes and recognize the value of others scrutinizing their work.[154]

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[150] *See* Tr. Aug. 13, 2020 134:7-135:9 (Testimony of L. Dunaway) (acknowledging that there is no opportunity for public input on the Agency's decision whether to concur, or not, with an alternate source demonstration).

[151] Ex. 19, Payne & Magruder Test. at 31-32.

[152] *See* Tr. Sept. 29, 2020 42:1-24 (Testimony of M. Hutson) (S. Diers: "Q. Do you believe Part 845 would be as protective and comprehensive as Part 257 if more than 90 days are allowed before the assessment of corrective measures is initiated? [Objections and audio issues follow, then] A. . . . [I]n my opinion, the input that can be gained from having outside people look at the ASD's is a valuable source of information that can be of assistance to the Agency. That's my objective in this is to – is to bring another set of eyes to it…."); *see also id.* at 41:5-14.

[153] *See* Ex. 16, Rehn Test. at 1-2, 8-10; Ex. 9, PCB 13-15, Interim Order at 39 (employees testifying to improper liner installation, liner tears, flooding of coal ash ponds); *id.* at 42 (employees testifying to temporary storage of coal ash on land at the site); *id.* at 55 (employees describing damage to liners and other appurtenances of coal ash ponds); *id.* at 67 (employees testifying to knowledge of historic coal ash fill areas).

[154] *See* Tr. Sept. 29. 2020 261:12-263:12 (Testimony of David Hagen) (With regard to whether it is prudent to have another set of eyes review a model, "The answer is oftentimes – most oftentimes when we do any work all of our work is checked by someone else. So I don't have any problem answering that our work is checked and when I do calculations, I have someone check them. When someone else does calculations, we have those checked. When groundwater models are developed, we have people cross-checking those groundwater models. So the answer is we have people looking over groundwater models before we even submit them"); *see also* Ex. 17, Rehn Answers at 11; Ex. 19, Payne & Magruder Test. at 31 ("Our review of the model reports generated for the three sites in Illinois indicate that owner/operators may not adequately document model development either because the importance of model documentation is not understood, it is costly to do so, or proper documentation will reveal severe deficiencies in the modeling process").

Given the potentially critical additional information that the public may provide, delaying the commencement of the assessment of corrective measures by a month or two to allow for public input into alternate source demonstrations would not render Illinois' rules less protective than the federal requirements.[155] Since those rules were adopted as "self-implementing" rules without regulatory review of approval, they did not build in time for public review.

In preparing the draft rules, IEPA did not consider instances where workers, former workers, or the public have identified sources of contamination at coal ash sites.[156] The Board, in contrast, should take that information into account in finalizing the rules. The Coal Ash Pollution Prevention Act finds that "meaningful participation of State residents, especially vulnerable populations . . . is critical" to ensuring that environmental justice considerations are accounted for in implementing environmental laws.[157] Failing to provide communities an opportunity to comment on whether cleanup is appropriate risks ignoring that mandate. The Board should require that no alternate source demonstration may be approved without first being subject to public review and comment, preferably by requiring submission of alternate source demonstrations in the form of an application to modify a permit.

Fifth, to comply with the Coal Ash Pollution Prevention Act, the rules should explicitly require that the alternative source demonstration specify the alleged source of groundwater contamination. Under that Act, these rules must "describe the process and standards for identifying a specific alternative source of groundwater pollution when the owner or operator . . . believes that groundwater contamination on the site is not from the CCR surface

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[155] *See* Ex. 15, Hutson Answers at 9-10 ("I do not agree that a slight delay in order to facilitate input from the public should be characterized as unnecessary. Given the length of time that most CCR impoundments have been in use [], a short pause for the Agency to gather input from the public prior to accepting an [ASD], while other activities proceed seems inconsequential"); Tr. Sept. 29, 2020 41:5-14 (S. Diers: "Q. How many – how much time do you envision would be needed for meaningful public input on alternative source demonstrations? A. In my experience, probably a month or two. Q. What experience have you had with public input on alternative source demonstrations? A. I have not done public input on ASD's. I've done input to attorneys on ASD's who asked me to look at them"); *id.* at 42:1-43:5 (S. Diers: "Q. Do you believe Part 845 would be as protective and comprehensive as Part 257 if more than 90 days are allowed before the assessment of corrective measures is initiated? [Objections and audio issues follow] A. . . . [I]n my opinion, the input that can be gained from having outside people look at the ASD's is a valuable source of information that can be of assistance to the Agency. That's my objective in this is to – is to bring another set of eyes to it and I think a small delay of a month or two or maybe as much as 90 days I think when you're looking at a site that has been sitting out in the environment for the past, who knows, 40 years, an additional 90-day delay is not a critical thing to me").

[156] Tr. Aug. 13, 2020 137:17-138:1 (Cassel: "Mr. Dunaway, did you or other Agency staff in preparing this rule consider instances where workers, former workers, or the public have identified sources of contamination at coal ash sites? MR. DUNAWAY: Lynn Dunaway. No, we did not review that information").

[157] 415 Ill. Comp. Stat. 5/22.59(a)(5).

impoundment."[158] The proposed rules, however, do not include sufficiently specific language to meet that requirement. Proposed Section 845.650(d)(4) states:

> Alternative Source Demonstration. The owner or operator of a CCR surface impoundment may, within 60 days of the detected exceedance of the groundwater protection standard, submit a demonstration to the Agency that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the groundwater protection standard resulted from error in sampling, analysis, statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer.

Nowhere does that proposal specify that the alleged alternative source of the contamination must be identified. The "factual or evidentiary basis" mandate does not cure the problem. In some alternate source demonstrations done pursuant to the federal rule, various lines of evidence are presented as to why the ash pond is allegedly not the source of the pollution, but the alleged source is not identified.[159]

Specific identification of the source of contamination is important not only because the Coal Ash Pollution Prevention Act requires it, but also because failing to do so hampers efforts to halt further pollution and clean up pollution already in the groundwater.[160] If the source is coal ash located outside of the impoundment, it is critical that that source be identified so it can be addressed, since, as explained by Mr. Hagen, remediation will likely fail if the same pollutants continue to leach out of other coal ash but that ash is not cleaned up.[161]

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[158] 415 Ill. Comp. Stat. 5/22.59(g)(11).
[159] *See, e.g.*, Ex. 14, Hutson Test., Attach. 5, Baldwin Alternate Source Demonstration, Appendix A at 5 ("Background lithium concentrations at MW-304 were also shown to be significantly higher than water in the pond, indicating lithium concentrations are *either* naturally occurring due to geochemical variations within the Uppermost Aquifer *or from upgradient anthropologenic sources*") (emphasis added).
[160] *See* Ex. 14, Hutson Test. at 17 ("An affirmative demonstration of the source and aerial extent of impacts identified as a potential alternative source must be required in order to allow regulatory personnel to ascertain . . . what remedial actions, if any, might be necessary").
[161] *See* Tr. Sept. 29, 2020 257:10-20: ("Q. No, I think this is a different question. I'm asking whether a remediation could fail to achieve the groundwater protection standard if there is an onsite source of the same pollutant that is not addressed by the remediation? A. If I'm understanding your question correctly, I believe that's what my answer is is that if a remediation is undertaken, but is not addressing the actual source of the contamination, it is likely that the remediation will fail"); Ex. 35, Hagen Answers at 50

Sixth and relatedly, the Board should not permit owners and operators to avoid cleanup when coal ash on the power plant property, outside of the impoundment, is identified as the source of contamination. Evidence is clear that, at several Illinois coal plant sites, coal ash has been deposited not just in impoundments but also other areas, including scattered or concentrated "fill," in berms, and in piles.[162] In at least one instance, an owner/operator in Illinois has attempted to circumvent corrective action by alleging in a federal rule-mandated Alternate Source Demonstration that other onsite coal ash, rather than the ash in an impoundment, is the source of groundwater pollution.[163]

Under existing Illinois law, owners of property are responsible for contamination they control but have not taken sufficient precautions to halt.[164] Where coal ash contaminating groundwater is located on the owner/operator's property, it is the owner's obligation to take actions needed to achieve the applicable groundwater standards and not further pollute groundwater.[165] Given those mandates and Mr. Hagen's explanation that any remediation effort that does not address the actual source of the pollution would be destined for failure, it simply does not make sense to require remediation of impoundments alone when a significant source of the pollution is coal ash deposited outside of the impoundments. Accordingly, Section 845.650(d) should be modified to provide that, where onsite coal ash is identified as a source of groundwater pollution, the owner/operator must proceed with corrective action under Subpart F of the rules.

To address these deficiencies, the Board should adopt the suggestion in the above paragraph, look to the recommendations of Mr. Hutson on pages 13-15 and 17-18 of his testimony, and consider additional language requiring that the alleged alternate source of identified contamination be identified in proposed Section 845.650(d)(4).

("Without knowledge of background to the unit, the owner/operators may be trying to remediate something other than the unit, a proposition that would be destined for failure").

[162] *See*, *e.g.*, Ex. 9, PCB 13-15, Interim Order at 28, 41-42, 56-57, 66-68; CCR Compliance Annual Groundwater Monitoring and Corrective Action Report – 2019 for Powerton, Appendix B, Alternate Source Demonstration (attached hereto as Attach. 4) at 3 (stating that "Wells MW-15 and MW-17 are also both completed within areas of historical fill material placement which includes ash") and 4-7 (asserting that exceedances of the groundwater protection standards for barium, molybdenum, selenium, and thallium are caused by another "localized source," rather than coal ash impoundments).

[163] *See* Attach. 4 hereto, CCR Compliance Annual Groundwater Monitoring and Corrective Action Report – 2019 for Powerton, Appendix B, Alternate Source Demonstration.

[164] *See*, *e.g.*, Ex. 9, PCB 13-15, Interim Order at 79.

[165] *See* 415 ILCS 5/12(a), *People v. CSX*, PCB 7-16, slip op. at 17 (July 12, 2007); *see also Cent. Ill. Pub. Serv. Co. v. PCB*, 116 Ill. 2d 397, 408 (1987).

5. *Improvements Are Needed to Ensure Corrective Action is Complete.*

Finally, once corrective action has been triggered, certain specifications should be added to the rules to ensure the full extent of contamination is identified so that it can be remediated. First, the proposed rules should specify that enough "wells must be installed inside and outside the leading edge(s) of the contaminant plume to determine the location and rate of movement of the leading edge of the plume and identify contaminant concentrations and internal concentration gradients for each contaminant."[166] Such specificity is necessary because, while the proposed rules require installation of additional monitoring wells to define the contaminant plume, the rules "fail[] to specify the specific questions to be answered by the characterization."[167] Without such specificity, it is possible that some owners or operators might fall short of fully and properly characterizing the extent of the plume[168] – which is especially critical if polluted groundwater has migrated offsite.[169] Increased regulatory clarity will also save Agency time and resources down the line, as well as ensure that pollution is comprehensively identified so it can be properly cleaned up.

Second, the rules should explicitly require surface water and sediment/sediment porewater sampling in all locations where a contaminant plume may be discharged to surface water, and that the sediment/sediment porewater sampling must be sufficient to characterize the "porewater column at regular intervals to the bottom of the sediment column."[170] As Mr. Hutson explained, the discharge of groundwater contaminants into surface waters can result in the buildup of potentially dangerous concentrations of those contaminants in sediment, creating a potential risk to aquatic life.[171] Such contamination must be identified and remedied as part of

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[166] Ex. 14, Hutson Test. at 16.
[167] Ex. 14, Hutson Test. at 15; *see also* Ex. 15, Hutson Answers at 11 ("Documentation of the location and rate of movement of the leading edge of the contaminant plume is readily achieved by monitoring groundwater quality within and downgradient of the plume. Contour maps of the water quality data can then be compared over time to establish the location of the plume and that its location is stable").
[168] Ex. 15, Hutson Answers at 9 ("[I]n practice, many facilities are not particularly interested in developing sufficient data to define the location, depth, or rate of movement of the leading edge of contaminant plumes, and do not take the necessary measures to do so").
[169] *See* Ex. 15, Hutson Answers at 41 ("If the plume is migrating offsite, robust monitoring is even more necessary to establish how far the contamination has traveled, the depth, width, and contaminant concentrations within the plume, whether any public or private water wells are at risk, etc.").
[170] *See* Ex. 14, Hutson Test. at 16.
[171] *See* Ex. 14, Hutson Test. at 15-16; Ex. 15, Hutson Answers at 29-30 (discussion of study finding arsenic in sediments in river adjacent to coal ash impoundment "at concentrations up to . . . 8.2 mg/l."); *id.* at 40; *id.*, Attach. 1; Tr. Sept. 29, 2020 44:9-45:5 (Testimony of M. Hutson) ("Q. Is it possible that groundwater seepage into a stream could be at a rate slow enough that the water quality standards in the stream are not exceeded? A. That is very often the case and it's also the case that we've seen cases where the slow migration of groundwater carrying contaminants into the surface water actually leads to build up of high concentrations of contaminants in sediments at the bottom of the river or the groundwater

the corrective action for the site. Suggested language is included on p. 15 of Mr. Hutson's testimony.

C. The Rules Should Prohibit Closure in Place When Coal Ash Would Pose a Risk in its Current Location.

In addition to prohibiting closure in place where ash is in contact with water, Illinois should not allow closure in place where impoundments pose other significant risks in their current locations. If an impoundment violates location restrictions, closure in place should be prohibited. Likewise, the rules should bar closure in place for structurally unsound impoundments. The rules should also prohibit closure in place if capping an impoundment will be insufficient to achieve the groundwater protection standards.

1. *The Rules Should Not Allow Closure In Place For CCR Surface Impoundments That Violate Location Restrictions, Including Floodplains.*

If an impoundment violates location restrictions for unstable areas, seismic areas, or wetlands, there is a significant risk that releases from the impoundment will continue to put Illinois communities and waters at risk.[172] Unstable areas can sink or collapse, removing any stability from a capped impoundment.[173] Seismic and fault areas pose similar risks. Similarly, since floodwaters inundate floodplains and erode riverbanks, increase groundwater levels, degrade caps, and increase the threat of collapse, floodplains should be explicitly included in Proposed Subpart C as a location restriction.[174]

An explicit prohibition on locating coal ash impoundments in floodplains should be added because storm-induced high water events are capable of overtopping berms and increasing the potential for catastrophic release of wastes, and rising water elevations caused by even minor high water events will re-wet CCR contained in the unlined disposal unit and renew production of leachate each time.[175] As Mr. Hutson notes in his prefiled answers:

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discharges into the sediments even though you can't detect contaminants in the surface water. Q. If water quality standards in the stream are not exceeded, would aquatic life be protected? A. I think that would really be a better question for a biologist, but, again, I think there are certain aquatic creatures that get exposed to bottom sediments that could be affected").

[172] Ex. 14, Hutson Test. at 10-12.

[173] *See* Ex. 5, EPA, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities, 80 Fed. Reg. 21,302, 21,457 (Apr. 17, 2015) (discussing the structural collapses at the Kingston TVA site in Tennessee in 2008, at the Dan River site North Carolina in 2014, at the Clinch River site in Virginia in 1967, and at the Martins Creek site in Pennsylvania in 2005).

[174] *See* Ex. 14, Hutson Test. at 10-12; Ex. 15, Hutson Answers at 2, 6, 16-18, 26.

[175] *Id.* at 10.

> [O]ver time, river channels are known to migrate and shift, eventually undercutting and endangering structures used to contain CCR. . . . CCR units located on floodplains are potentially subject to a variety of natural events or forces capable of impairing the ability of a surface impoundment to prevent releases. The obvious potential impairment is that floodwaters have the potential to erode surface structures, including berms and cap systems. The not-so-obvious problem is that these are generally shallow groundwater locations under normal conditions and groundwater elevations increase along with rising surface water, sometimes to elevations above ground surface. The combination of normally high groundwater and episodically high groundwater and surface waters during flood events enhances the potential for rewetting of disposed CCR and stimulation of renewed leachate generation. [176]

Therefore, retaining CCR surface impoundments, whether operating or closed, on a river's floodplain must be viewed as unacceptable waste management planning and a practice that will facilitate contamination of waters of the state and have potentially catastrophic results for future residents.[177]

Many CCR surface impoundments in Illinois are located immediately adjacent to flood-prone rivers and lakes. Using the FEMA 100-year floodplain maps available through the ArcGIS online database, Andrew Rehn was able to map the FEMA 100-year and 500-year floods (1% and 0.2% chance floods) in comparison to CCR surface impoundments in Illinois.[178] While the data for every CCR site in Illinois was not available, the maps show that the Dallman, Grand Tower, Hennepin, Hutsonville, Meredosia, Pearl Station, and Vermilion plants would all be partially or completely inundated according to the FEMA 100-year floodplain maps.[179]

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[176] Ex. 15, Hutson Answers at 2; *see also* Tr. Sept. 30, 2020 96:14-24 (Testimony of R. Gnat) ("Q. Okay. And just to confirm a couple things, is it your understanding that groundwater flow systems are affected by periods of flooding? A. That is correct, yes. I mean, that's a standard understanding, that there is an interaction between the surface water discharge boundary and groundwater next to the river. Q. And is it your understanding that periods of flooding are affected by storms? A. Yes, periods of flooding can be affected by storms, yes."). The Agency is also aware that changes in the elevation of surface water can affect the elevation of groundwater. Aug. 13, 2020 Tr. 18:20-19:2. Moreover, if there is a hydrological connection between groundwater and surface water, a change in elevation of the surface water due to a flood can affect the direction of groundwater flow – and flow reversals can and have happened in Illinois. Aug. 13, 2020 Tr. 19:3-21:9. The Agency has also acknowledged that floods could potentially overtop an impoundments berms. Tr. Aug. 13, 2020 177:12-19.

[177] Ex. 14, Hutson Test. at 10.

[178] Ex. 16, Rehn Test. at 12.

[179] *Id.*; *see also id.*, Attachs. 34-40; Ex. 15, Hutson Answers at 26 ("There are, however, examples of sites that have had floodwaters rise well up the side of their containment berms, such as the Springfield CWLP

These risks will likely only increase with time as heavy precipitation events are anticipated to increase in Illinois,[180] and overall flood risks in Illinois have increased due to increasing precipitation, especially heavy rain events.[181]

Over the long term, capping CCR impoundments in place in an area that violates the proposed location restrictions, such as in a floodplain, is neither secure nor permanent. For example, engineering is insufficient to adequately protect CCR surface impoundments located in floodplains from the impacts of flooding. As Mr. Hutson notes:

> One of the basic problems that I see with locating permanent waste disposal facilities on floodplains is that the processes attacking engineered flood protection structures require regular inspection and maintenance for as long as flood protection is required. The post-closure care period for waste disposal facilities is generally intended to extend only for thirty years past facility closure. Potential damage to waste containment and protection structures will continue indefinitely, but maintenance of these structures will eventually be terminated. It is my opinion that we must make good decisions now in order to minimize future problems associated with today's wastes.[182]

In the Agency's first post-hearing comments, it states that a suggested revision proposed by the Board requiring CCR surface impoundments located in floodplains to prevent wash out of CCR rather than solid waste is acceptable.[183] However, as noted, if ash is left in the floodplain, there are no controls that are sufficient for long-term protection. Since the utility that buries the waste in the floodplain is only responsible for maintaining the facility for thirty years, if groundwater protection standards have been met by that time, facility damage or releases of waste that occur after that time will be left for others to correct.[184] For these reasons, an active

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Dallman impoundments, where flooding along Sugar Creek caused berm erosion and damage to monitoring wells."); Tr. Sept. 29, 2020 31:17-24 (In response to the question "can you explain your basis for berm erosion to the CWLP Dallman impoundments for flooding," Mr. Hutson responds "At the time we did our site visit, we had talked about whether there was erosion that occurred on the outside of the berms along Sugar Creek and I could see a damaged monitoring well while we were out there.").

[180] *See* Attach. 41 to Ex. 16, Rehn Test.

[181] *See* Attach. 42 to Ex. 16, Rehn Test.; *see also* Ex. 15, Hutson Answers at 51 (noting that the "frequency of extreme storm events has been shown to be increasing in Illinois" and explaining that he is "aware of documents such as [Bulletin 70[]" which "indicates that the total annual precipitation and observed number of precipitation events in Illinois is increasing over time.").

[182] Ex. 15, Hutson Answers at 6.

[183] *See* IEPA post-hearing comments, Attach., at 5.

[184] Ex. 14, Hutson Test. at 10; *see also* Ex. 15, Hutson Answers at 16 (stating that these risks also apply "even if an impoundment berm were required to be kept 'in good repair.'").

floodplain along a meandering river can never be an acceptable location for establishing or maintaining a permanent waste disposal facility.[185]

The Agency's proposed rules do not adequately address these concerns. First, they do not adequately account for the risks of leaving coal ash in floodplains – possibly because the Agency did not take a hard look at the dangers associated with leaving coal ash in floodplains in preparing these regulations.[186] Proposed Subpart C – which provides the location restrictions for existing, new, and laterally expanded CCR surface impoundments[187] - does not explicitly list floodplains among the location restrictions. Although floodplains meet the definition of unstable areas, the Board should not leave any ambiguity in the restrictions. Instead, it should either (a) include a provision within subsection 845.340 that explicitly states that an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must not be located on a floodplain within the 100-year flood area of inundation,[188] or (b) add to Subpart C a separate location restriction for floodplains within the 100-year flood area of inundation.

Second, the Agency's proposal does not adequately address stability concerns because its proposed regulations aim only to ensure structural integrity through post-closure care, and the Agency does not "have any hard timeframes or deadlines beyond that."[189] According to the Agency, it is only expecting an applicant's structural stability demonstration pursuant to proposed 845.340 to demonstrate a "type of long-term stability."[190] However, it is unclear what specifically this "type of long-term stability" would look like as the Agency does not have a definition for the term "long-term."[191] Moreover, as discussed further in Section V of these comments, the Agency will not be conducting its own review of an applicant's structural stability

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[185] Ex. 14, Hutson Test. at 10.
[186] At hearing, the Agency acknowledged that it had only previously looked at information related to floods when submitted in closure plans, but had not otherwise evaluated the severity and frequency of floods in Illinois in preparing the proposed rules. *See* Tr. Aug. 13, 2020 21:10-22:7.
[187] Although the proposed rules include location restrictions, the Agency is not aware of which CCR surface impoundments currently do not meet the proposed rule's location standards nor did the Agency, in developing the proposed rule, review the filings concerning location restrictions of the CCR surface impoundments subject to the federal CCR rule that are posted on the public CCR website. Tr. Aug. 12, 2020 91:18-92:5.
[188] Ex. 14, Hutson Test. at 12.
[189] *See* Tr. Aug. 12, 2020 121:9-122:4: (when asked "Over what time horizon will the Agency be evaluating whether an impoundment can be designed and engineered to ensure structural integrity?" the Agency answered "Kind of our charge is regulating these through postclosure care, whatever time that would be based on the site specific circumstances, and we don't have any hard timeframes or deadlines beyond that.").
[190] Tr. Aug. 12, 2020 122:12-13 (emphasis added)
[191] Tr. Aug. 12, 2020 122:16-20.

demonstration, but will instead rely entirely on a third party to ensure the stability of impoundments.[192]

In summary, the Agency's current plan to address the significant risks posed by CCR surface impoundments that violate location restrictions, such as location in floodplains, is not sufficient to protect human health and the environment. As Mr. Hutson states, "a failed location restriction indicates that the location is not suitable for establishing a permanent waste disposal facility."[193] As such, the rules should bar closure in place when an impoundment violates a location restriction.

2. *The Rules Should Not Allow Closure In Place For Structurally Unsound Ash Ponds.*

The rules should also prohibit closure in place for structurally unsound impoundments, such as impoundments that fail to meet the required minimum safety factors. The Agency has acknowledged the importance of ensuring structural stability as it "can be a physical safety issue as well as protective of human health and the environmental conditions if . . . berms . . . fail."[194] The Agency is also aware of impoundment failures in other states.[195]

Furthermore, there are structural stability threats at several impoundments in Illinois. Safety factor reports released by owners of CCR surface impoundments in 2016 show that many impoundments in Illinois were very close to failing to meet the minimum "safety factors" set by USEPA as a threshold for impoundment stability.[196] As Mr. Rehn notes in his prefiled testimony:

> Ash Pond No. 1 at Coffeen met the minimum long-term loading safety factor (1.50) exactly, and other ponds, such as the East Ash Pond at Joppa and the Ash Pond at Edwards, were just a small fraction above the minimum requirements. Both

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[192] *See* Tr. Aug. 12, 2020 116:10-22 ("MS. CASSEL: . . . What does the Agency mean by 'is accepting the certification of the qualified professional engineer?' MR. LECRONE: This is Darin Lecrone. It means that the Agency is not conducting its own review. It's accepting the certification made by another qualified engineer. MS. CASSEL: So the Agency would rely entirely on the certification of this engineer submitting the document rather than conducting any other independent review? MR. LECRONE: This is Darin Lecrone. That's the intent of the rule as drafted.").
[193] Ex. 15, Hutson Answers at 17.
[194] Tr. Aug. 12, 2020 103:19-23.
[195] Tr. Aug. 12, 2020 105:11-12; *see also* Ex. 5, EPA, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities, 80 Fed. Reg. 21,302, 21,457 (Apr. 17, 2015) (discussing the structural collapses at the Kingston TVA site in Tennessee in 2008, at the Dan River site North Carolina in 2014, at the Clinch River site in Virginia in 1967, and at the Martins Creek site in Pennsylvania in 2005).
[196] Ex. 16, Rehn Testimony at 6.

> Edwards and Joppa were rated as high hazard potential impoundments, which means that a loss of life is likely in the case of failure. Overall, the industry reports I reviewed showed ash ponds at Coffeen, Dallman, Edwards, Joliet 29, Joppa, Kincaid, Newton, and Waukegan to be within 10% of the minimum required safety factor for one or more loading conditions.[197]

In addition to failing to meet minimum safety factors, eroding rivers or subsidence risks can also rapidly change conditions at an impoundment and threaten collapse. For example, at the Vermilion site, the river is eroding the banks of the Middle Fork on which the CCR surface impoundments are located.[198] The eroding river at the Vermilion site is also an example of why structural stability cannot be a one-time analysis because as environmental factors change, so do the stability risks.[199] Furthermore, at Vermilion and other CCR surface impoundments in Illinois, there are old coal mine shafts located below, or near, the impoundments which could collapse and destabilize the impoundments.[200] For these reasons, the rules should not allow closure in place for structurally unsound impoundments or those located in areas that pose a high threat to impoundment stability.

D. <u>The Proposed Rules Fail to Ensure that Groundwater Modeling is Adequate.</u>

The Proposed Rules requirements for modeling are insufficient to ensure adequate, acceptable modeling is submitted to the Agency in support of corrective action or closure. Expert witnesses Ian Magruder and Scott Payne reviewed recent closure plan documentation submitted to the Agency between 2016 and 2018, including hydrogeologic characterization reports, CCR impoundment leachate percolation models, and groundwater modeling for three Illinois coal plants: Vistra's Hennepin Station, the Ameren's Meredosia Station, and Vistra's Wood River Station (closed by Dynegy). These groundwater modeling efforts were intended to document existing contaminant plumes and support proposed closure measures for remediating groundwater over the long-term. As stated by Mr. Magruder and Mr. Payne,

> All three models reviewed contain fatal flaws which render them inaccurate for predicting either the efficacy of proposed closure measures or the groundwater remediation timeframe. Our review of these closure plan documents makes it clear that the process of evaluating corrective action needs and appropriate closure plan methods used by at least two of the three major coal plant owner/operators in Illinois is severely deficient from lack of regulatory constraint.[201]

In other words, the modeling related to corrective action and closure of coal ash impoundments in Illinois has been inadequate. A third witness, Andrew Rehn, corroborates Mr. Payne's and Mr.

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[197] Ex. 16, Rehn Test. at 6; *see also* Attachs. 1-8 of Ex. 16, Rehn Test..
[198] Ex. 16, Rehn Test. at 6; *see also* Ex. 18, *Cap and Run* at 34.
[199] Ex. 16, Rehn Test. at 6.
[200] *Id.*
[201] Ex. 19, Payne & Magruder Test. at 5.

Magruder's observations. Mr. Rehn observed similar deficiencies in modeling submittals to the Agency in relation to CCR impoundments.

> [T]he way I've seen Illinois EPA regulate coal ash sites . . . is to request more information about industry proposals until the company refines their solution to something that Illinois EPA can accept. . . . [T]his regulatory method incentivizes industry to do a lackluster job in their initial offering, trying to find the cheapest option that will get approval and having no real reason to do a comprehensive analysis. Industry can start low and slowly raise the bar until Illinois EPA approves.[202]

Stated another way, industry practice in Illinois in the area of CCR impoundment corrective action and closure has been to perform substandard modeling.

Mr. Payne made clear in response to live questioning that the fix to this pattern of sub-par modeling is not complicated.

> I don't think anybody is suggesting we need **perfect models**. I think what you have in the past that has been submitted to the Illinois EPA has been far from perfect and could be greatly improved by simply requiring some basic parameters that stipulate what a model should be designed to include if it's going to answer these very complex questions.[203]

In order to remedy this situation, Mr. Magruder and Mr. Payne recommend additions and changes to the proposed rules, along with a detailed guidance document, and Agency supervision.[204] "Our professional opinion is that an adequate regulatory framework, an official technical guidance document which details required modeling practices, and close oversight by IEPA are necessary to prevent Illinois from having severe and perpetual groundwater pollution problems near these retired coal powered electric plants in the long-term."[205]

The benefit to making these changes and improvements to the rule is reducing the expenditure of Agency resources and staff time in a back and forth with owners/operators as the Agency asks them to repeatedly correct and improve their modeling submittal.

> [T]he process of IEPA model review will be more efficient if models meet basic standards to begin with. IEPA has limited resources to review models. It should not

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[202] Ex. 16, Rehn Test. at 7.
[203] Tr. Sept. 29, 2020 109:1-8 (emphasis added).
[204] Ex. 19, Payne & Magruder Test. at 34-45.
[205] *Id.* at 5.

> be IEPA's job to dictate basic modeling practices and industry standards in their review comments. Models and modeling reports should come in the door with a basic level of adequacy that is missing from the models prepared for the three sites we reviewed.[206]

Across the modeling that they reviewed, Mr. Magruder and Mr. Payne identified at least eleven general concerns that can be addressed through revisions to the proposed regulations. First, groundwater models need to be based upon site characterizations, actual site conditions, and clearly-defined[207]

> A conceptual site model (CSM) is a descriptive presentation of the site, included in either the hydrogeologic assessment or modeling report, which discusses the groundwater flow, aquifer properties, and contaminant release and transport pathways. ... One purpose of the CSM is to provide the framework that needs to be included in the modeling; implicit in this is that models developed for the site should be based upon and agree with the CSM.[208]

U.S. EPA's Hydrologic Evaluation of Landfill Performance ("HELP") Model is traditionally used to predict vertical percolation and leachate production for CCR units. The HELP model assumes free drainage from the bottom of the unit but free drainage does not occur when the bottom of the unit is in contact with groundwater. Id. "When groundwater is in contact with the CCR, the downward percolation of CCR leachate will cease and the CCR will be rewetted, providing a source for additional leachate."[209] ; "When the HELP model is misapplied to [such] CCR units … , it will provide inaccurate predictions of hydrostatic equilibrium and leachate percolation rates … ."[210] The CSM must describe "the geologic and hydrogeologic conditions of a site which affect groundwater flow."[211] Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their suggested changes to the proposed rules to address CSMs, site characterizations, and actual site conditions.[212]

Second, groundwater models need to be developed and calibrated using all of the relevant site characterization data available.[213] ."All available groundwater elevation data should be

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[206] Ex. 20, Joint Prefiled Answers of Scott Payne and Ian Magruder at 18 (Sept. 24, 2020) (hereinafter "Payne & Magruder Answers").
[207] Ex. 19, Payne & Magruder Test. at 34, 38.
[208] *Id.* at 5.
[209] *Id.* at 6-7; *see also id*. at Attach. 28, Emails between Ian Magruder and Thabet Tolaymat (June 11, 2020).
[210] Ex. 19, Payne & Magruder Test. at 6.
[211] *Id.* at 7
[212] *Id.* at 34, 38.
[213] *Id.* at 34, 38.

included in hydrogeologic characterization reports, considered in site conceptual model development, and used as calibration targets in groundwater flow models."[214] Mr. Payne and Mr. Magruder's testimony recommends "[p]re-defined calibration targets which *consider* the entirety of available Hydrogeologic Site Characterization data required in 845.620."[215] Mr. Payne and Magruder intentionally used the word "consider" to indicate that all the available data are evaluated for use as calibration targets, but data may be excluded for a valid reason.[216] "The modeling report should document calibration targets, the source of the calibration targets, and calibration performance including whether these targets were met, and the adjustments that had to be made to complete the modeling."[217] This is a self-implementing requirement, is used in other regulatory settings, and is an industry best practice standard. Id. at 15. Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their revisions to the proposed rules regarding the use of all relevant site characterization data.[218]

Third, model boundaries should be based on site data or actual field measurements.[219] It is critical that "boundary conditions" such as rivers, ponds, percolation of precipitation, groundwater inflows, CCR unit leakage, etc., be modeled accurately because they determine the flow of the groundwater system which, in turn, affects flow direction, contaminant transport, and the timeframe for groundwater remediation to meet water quality standards.[220] The accuracy of the model's predictive capabilities relies on boundary conditions being realistically simulated.[221] "Boundary conditions should be constrained by supportable data for the groundwater system to the extent possible. The source of the data should be clearly specified in the modeling report. Boundary conditions should not be arbitrarily defined with a lack of any real data."[222] The objective of the modeling is to simulate processes which affect CCR leaching to groundwater. "Where river elevations affect CCR leaching, the model stress periods should be set up to simulate such."[223] Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their suggested changes to the proposed rules to address use of site data and field measurements for model boundaries.[224]

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[214] *Id.* at 9
[215] Id. at 35, 37 (emphasis added).
[216] Ex. 20, Payne & Magruder Answers at 7.
[217] *Id.* at 15.
[218] Ex. 19, Payne & Magruder Test. at 34, 38.
[219] *Id.* at 34, 38.
[220] *Id.* at 10.
[221] *Id.*
[222] *Id.*
[223] Ex. 20, Payne & Magruder Answers at 7.
[224] Ex. 19, Payne & Magruder Test. at 34. 38.

Fourth, hydraulic properties used in the model need to be based on site-specific testing.[225] Hydraulic conductivity, which is the ease with which a particular geology or soil allows groundwater to flow through it, is one of the most important model parameters to have quality data measured at the site. ... Hydraulic conductivity values described in a conceptual site model and used in flow modeling need to be determined from testing performed at the site.[226] The Agency agrees that, where possible to obtain, site-specific hydraulic conductivity values should be used.[227] The proposed rules need to ensure that the appropriate tests are performed to obtain site-specific hydraulic conductivity values.[228] Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their revisions to the proposed rules regarding site-specific testing for hydraulic properties.[229]

Fifth, contaminant source concentrations and CCR leachate flux need to be accurately modeled.[230] Expert Witness Mark Hutson agreed with Mr. Payne and Mr. Magruder on this point. "Adequate characterization of porewater chemistry is needed to identify source concentrations of groundwater fate and transport modeling and is often needed to evaluate the validity of [ASDs]."[231] Leachate percolation rates need to be accurate and based on a reliable description of CCR contact with groundwater.[232] EPA's HELP model needs to stop being used to erroneously model leachate percolation.[233] Leachate concentration should be measured in each CCR unit, such that a statistically supportable estimate of the concentration is known.[234] The reliability of contaminant transport models is "highly dependent on having accurate information on the contaminant source concentration and percolation rates from CCR impoundments."[235] Examples of recent groundwater models for CCR impoundments in Illinois had either no or extremely limited data on contaminant concentration in the impoundment leachate. Id. HELP model results, which were used to provide the contaminant percolation flux rate in the groundwater models, were completely unreliable because they did not use sufficient site-specific contaminant concentration[236] data. Please see Mr. Payne and Mr. Magruder's Pre-filed testimony

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[225] *Id.*
[226] *Id.* at 12.
[227] IEPA First Post-Hearing Comments, Attach. 1 at 4 (Sept. 24, 2020).
[228] Ex. 19, Payne & Magruder Test. at 13.
[229] *Id*. at 34, 38.
[230] Id.
[231] Ex. 15, Hutson Answers at 27.
[232] Ex. 19, Payne & Magruder Test. at 38.
[233] *Id.*
[234] *Id.*
[235] *Id.* at 13.
[236] *Id.*

for their suggested changes to the proposed rules to address the need for site –specific contaminant source concentrations. [237]

Sixth, modeling needs to consider transport attenuation for each contaminant and each geologic unit at the site and use site-specific values for hydraulic conductivity.[238] A site-specific analysis of contaminant attenuation and dispersion properties to evaluate the transport characteristics of each parameter should be performed for each geologic unit which has the potential to transport contaminants.[239]

> Many of the inorganic contaminants typical of coal ash (boron, cadmium, cobalt, selenium, etc.) do not behave conservatively in groundwater and are subject to attenuation (e.g. Masahiro 1987). Attenuation ... means chemical processes such as sorption that cause contaminants to exhibit slowed transport or to be immobilized. This attenuation can increase the cleanup timeframe of the contaminant plume because dissipation of contaminants takes longer. ... Groundwater models which do not account for attenuation may underestimate the groundwater remediation timeframe because contaminants are modeled to travel faster than reality and are diluted or otherwise dissipated in the model … . Models that do not account for attenuation may also suffer from additional inaccuracies because during model calibration, other parameters such as hydraulic conductivity, dispersion, and contaminant flux rates are adjusted to bring the model into calibration, when in fact it is the attenuation that needs to be calibrated.[240]

If a contaminant can be attenuated, it must be modeled as attenuated for accurate modeling results.[241] In order to obtain an accurate depiction of actual contaminant transport, attenuation cannot be arbitrarily left out of the model.[242] If attenuation is omitted, the modeler may need to match the higher modeled concentrations to site sampling data.[243] This can result in the modeler adjusting other model parameters during calibration to values which are not representative of the actual site conditions.[244] The end result is a cascading loss of model accuracy when attenuation is not included.[245] Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their revisions to the proposed rules regarding these concerns.[246]

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[237] *Id.* at 34, 38.
[238] *Id.* at 34, 38.
[239] *Id.*
[240] *Id.* at 16.
[241] Ex. 20, Payne & Magruder Answers at 6.
[242] *Id.*
[243] *Id.*
[244] *Id.*
[245] *Id.*
[246] Ex. 19, Payne & Magruder Test. at 34, 38.

Seventh, the modeling needs to include robust model calibration targets, better calibration, and adequate reporting of model calibration performance. Estimates of groundwater flux rates are needed to provide quantitative calibration targets that can constrain unique model solutions.[247]

> Accurate model calibration is critical to ensure that model predictions of closure and corrective action performance are accurate. Groundwater models are typically calibrated, by adjusting model parameters, so that they match field measured groundwater elevations and measured or calculated flow rates. These measurements are referred to as calibration targets. . . . It is important that calibration targets include as much of the available site data as possible to produce an accurate model.[248]

When questioned about calibration, Mr. Payne and Mr. Magruder pointed again to the level of deficiencies in modeling supporting prior closures of CCR impoundments in Illinois.

> We believe the modeling performed for the three sites we reviewed (Hennepin, Meredosia, and Wood River) speaks for itself. The models are poorly calibrated as demonstrated in the comparison between modeled and observed water levels and concentrations. It is clear that the poor calibration is partly a result of the models not sufficiently reflecting actual site conditions or an accurate site conceptual model. We believe the additional data and modeling inputs we are advocating for are necessary to develop both accurate site conceptual models and GCT models which are based on the site-specific information needed to accurately simulate contaminant transport at a site.[249]

Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their suggested changes to the proposed rules to address these concerns.[250]

Eighth, coal ash must not be allowed to remain in contact with groundwater.[251] If CCR is not removed, the closure alternatives analyses, assessment of corrective measures and modeling

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[247] *Id.* at 34, 38.
[248] *Id.* at 17.
[249] Ex. 20, Payne & Magruder Answers at 26.
[250] Ex. 19, Payne & Magruder Test. at 34-39, 41.
[251] *See supra* Section III(A); Ex. 19, Payne & Magruder Test. at 32 ("The safest method available to avoid long-term water quality exceedances, risks to human health, and institutional control requirements for CCR impoundments which are regularly in contact with groundwater is to excavate and remove the CCR to a landfill compliant with current federal regulations (40 CFR Subpart D)").

need to consider groundwater contact with CCR because this is a pathway for contamination to groundwater. "SIs that are constructed with intersecting groundwater conditions (i.e., the base of the impoundment is below the natural groundwater elevation) are often of particular concern due to the potential for CCR constituent mass to continue leaching into groundwater even after closure is completed."[252] The Agency acknowledges that the corrective action alternatives analysis failed to include the requirement for modeling to reflect a seasonally-intersecting water table and that modeling has been submitted to the Agency without accounting for seasonal variations.[253] In addition, there are groundwater modeling methods that account for intermittent saturation of coal ash due to contact with groundwater.[254] If CCR is not removed from contact with groundwater, then the modeling must include an evaluation of the frequency and magnitude of groundwater contact with CCR including continuous or daily records from monitoring groundwater level elevation/water table depth of the shallowest aquifer.[255]

> The regular inundation of CCR in unlined or poorly lined impoundments creates a perpetual source of contamination to groundwater because the high groundwater will rewet the CCR even after the CCR impoundment is capped and closed. This contaminant pathway should be evaluated in all closure plans and accounted for in models used to predict the performance of the closure plan.[256]

Mr. Magruder and Mr. Payne were not the only witnesses to acknowledge groundwater contact with coal ash. Mr. Rehn identified groundwater contact with coal ash as a pathway for contamination at four additional sites – Vermillion, Venice, Hutsonville, and Lincoln Stone Quarry – beyond the ones evaluated by Payne and Magruder.[257] The need for daily or continuous monitoring of groundwater elevations was emphasized in extensive live questioning at the hearings. First, it is possible to characterize groundwater flow without daily monitoring but this raises a question as to accuracy.

> Q: Can you characterize a site and determine groundwater flow direction without daily or continuous groundwater flow measurements?
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> MR. PAYNE: ... So the answer is, yes, you can take any spot in time and collect groundwater potentiometric data and create a groundwater flow map. Now, two weeks later when you didn't collect groundwater data, you can have a complete

[252] Ex. 37, Bittner Test. at 9 (Aug. 27, 2020).
[253] Tr. Aug. 13, 2020 220:3-221:1, 221:16-24, 217:2-15.
[254] Ex. 2, IEPA Answers at 60-61.
[255] Ex. 19, Payne & Magruder Test. at 34, 38.
[256] *Id.* at 19. *See also id.* at 32-33; Tr. Aug. 13, 2020 213:3-20 (Agency witness Amy Zimmer acknowledging water table intersecting with coal ash on a seasonal basis).
[257] Ex. 16, Rehn Test. at 11.

> change in your groundwater flow direction and that may be significant in terms of where the receptors are.[258]

The Agency acknowledged that with just monthly measurements it is possible to miss higher groundwater elevations.[259] In addition, using surface water elevations, Mr. Magruder was able to identify specific instances of higher groundwater elevations that were missed by less frequent groundwater elevation measurement.

> MR. MAGRUDER: . . . When I looked at the three sites in Illinois, I found examples where groundwater flow reversals and groundwater elevation events that contacted coal ash were missed because of infrequency of quarterly data."[260] Finally, it is less desirable to attempt to reconstruct this data after-the-fact.
> MR. MORE: So I think I understand the two of you to be saying if the data is not available, it's appropriate to use the groundwater – the surface water elevation data to estimate or model the groundwater elevation?
> MR. PAYNE: No, that is not what we're saying. We're saying we have to resort to a less desirable process to try to ascertain what data may have been missing from site characterization data that was needed for a modeling effort. . . . We're saying best practices is you collect the data. It's not that hard to do . . . [261]

Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their revisions to the proposed rules regarding daily groundwater elevation measurements.[262]

Ninth, the contaminant transport modeling and evaluation of potential impacts to human and environmental receptors, including drinking water supplies, need to account for variability in groundwater flow direction.[263] This needs to include an evaluation of the effects of variations in groundwater flow direction on contaminant transport and present the variable flow direction in potentiometric maps.[264] Mr. Payne and Mr. Magruder testify that sites can:

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[258] Tr. Sept. 29, 2020 95:22-96:9.
[259] Tr. Aug. 13, 2020 161:10-19 ("MS. CASSEL: . . . [I]f by monitoring groundwater elevation monthly [is it] possible that the peak elevation of groundwater or a peak elevation of groundwater might occur within that month that is missed by only monitoring on a monthly basis? MR. DUNAWAY: That could happen, yes. . . .").
[260] Tr. Sept. 29, 2020 96:22-97:2.
[261] Tr. Sept. 29, 2020 106:11-107:3.
[262] Ex. 19, Payne & Magruder Test. at 34-35, 38, 40.
[263] *Id*. at 34-35, 38.
[264] *Id.*

> [E]xperience periodic reversal of groundwater flow when rivers adjacent to the site have elevated stage. These flow reversals should be accounted for in groundwater modeling because they have the capability of transporting contaminant plumes in what would otherwise be upgradient directions. Variations in groundwater flow have important implications for, and should be accounted for, in developing conceptual site models, choosing background monitoring wells, alternative source demonstrations, and groundwater modeling. Ignoring significant variability in groundwater flow direction may cause corrective actions and closure plans to miss critical contaminant pathways to groundwater and to human or environmental receptors.[265]

Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their proposed revisions to the rules to address variability in groundwater flow.[266]

Tenth, the analysis of uncertainty in the model predictions needs to evaluate the range of simulated outcomes in contaminant transport and groundwater remediation.[267] Models need to:

> [E]valuate the uncertainty in the modeling predictions and how the level of accuracy achieved by the model should be interpreted when reviewing the model predictions regarding closure plan performance and contaminant plume dissipation over time. Modeling practices commonly include a sensitivity analysis which evaluates how adjustments to model parameter values (e.g. +/- 25%) affect calibration. The result of the sensitivity analysis is a quantitative understanding of how much the various model parameters influence model calibration.[268]

In response to a question about the burden that this might place on owner/operators, Mr. Payne and Mr. Magruder responded that for model forecast uncertainty analysis, "new information is not required and the analysis should not require significant extra time."[269] Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their edits and additions to the proposed rules to address model forecast uncertainty analysis.[270]

Finally, there are gaps in the proposed rules where modeling should clearly be referenced and required but was omitted. Section 845.660 requires the Assessment of Corrective Measures to evaluate the performance of the potential corrective measures, but it does not reference the

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[265] *Id.* at 26-27; *see also* Ex. 14, Hutson Test. at 12.
[266] Ex. 19, Payne & Magruder Test. at 34-35, 38.
[267] *Id*. at 35.
[268] *Id.* at 30.
[269] Ex. 20, Payne & Magruder Answers at 16.
[270] Ex. 19, Payne & Magruder Test. at 35.

modeling requirements specified in Section 845.220. "The groundwater flow and transport model is the appropriate tool to use to assess the performance of corrective measure alternatives."[271] Section 845.670 requires the Corrective Action Plan to attain groundwater protection standards and the Corrective Action Alternatives Analysis to predict the time required to achieve those standards, but it does not reference the modeling requirements specified in Section 845.220. "The groundwater flow and transport model is the appropriate tool to use to predict the timeframe for attainment of groundwater protection standards."[272] Section 845.710 requires groundwater contaminant transport modeling but does not reference the modeling requirements specified in Section 845.220. For all three of these sections, Sections 845.660, 670, and 710, "specification of modeling requirements is needed for the modeling to be performed properly..."[273]

In addition to the revisions to the proposed rule discussed above, Mr. Payne and Mr. Magruder also recommend additional oversight by the Agency. Model documentation needs to include all information for the Agency or public to review and understand model development, calibration, and predictive application.[274] Model documentation should also describe the appropriateness of the chosen modeling methods.[275]

> IEPA and the public need to have a complete understanding of the source of data and rationale for model set up to review groundwater models used to predict closure performance. The source of model parameter values and boundary condition choices must be clearly laid out in the modeling documentation provided with the Closure Plan. Additionally, the model report should describe how the model was developed to agree with the conceptual site model (described in detail in Comment a), and the modeling methods used and their appropriateness to the problem being solved (Reilly and Harbaugh 2004). All documentation of model development should be included in the modeling report . . . .[276]

Please see Mr. Payne and Mr. Magruder's Pre-filed testimony for their revisions to the proposed rules to provide for more Agency oversight.[277]

Mr. Payne and Mr. Magruder also recommend that the State of Illinois develop an official groundwater flow and transport modeling guidance and policy document to more clearly define

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[271] *Id.* at 42.
[272] *Id.* at 43
[273] *Id.* at 42, 43 and 45.
[274] *Id.* at 35.
[275] *Id.*
[276] *Id.* at 31.
[277] *Id.* at 35.

best practices and the procedures for model review by the Agency.[278] Rules alone are generally insufficient to adequately define appropriate modeling practices.[279] "State and Federal agencies generally provide guidance or policy documentation to support work on complex technical requirements, such as groundwater flow and contaminant transport modeling."[280]

As Mr. Payne and Mr. Magruder explain, the modeling specifications they recommend are common, feasible requirements. "In our professional careers, we have seen many instances where modeling performed for site characterization and groundwater remediation meets the standards we are proposing so we know it is both possible and economically feasible. Further, the additional modeling can be built into existing timelines in the rule. "[I]t's appropriate I think for the site hydrogeologic characterization to be finished along the timelines of the other aspects of the rule that are driving that characterization, but that the daily water level measurements should be taken for the duration of the groundwater monitoring that applies to the impoundment."[281]

In addition, Mark Hutson recommends that closure-in-place modeling (1) extend for a sufficient duration to show that groundwater protection standards ("GWPS") have been achieved and (2) evaluates the deterioration of the cap. Closure in place modeling "must include groundwater fate and transport modeling that critically explores possible long-term closure system performance…[the owner/operator] should be required to model system performance at least until [GWPS] have been achieved and include evaluations of how declining closure-system performance (such as estimated cap deterioration) will affect compliance with the [GWPS]."[282]

With regard to meeting the GWPS, the regulations do not currently specify that the modeling must show achievement of the GWPS after active remedial activities have ended and passive remedial activities have been installed.

> How many years, at a minimum, does the Agency propose to require owners and operators to model out?
> Response: The Agency does not have a minimum specified, but in practical terms at least 30 years post closure for closure in place. The model must also meet a steady state after passive remedial activities have been installed and active remedial activities have stopped, in order to show that problems will not reoccur in the future. Is that specified in the proposed regulations? If so, please specify the relevant provision(s).

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278 *Id.*
279 *Id.* at 33.
280 *Id.*
281 Tr. Sept. 29, 2020 111-4:10 (Payne).
282 Ex. 14, Hutson Test. at 20-21 .

Response: No, it is not specified in the regulations.[283]

With regard to modeling of post-closure deterioration, it would be "particularly useful on sites where synthetic cap materials are likely to be exposed at or near the surface with little or no protective layer."[284] This would involve modifying the infiltration through the cap over a period of time.[285] Please see Mr. Hutson's Pre-filed testimony for his edits and additions to the proposed rules to address modeling of post-closure deterioration.[286]

E. The Proposed Rules Fail to Address the Contamination from Unconsolidated Ash Fill and Coal Ash Piles.

Not only are CCR impoundments contaminating groundwater and surface waters and harming communities, but CCR landfills and piles are also causing contamination. Existing regulations do not adequately protect against pollution from CCR landfills and piles. The Board has authority to regulate such landfills and piles. Accordingly, to achieve the purposes of the Illinois Environmental Protection Act, the Board should adopt rules directing owners and operators of CCR landfills to put in place much-needed safeguards at those landfills and, where necessary, close them safely.

1. *Coal Ash Landfills And Fill Are Polluting Illinois' Environment.*

CCR landfills and CCR fill are contaminating Illinois' air and water. In preparation for issuance of the federal CCR rule, USEPA identified numerous "damage cases" from CCR landfills or "fill" areas in Illinois, including Vistra's Coffeen facility; Midwest Generation's Lincoln Stone Quarry; Midwest Generation's Powerton Plant Mahoney Landfill in Pekin; Southern Illinois Power Cooperative's Marion Plant; Rocky Acres Coal Combustion By-Product Disposal Site – Bunge Corp., Oakwood, among others.[287]

More recently, groundwater monitoring at CCR landfills in the state regulated by the federal CCR rule has revealed unsafe levels of antimony, arsenic, cobalt, lead, lithium,

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[283] Ex. 2, IEPA Answers at 60.
[284] Ex. 15, Hutson Answers at 12.
[285] Tr. Sept. 29, 2020 at 45:22-46:4 (Testimony of Mark Hutson).
[286] Ex. 14, Hutson Test. at 21.
[287] *See* Attach. 01, Alexander Livnat, *Damage Case Compendium, Technical Support Document, Vol. IIa: Potential Damage Cases* at 41-44, 48-51 (U.S. EPA Dec. 18, 2014); Attach. 02, Alexander Livnat, *Damage Cases: Fugitive Dust Impact* at 40-41 (U.S. EPA Dec. 18, 2014); Attach. 03, Alexander Livnat, *Damage Case Compendium*, *Technical Support Document, Vol. IIb: Potential Damage Cases* at 43-56 (U.S. EPA Dec. 18, 2014).

beryllium, cadmium, chromium, and thallium, as well as elevated levels of CCR indicator boron and CCR constituents calcium, chloride, fluoride, and total dissolved solids or "TDS."[288]

> [O]ur coal ash problem does not exist to impoundments alone. Coal ash ends up in landfills, dumps, piles and coal mines and more. Pollution at these sites is or could be just as harmful as the pollution coming from an impoundment. The Board should be developing comprehensive rules that deal with the whole coal ash problem, not just part of it.[289]

The extent of the problem with ash landfills and historic ash fill is demonstrated by the Board's recent decision in *Sierra Club v. Midwest Generation.*[290]A little over a year ago in June of 2019, the Illinois Pollution Control Board ("Board") found that a combination of CCR fill and old coal ash landfills at Midwest Generation's Waukegan, Will County, Joliet 29, and Powerton coal plants were causing or contributing to water pollution and/or violations of Illinois groundwater standards at those sites.[291] Specifically, the Board found that: (1) the historic ash areas and coal ash spread out across in fill are likely contributing to exceedances of groundwater quality standards at the Powerton Station;[292] (2) the historical coal ash storage and fill areas at Joliet are likely contributing to the groundwater contamination at that site[293] (3) the historic coal ash areas and coal ash in the fill areas at Will County are contributing to exceedances of groundwater quality standards at the Station[294] and (4) the historic coal ash areas and coal ash in the fill areas at the Waukegan Station are contributing to exceedances of groundwater quality standards at the Station. [295] CCR constituents that were found in excess of groundwater quality standards at the coal plants include antimony (Will County), arsenic (Powerton, Will County), boron (Powereton, Waukegan, Will County), sulfate (all four Stations), and TDS (all four Stations).[296]

Another example is the Alternate Source Demonstration for Midwest Generation's

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[288] Ex. 18, *Cap and Run:* at 13-16, 20, 25-26, 37, 39-40 (discussing unsafe and elevated concentrations of CCR constituents found in groundwater adjacent to CCR landfills at the Waukegan, Will County, Duck Creek, Powerton, Joppa, and Prairie State coal plants); Ex. 16, Rehn Test. at 5 (Aug. 27, 2020).
[289] Tr. Sep. 29, 2020 at 65:21-66:4 (Rehn Test.). *See also* Ex. 14, Hutson Test. at 7, 10, 12, 24 (Aug. 27, 2020) (discussing groundwater contamination from both CCR impoundments and coal ash landfills).
[290] *See* Ex. 9, PCB 13-15, Interim Order at 92-93.
[291] *Id*. at 92-93.
[292] *Id*. at 41-42.
[293] *Id*. at 26-28.
[294] *Id*. at 56-57.
[295] *Id*. at 66-68.
[296] *Id*. at 22-77.

Powerton Station.[297]The 2019 Annual Groundwater Monitoring for the Ash Surge Basin and Ash Bypass Basin at Powerton stated that an alternative source demonstration ("ASD") was completed for detected Appendix IV parameters above GWPSs[298] The 2019 Report goes on to say that ash and water samples were analyzed to determine if the ***"another potential historical source in the vicinity of the ash ponds*** may be affecting the local groundwater quality.[299] The annual report determines that the two Powerton CCR impoundments were not the source of the monitoring detections above the groundwater standards and that "there is an alternate source(s) of impacts."[300] The report concludes that four out of five of the elevated constituents are from a different "***localized source***" and all five of the elevated constituents are from a different source than the two CCR impoundments.[301] As discussed in Section III(B)(4) of these comments, it is unacceptable and contrary to Illinois law for owner/operators to be able to abdicate responsibility for groundwater contamination by using an Alternate Source Demonstration to point to another onsite source of coal ash causing the groundwater contamination.

Similarly, if remediation is undertaken at a site where there is contamination caused by coal ash but there is a combination of sources, both impoundments and historic coal ash fill, then remediation will likely fail:

> I'm asking whether a remediation could fail to achieve the [GWPS] if there is an onsite source of the same pollutant that is not addressed by the remediation? A. If I'm understanding your question correctly, I believe that's what my answer is is that if a remediation is undertaken, but is not addressing the actual source of the contamination, it is likely that the remediation will fail.[302]

It would be a far better use of resources to address all sources of contamination at a site at once instead of leaving contributed sources unaddressed and contamination ongoing.

In short, CCR landfills and fill in Illinois are leaching pollutants into our waters and can be expected to continue to do so. CCR landfills and fill pose a confirmed threat to groundwater,

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[297] *See* Attach. 04, KPRG and Associates, Inc., *Annual Groundwater Monitoring and Corrective Action Report – 2019 Ash By-Pass Basin and Ash Surge Basin* at 5 (Jan 31, 2020) (hereinafter "Powerton Station Groundwater Report"), App. B, Alternate Source Demonstration, at 4-7 (March 25, 2019). This document was previously filed as a public comment on October 13, 2020 but is attached to these comments for ease of reference and convenience of the Board.
[298] *See* Attach. 04, Powerton Station Groundwater Report at 5.
[299] *Id.* (emphasis added).
[300] *Id.*
[301] *Id.,* App. B, Alternate Source Demonstration, at 4-7 (March 25, 2019) (emphasis added). Two of these monitoring wells are *actually completed within areas of historical fill material* that includes ash again demonstrating that the alternate source that the ASD is pointing to is an *onsite source of coal ash*. *Id.* at 3.
[302] Tr. Sept. 29, 2020 at 257:10-20 (Hagen).

surface waters, and air. Illinois should adopt safeguards to minimize the contamination from CCR landfills, in addition to that from CCR impoundments. Solving only part of the problem is insufficient to protect Illinois groundwater, surface water, and communities.

2. *Coal Ash Piles Are Causing Contamination and The Proposed Rules Don't Place Adequate Limits On Piles.*

The Proposed Rule includes important provisions restricting where CCR may be stored, including the prohibition on storage in unlined landfills or impoundments. However, the rules require significant changes to ensure that removed CCR in storage piles does not impose an environmental or health burden on other Illinois communities where the CCR is moved.[303]

First, the Board must revise the provisions in the Agency's proposal that allow the use of coal ash piles of unlimited size for an indefinite time. Coal ash must not be stored in piles unless those piles are subjected to the full regulatory mandates of the current federal CCR rule for such piles, which treats coal ash piles as landfills,[304] as well as additional controls including but not limited to covers, wind protection, operating restrictions and berms. This is because CCR piles are notorious sources of air pollution, in particular – but not only – fugitive dust pollution.

> The Board must develop rules regulating more than just coal ash *impoundments*. Coal ash ends up in coal ash landfills, dumps, piles at coal mines, various re-use sites, and more. All of these types of coal ash sites have problems. … I've heard concerns from communities living downwind of a coal ash pile stored at a coal mine who have seen their animals get sick since the piles started. … I've seen satellite images of a huge pile of coal ash at a re-use facility near Powerton where the ash is seemingly strewn along the railroad tracks.[305]

CCR piles have significantly greater exposed surface area than do CCR landfills, and as a result are more vulnerable to wind, rain, and other elements. Consequently, they are at greater risk of wind erosion – wind blowing the small, light CCR particles, particularly fly ash particles, off the piles and into surrounding waterways and neighborhoods.

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[303] In addition, as discussed in Section VII of these comments, the provisions on temporary storage piles are weaker than the Federal Coal Ash Rule which is impermissible under CAPPA. 415 ILCS 5/22.59(g)(1).

[304] *See* Ex. 8, 40 C.F.R. § 257.53 (defining CCR landfill to include CCR piles: "CCR landfill or landfill means an area of land or an excavation that receives CCR and which is not a surface impoundment, an underground injection well, a salt dome formation, a salt bed formation, an underground or surface coal mine, or a cave. For purposes of this subpart, a CCR landfill also includes . . . *CCR piles*, and any practice that does not meet the definition of a beneficial use of CCR." (emphasis added)).

[305] Ex. 16, Rehn Test at 12-13.

The massive coal ash pile at AES's coal plant in Puerto Rico is a devastating example: it has caused severe fugitive dust pollution as well as polluted groundwater above groundwater protection standards for selenium, lithium, and molybdenum. Pollution from the massive ash pile lead Puerto Rico to require removal of that pile in legislation signed on January 2, 2020.[306] Coal ash piles in Texas, Iowa, Montana, Alaska, and Puerto Rico have caused significant pollution, either of water, air, or both.[307] In Puerto Rico, for example, health harms have been documented in areas near ash piles.[308]

Even a short-term, much smaller CCR pile at the Powerton coal plant site here in Illinois was found to cause pollution: the Illinois Pollution Control Board held that the pile, in existence for a mere "two to three" months, contributed to exceedances of Class I Groundwater Quality Standards for arsenic, boron, sulfate, and total dissolved solids, as well as boron and sulfate pollution in excess of background levels.[309] The Board likewise concluded that the temporary coal ash pile constituted a "water pollution hazard."[310] The U.S. Minerals site, just south of the Coffeen power plant, is listed in US EPA's compendium of fugitive dust damage cases due to dust contamination from CCR piles that, when the damage case was finalized, lacked covers or windbreaks.[311] Finally, as Illinois EPA is aware, the Agency has received repeated complaints of coal ash dust pollution from uncovered stockpiles of CCR at mines where coal ash has been used for "reclamation."[312]

Neither the definitions of "CCR storage pile" and "temporary accumulation" nor the controls required at Section 845.740(b)(4)(B) provide protections sufficient to address those significant pollution risks. The rules' proposed definition of "CCR storage pile" is inadequate because it, in itself, does not specifically require particular controls and it relies on the definition of "temporary accumulation" to, in theory, keep piles in place for a limited time. That definition, however, does not place <u>any limit</u> on the amount of CCR that can be accumulated.[313] "MR. OZAETA: … Does Part 845 set out any limit to the acreage that a CCR pile can cover? MR.

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306 *See* Attach. 05, Victor Alvarado Guzmán, *Lucha de las comunidades logra convertir en ley prohibición del depósito de cenizas*, El Patriota de Sur, Jan. 2, 2020.
307 *See* Attach. 06, Mark Hutson, *Responses to EPA Solicitation for Comments on: Enhancing Public Access to Information; Reconsideration of Beneficial Use Criteria and Piles* (Geo-Hydro Inc. Oct. 14, 2019).
308 *Id.*
309 *See* Ex. 9, PCB 13-15, Interim Order at 2, 48-51, 86.
310 *Id*. at 86.
311 *See* Attach. 02, Alexander Livnat, Damage Cases: *Fugitive Dust Impact* at 39 (U.S. EPA Dec. 18, 2014).
312 *See* Attach. 07, IEPA, *Other Coal Ash Sites* (Sept. 2011).
313 *See* Proposed Rule, Section 845.120.

DUNAWAY: No. It's limited to the size of the liner."[314] There is no maximum size for a liner in the rules, however, and, as the Agency recognizes, liners can cover multiple acres.[315]

IEPA states that there shouldn't be "a significantly greater amount from month to month of accumulation versus removal."[316] "MR. OZAETA: When you say there shouldn't be, is that specifically required in the rulings in Part 845? MS. ZIMMER: It does not specify it in the rules. But, in practical terms, it's going to be limited by the space and the size of the pile."[317] Consequently, the rules don't set any limit on area or volume of the CCR pile.

The only requirement in the definition that addresses the length of time a CCR pile may be in place is that the entity managing the pile has a "record in place" that "document[s] that all of the CCR will be completely removed according to a specific timeline." When questioned about whether a time limit should be set for storage piles, the Agency stated "[t]he Agency does not believe a time frame is necessary because CCR storage piles are a practice associated with closure by removal under Section 845.740."[318] Therefore, the duration over which a CCR storage pile exists will be limited by the time required to complete CCR removal from the CCR surface impoundment. The Agency relies on the recordkeeping requirements for limits on coal ash storage piles but these requirements do not set time limits, or any other explicit limits.[319] While the definition requires that all CCR must eventually be removed from the pile, it does not define a specific duration during which this must occur. The definition only states that the period not be "indefinite." The definition thus leaves open whether this period is 90 days or 90 years.[320]

> MR. OZAETA: Do recordkeeping requirements -- the recordkeeping requirements of proposed Section 845.740 set limits for the duration that CCR may be stored in a pile?
> MS. ZIMMER: Amy Zimmer. There is – I would – there is no time limit on a storage pile other than it can be there during closure . . .[321]

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[314] Tr. Aug. 25, 2020 at 62:5-9; *see also* Ex. 2, IEPA Answers at 154 (Aug. 3, 2020) ("Section 845.740(c)(4)(B)(iii) requires a CCR storage pile to have a liner, therefore, the area of a CCR storage pile is fixed.").
[315] *See* Tr. Aug. 25, 2020 at 61:19-62:4.
[316] Tr. Aug. 25, 2020 at 63:19-21.
[317] Tr. Aug. 25, 2020 at 63:24-64:5.
[318] Ex. 2, IEPA Answers at 154 at 65:11-18. ("MR. OZAETA: Do the recordkeeping requirements of proposed Section 845.740 require that the CCR be transported off-site at any particular time intervals? MS. ZIMMER: Amy Zimmer. I think the rules as written show that it cannot accumulate, and that covers the process of transport. It cannot accumulate, so it has to be moved.").
[319] Tr. Aug. 25, 2020 at 63:17-64:12.
[320] Ex. 2, IEPA Answers at 64.
[321] Tr. Aug. 25, 2020 at 64:13-19.

Nor do those recordkeeping provisions set any requirements for transporting the coal ash offsite at any certain frequency or time duration.[322]

The Agency also indicates that not accumulating means that as ash goes into a storage pile, ash must come out, but that is also not required by the rules.[323] "MR. OZAETA: Is there an explicit requirement in Part 845, that coal ash must be taken out of a CCR storage pile before more can be placed in the pile? MS. ZIMMER: Amy Zimmer. The answer – the simple answer is no."[324] Consequently, the definition would allow piles of substantial amounts of waste that are present for long periods of times – years and possibly decades – to be considered "temporary accumulation."[325] In sum, the definition allows owner/operators to store CCR in piles for any length of time. Accordingly, the definition does not ensure that the accumulations are, in fact, temporary. Compare this with 415 ILCS 5/3.135(a-5)(E) which goes further in setting limits on accumulations. Section 5/3.135(a-5)(E) states "CCB is not to be accumulated speculatively. CCB is not accumulated speculatively if during the calendar year, the CCB used is equal to 75% of the CCB by weight or volume accumulated at the beginning of the period." Thus, Section 5/3.135(a-5)(E) demonstrates that it is feasible to provide a more concrete, quantitative and enforceable definition of "temporary accumulation." The definition's failure to place time and volume limits on "temporary accumulation" allows unlimited volumes of CCR to be placed in a waste pile for considerable periods of time, without specific controls. In short, neither the definition of "temporary accumulation" nor the definition of "CCR storage piles" are anywhere near protective enough to safeguard against pollution of Illinois' groundwater, surface water, and air.

The controls required by Section 845.270(b)(4)(B) do not cure the problem. While they add some key protections for piles, they include language that could be interpreted as providing "escape valves" allowing companies to avoid using needed protections. For example, berms to limit against run-on and run-off pollution are only required "where appropriate,"[326] and piles must only be tarped over the edge of the storage pad "where possible,"[327] Moreover, while the piles must be located on an "impervious storage pad" or have a "geomembrane liner," there are no technical details of what those liners must contain, in stark contrast to the voluminous technical precision of the liner requirements for CCR impoundments (and CCR landfills in the federal CCR rule). Finally, "good practices" during loading and unloading at piles is left entirely undefined, notwithstanding clear, evidence-based specific mandates that could and – if piles are allowed – should be put in place to limit dust pollution during loading and unloading.

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[322] Tr. Aug. 25, 2020 at 65:11-18.
[323] Tr. Aug. 25, 2020 at 64:17-65:10.
[324] Tr. Aug. 25, 2020 at 88:18-22.
[325] Ex. 2, IEPA Answers at 64 ("Closure by removal from a large CCR surface impoundment will take multiple years.").
[326] *See* Section 845.740(b)(4)(B)(v).
[327] *Id*. at (b)(4)(B)(iv).

In short, the rules' definitions and control requirements for CCR storage piles are completely inadequate. As US EPA understood in 2015 – and as the evidence of contamination at CCR piles has borne out – those piles pose a significant risk to health and the environment and should not be permitted short of the full safeguards resulting from classifying them as CCR landfills and requiring additional protections to account for piles' greater susceptibility to the elements.[328]

3. *The Board Has The Authority To Regulate Coal Ash Piles And Landfills.*

The Board has the authority to regulate coal ash landfills and coal ash piles.[329] First, the Coal Ash Pollution Prevention Act does not limit the Agency or the Board from regulating more broadly that what is specified in CAPPA.[330] The authority to regulate these sources comes from the Environmental Protection Act. Title V of the Environmental Protection Act covers Land Pollution and Refuse Disposal. Section 21 of the Act, within Title V, provides:

> No person shall . . . (a) Cause or allow the open dumping of any waste...
> (d) Conduct any waste-storage, waste-treatment, or waste-disposal operation:
>> (1) without a permit granted by the Agency . . . provided, however, that . . . no permit shall be required for (i) any person conducting a waste-storage, waste-treatment, or waste-disposal operation for wastes generated by such person's own activities which are stored, treated, or disposed within the site where such wastes are generated, …
>> (2) in violation of any regulations or standards adopted by the Board under this Act; or . . .

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[328] Notably, US EPA recognized in 2015 that even short-term "storage" piles are really disposal sites: "EPA also disagrees that the inclusion of CCR piles would capture on-going or short-term CCR management activities that do not constitute disposal. Irrespective of whether the facility is using the pile as 'temporary storage' or ultimately intends to direct the CCR to beneficial use, by placing the CCR on the land with no containment or other method of preventing environmental exposures, the facility is engaging in an activity that clearly falls within the statutory definition of disposal. *See* 42 U.S.C. § 6903(3) ('placing of solid waste . . . on any land, so that such solid waste . . . or any constituent thereof may enter the environment'") Ex. 5, 80 Fed. Reg. 21,302, 21,356 (Apr. 17, 2015) (emphasis added). This observation is consistent with the Illinois Pollution Control Board's June order holding that CCR placed on the land without controls constitutes "open dumping" under the Act. *See* Ex. 9, PCB 13-15, Interim Order at 86-91.

[329] Tr. Aug. 11, 2020 at 105:6-13 (Dunaway).

[330] Tr. Aug. 11, 2020 at 105:6-13: "MS. CASSEL: The Agency has additional authority to regulate polluting entities outside of what was authorized in the Coal Ash Pollution Prevention Act or what has been called earlier today as the Illinois CCR Act, I believe, is that correct? MR. DUNAWAY: Lynn Dunaway. Yes, the Agency has that authority."

(r) Cause or allow the storage or disposal of coal combustion waste unless: (1) such waste is stored or disposed of at a site or facility for which a permit has been obtained or is not otherwise required under subsection (d) of this Section . . . [331]

This prohibition on open dumping in the Environmental Protection Act has been held to apply to the current owner/operator even if the waste was placed on the site prior to the current owner/operator's involvement.[332]

The Board also has the authority to regulate landfills under Title IV, public water supplies. The legislature granted the Environmental Protection Agency the authority to regulate landfills where they pose the risk of causing groundwater contamination:

a) No later than January 1, 1989, the Agency, after consultation with the Interagency Coordinating Committee on Groundwater and the Groundwater Advisory Council, shall propose regulations to the Board prescribing standards and requirements for the following activities:

(1) landfilling, land treating, surface impounding or piling of special waste and other wastes which could cause contamination of groundwater and which are generated on the site, other than hazardous, livestock and landscape waste, and construction and demolition debris . . .[333]

4. *The Environmental Protection Act and Permitting*

The Environmental Protection Act does not preclude the Board from regulating coal ash landfills. As the Board pointed out in the *Sierra Club v. Midwest Generation* order, none of the landfills or fill areas in that case fulfilled the requirements of a sanitary landfill; none of them was a facility "permitted by the Agency for the disposal of waste on land"; and none of the fill areas of the historic coal ash storage areas had any permits at all.[334] None these areas were exempt from permitting under the Environmental Protection Act.

The Environmental Protection Act makes clear that waste operations are subject to permitting under Section 21(d).[335] Section 2l(d)(1) prohibits any person from conducting any waste-storage, waste-treatment, or waste-disposal operation without a permit issued by Illinois

[331] 415 ILCS 5/21.
[332] *Illinois EPA v. Rawe*, No. AC 92-5, 1992 WL 315780, at *3-5 (IPCB Oct. 16, 1992); *Illinois EPA v. Coleman*, No. AC 04-46, 2004 WL 2578712, at *7 (IPCB Nov. 4, 2004); *see also People v. Lincoln*, 70 N.E.3d 661, 679-80 (Ill. App. 4th Dist. 2016).
[333] 415 ILCS 5/14.4(a), (a)(1).
[334] *See* Ex. 9, PCB 13-15, Interim Order at 90-91(citing 415 ILCS 5/3.445).
[335] 415 ILCS 5/21(d).

EPA.[336] Section 21(d)(1)(i) provides an exception for "any person conducting a waste-storage, waste-treatment, or waste-disposal operation for wastes generated by such person's own activities which are stored, treated, or disposed within the site where such wastes are generated."[337]

Since 1975, the Board has interpreted the exception narrowly; applying it only to "*minor amounts of refuse* which could be disposed of *without environmental harm* on the site where it was generated" and this interpretation has been consistently sustained by the courts.[338] This construction of the exception is "consistent, long-continued, and in conjunction with legislative acquiescence on the subject."[339] Coal ash landfills are causing environmental harm, as the Board held in *Sierra Club v. Midwest Generation*[340] and therefore, are not subject to the exemption.

Despite recent enforcement before the Illinois Pollution Control Board involving groundwater contamination from Midwest Generation's coal ash sources, existing law is not sufficient to address the problems of onsite coal ash landfills. Enforcement action over contamination of groundwater from coal ash takes place after the fact when the harm is already done. Enforcement cases are also resource intensive and time consuming. For instance, the Midwest Generation case has been going on for eight years and remedy phase has just barely begun.[341] Because of the time and resources, and the fact that enforcement cases cannot prevent coal ash contamination from occurring, they are an inefficient means of addressing groundwater contamination from coal ash landfills.

Existing solid waste law does not preclude IEPA from permitting coal ash landfills under that existing law.[342] The unique circumstances of these sites, however, strongly suggest that they would be more appropriately addressed under a new set of regulations tailored to the circumstances. First, as discussed above, many, if not all, of these sites are causing groundwater

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336 *Id.*
337 *Id.*
338 *See Pielet Bros. Trading, Inc. v. Pollution Control Bd.*, 110 Ill. App. 3d 752, 755 (5th Dist. 1982) (traces the legislative history of the exemption and case law) (emphasis added); *see also In the Matter of Development, Operating and Reporting Requirements for Non-Hazardous Waste Landfills*, PCB R88-07, Proposed Opinion of the Board at 41 (Feb. 25, 1988); *People v. Commonwealth Edison Company,* PCB 75-368, Opinion Order of the Board at 5 (Nov. 10, 1976) (holding that an onsite CCW landfill violated Section 21(e)).
339 *Pielet Bros.*, 110 Ill. App. 3d at 756 (citing *People ex rel. Watson v. House of Vision*, 59 Ill.2d 508, 514-15 (1974)).
340 Ex. 9, Interim Order at 90-91 (June 20, 2019).
341 *See, e.g.*, *Sierra Club v. Midwest Generation*, *LLC*, PCB 13-15, Hearing Officer Order (Oct. 18, 2020) (Order setting discovery schedule for remedy phase).
342 *See, e.g.*, Ex. 16 Rehn Test., Attach. 16, Comments on Application for a Significant Modification to Permit: Bottom Ash Disposal; Lincoln Stone Quarry (Oct. 12, 2017).

contamination. Likely, they are all unlined and some of them have coal ash waste sitting in groundwater.[343] The regime used to regulate these sites needs to address existing violations of state groundwater regulations and the need for corrective action.

Second, some of these sites are known, but there are very likely many that are unknown. In the enforcement action against Midwest Generation, the presence of historic ash landfills at the facilities did not come to light until discovery in the case.[344] Unlike already-identified, permitted landfills, measures need to be put in place to locate unidentified coal ash landfills and the regulations need to place the investigatory burden on owners, not IEPA. Third, these sites are inactive and may contain just historic ash. Regulations need to address the inactive nature of these sites. Unlike landfill regulations where there is a need to focus on ongoing operations, coal ash landfill regulations need to focus on corrective action and safe closure. Fourth, unlike current solid waste regulations, there is no need for complex regulations that address multiple unique wastes streams such as landscape waste, construction waste, medical waste, household waste, etc. The waste at coal ash landfill sites should be fairly uniform.[345] For all these reasons, it makes sense to draft specific coal ash landfill regulations (which can even replicate many of the regulations for coal ash impoundments) instead of relying on existing solid waste regulations.

5. *Content of Rules Covering Coal Ash Landfills and Piles.*

The Board should address the gap in the rules left by the failure to include coal ash landfills and piles. The Board should include in this rulemaking regulations that address historic CCR landfills and piles in order to ensure that those CCR dumps do not continue contaminating Illinois' environment. Specifically, the Board should include in the rulemaking a prohibition on using unlined areas for the temporary or permanent storage or disposal of CCR and requirements for CCR landfills similar to those for CCR impoundments, including but not limited to requirements on groundwater monitoring, corrective action, closure, fees, and financial assurances.

If unlined old fill areas include coal ash that is in contact with water, in a floodplain, or in other inappropriate locations, the same mandate should apply as we propose for impoundments: the coal ash should be removed and moved to a safer disposal area. Lined CCR landfills and, where done properly, enclosures are the best options for storage of CCR, short of safe, encapsulated beneficial uses. Any new or expanded CCR landfill (or other landfill subject to federal CCR rule requirements)[346] should, in addition to meeting the requirements of the federal CCR rule for new CCR landfills, meet other requirements consistent with the rules we propose here for coal ash impoundments.

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[343] *See* Ex. 9, PCB 13-15, Interim Order at 27, 67.
[344] *See*, *e.g.*, *Sierra Club v. Midwest Generation*, *LLC*, PCB 13-15, Second Motion for Leave to File Amended Complaint (Jan. 14, 2015) (motion granted on Feb. 19, 2015).
[345] *See* Ex. 9, PCB 13-15, Interim Order at 27, 28, 41, 56-57, 67.
[346] That includes any CCR landfill, excluding MSWLFs, which received CCR on or after Oct. 19, 2015. *See* 40 C.F.R. §§ 257.50(d), 257.50(i).

If CCR is moved to an existing landfill not covered by the federal CCR rule, it should be one with a liner – defined as the type of liner required by the federal CCR rule for CCR landfills, *see* 40 CFR § 257.70, or, at a minimum, as the type of liner required for Municipal Solid Waste Landfills ("MSWLFs") under 35 Ill. Adm. Code Part 811. Moreover, all other protections at MSWLFs – including leachate collection, groundwater monitoring, daily cover, etc. – under 35 Ill. Adm. Code Part 811 should be required for landfills in which CCR will be stored or disposed.

In terms of the content of rules covering coal ash piles, enclosed structures can serve as relatively safe storage vessels for CCR as long as they are constructed, maintained, and operated in accordance with numerous regulatory safeguards. Lined CCR surface impoundments should not be permitted as sites where removed CCR is stored. While more protective than unlined CCR surface impoundments, lined impoundments have also proven to leak and are susceptible to forces such as wear and tear of liner, erosion of adjacent water bodies, flooding, seismic activity, and other forces that could destabilize the impoundment and lead to pollution of Illinois waters. Moreover, under the federal "Effluent Limits Guidelines" rule under the Clean Water Act, such impoundments are highly likely to be phased out (barred) in short order. It makes no sense to move CCR to other impoundments which will be required to close shortly, causing the Agency – and the public – all that much more work. Per the above comments, lined CCR landfills and, where done properly, enclosure are the best options of where to store CCR, short of safe, encapsulated beneficial uses.

If the Board chooses not to expand the Proposed Rule to cover coal ash fill, landfills and piles, the Board should open a sub-docket on coal ash fill, landfills and piles. The Board has the authority to do so under 35 Ill. Adm. Code 101.408 and has severed dockets many times previously.[347]

IV. The Proposed Rules Do Not Protect Communities near, and Workers at, Coal Ash Impoundments.

The proposed rules fall short on protecting communities adjacent to coal ash ponds and the workers who handle the ash, as we described in our pre-hearing comments.[348] The proposed rules thereby fail to satisfy the Coal Ash Pollution Prevention Act's directive to set "standards for responsible removal of CCR from CCR surface impoundments."[349] Key shortcomings of the

[347] *See, e.g.*, *In the Matter of: Water Quality Standards and Effluent Limitations For the Chicago Area Waterway System and Lower Desplaines River, Proposed Amendments to 35 Ill. Adm. Code 301, 302, 303, and 304*, R2008-009 (Rulemaking – Water), Hearing Officer Order (Mar. 18, 2010) (Severing the docket into several subdockets focused on different topics within the rulemaking); *In the Matter of: Nonhazardous Special Waste Hauling and the Uniform Program: Amendments to 35 Ill. Adm. Code 809*, R99-18 (Rulemaking-Land), 1998 Ill. Env. Lexis 617, 7 (Dec. 17, 1998) (Severing used oil management and oil transport rules from substantively different hazardous waste transport rules).
[348] *See* Envtl. Groups Initial Comments at 10-15.
[349] 415 ILCS 5/22.59(g)(10).

proposed rules illustrate their failure to require responsible removal as directed by the legislature: the requirements for both fugitive dust plans and safety and health plans do not ensure that workers and communities are protected from fugitive dust, and the Agency's proposed approach to monitoring and enforcement of these requirements is seriously deficient. Moreover, the proposed rules neither require consideration of alternatives to trucking for transport of excavated ash, nor limit the trucks that may be used for CCR transport to low- or zero-pollution trucks.

A. The Requirements for Fugitive Dust Control Plans and Safety and Health Plans in the Proposed Rules Fail to Ensure that Workers and Communities are Protected, as does the Agency's Intended Approach for Enforcing those Requirements.

Coal ash dust is severely harmful, and inhalation of CCR poses grave hazards to human health, especially during removal. Coal ash is emitted to the air during removal by loading and unloading, transport, and wind. Once in the air, fugitive dust can both impact workers on-site and migrate off-site, as IEPA has acknowledged,[350] and robust fugitive dust controls are therefore essential to protect both workers and nearby communities. Yet the proposed requirements are simply not adequate to ensure that robust dust controls are in place. The rules should require certain minimum dust control measures at all sites, together with a robust monitoring program to ensure that fugitive dust controls are in fact minimizing CCR dust pollution.

The fugitive dust control requirements in the proposed rules leave far too much up to coal ash pond owners' and operators' discretion.[351] Rather than allowing owner-operators to select from a non-exhaustive list of control measures that "may be appropriate" in Section 845.500(b)(1) – or even opt not to adopt those control measures as long as they provide "an explanation of how the measures selected are applicable and appropriate for site conditions" – the Agency should specify minimum dust control measures to be required of all sites, such as

[350] Ex. 1, Prefiled Testimony of Lauren Martin at 2 (June 2, 2020) ("Martin Test.") ("Worker safety protections, when properly implemented will also protect the surrounding communities by controlling the hazards within the worksite. Worker safety protections on site, by extension, prevents the hazardous materials from traveling offsite in quantities that could impact the health and wellbeing of the surrounding community."); Tr. Aug. 25, 2020 at 82:12-83:2 (Ms. Martin affirming that this statement in her testimony "remain[s] true"); *see also* Tr. Aug. 12, 2020 158:24-159:4 ("MS. GALE: . . . Is the Agency concerned about drying out that CCR such that it becomes a fugitive dust? MR. BUSCHER: There is always that concern."); Ex. 5, EPA, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities, 80 Fed. Reg. 21,302, 21,356 (Apr. 17, 2015) ("[T]he single most frequent issue presented during the public hearings was the allegation by individual citizens of damage caused by fugitive dusts from neighboring CCR facilities.").

[351] *See, e.g.*, Proposed Section 845.500(b) (leaving owners and operators to choose the measures they plan to use to control dust); Proposed Section 845.740(c)(2)(B) (requiring that "CCR must be handled to minimize airborne particulates and offsite particulate movement" but only "during any weather event or condition.").

non-toxic soil stabilizers or dust suppressants, on-site water trucks, off-site sweepers, track-out controls, covers or soil binders for covering stored or stockpiled soil, and vehicle covers during wind events.[352] Yet the Agency never considered specifying any minimum control measures,[353] and the Agency's testimony casts doubt on whether the Agency will review the measures chosen by owners and operators at all.[354] This is especially concerning considering the Agency's admission that certain dust control measures allowed under the Act, such as relying upon the water used to sluice the ash into the impoundment to suppress dust,[355] may not actually suppress the dust.[356] The Agency must review the dust control measures selected by owners and operators to ensure that those measures are actually sufficient to control dust at the site and during transport, and that the plan provides the specificity necessary to be enforceable.[357]

Another critical weakness of the proposed rule is its failure to require monitoring of fugitive dust. Even if a strong fugitive dust plan with strict controls is in place, a robust monitoring program is necessary to ensure that fugitive dust plans are working and being implemented properly. Dr. Ron Sahu's report on a proposed fugitive dust management plan at an Indiana CCR site, attached to Andrew Rehn's prefiled testimony, emphasizes the importance of robust air monitoring to ensure that fugitive dust controls are working:

> The purpose of air monitoring is to ensure that the dust control approaches and techniques that will be used during remediation, transport, and placement [of CCR]

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[352]*See* City of Burbank, Fugitive Dust Control, *available at* https://www.burbankca.gov/home/showdocument?id=2874, cited in Ex. 16, Rehn Test., Attach. 19, Comments on Fugitive Dust Plan Management and Lack of Air Monitoring as Part of Coal-Ash Removal Project at NIPSCO Michigan City Generating Station (MCGS) at 3 n.2 (Aug. 27, 2020).
[353] Ex. 2, IEPA Answers at 113 (Aug. 3, 2020) ("IEPA Answers").
[354] Ex. 2, IEPA Answers at 111 ("Will the Agency review owners' and operators' choice of fugitive dust control measures to ensure that the measures actually 'minimize CCR from becoming airborne at the facility'? Response: The Agency will review Fugitive Dust Control Plans for compliance with Part 845. Specifics related to worker safety are the jurisdiction of OSHA.").
[355] Ex. 3, IEPA Prefiled Answers, First Supp. at 18 (Aug. 5, 2020) ("49. The fugitive dust control plan offers examples of control measures to minimize CCR from becoming airborne, but does not include relying upon the water in the CCR surface impoundment. Is the Agency foreclosing the availability to rely upon the water used to sluice the ash into the basin to prevent potential fugitive dust emissions? Response: No.").
[356] IEPA witness Buscher testified that impoundment water enough is not necessarily sufficient to control dust. Tr. Aug. 12, 2020 at 155:10-21 ("MS. GALE: Okay. So that's what I mean by operate differently. A CCR surface impoundment typically has water on top of the CCR, right? MR. BUSCHER: Correct. MS. GALE: And actually that water acts as a dust suppressant, doesn't it? MR. BUSCHER: In some cases, yes. MS. GALE: I'm sorry. I guess when does water not act as a dust suppressant? MR. BUSCHER: When there's a delta built up and it's just damp.").
[357] *See* Ex. 16, Rehn Test., Attach. 19 at 2 ("While the elements of the plan . . . are important, without more detail they will not be effective since they are, at this point, just statements of purpose.").

> are effective. Feedback from ambient air monitoring is often used to adjust or enhance dust control methods as needed.[358]

Not only should the final rule require air monitoring, it should require that owner/operators prepare a monitoring *plan*, which should include baseline monitoring as well as monitoring during the entire duration of removal, continuous measurements for PM_{10} and $PM_{2.5}$ as well as periodic sampling of metals and radionuclides from the dust collected in the PM monitors, monitoring locations for both fixed and mobile monitors, defined sampling methods and schedules, among other elements.[359]

Agency witnesses testified that the Agency plans to rely on complaints to determine whether the fugitive dust plan contains sufficiently protective control measures.[360] The Agency's plan for enforcement based on investigating complaints that it "become[s] aware of," rather than based on actual emissions monitoring, is insufficiently protective. Visual observations cannot detect dangerous fine particulate matter, which is not visible to the eye,[361] and community members cannot be expected to be present at all times when fugitive dust emissions occur. Moreover, the proposed rules only require complaints to be published by owner-operators annually in a complaint log,[362] so there could be a months-long lag before the Agency becomes aware of a complaint indicating a problem with the fugitive dust controls at the site. And the proposed rules do not require any action on the part of owner-operators to address the factors underlying a complaint.[363] While we applaud the Agency's openness to change the language in the rule to make clear that any member of the public can make a complaint, it is clear that

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[358] *See id.* at 6

[359] For the full list of 12 minimum elements for a fugitive dust air monitoring plan, see *id.* at 6-7.

[360] When asked how the Agency would determine whether a fugitive dust plan is effectively controlling dust, Ms. Martin stated that the Agency would rely on complaints that it "become[s] aware of," Tr. Aug. 12, 2020 at 192, and "visual emissions across the property line," *id.* at 197.

[361] Ex. 16, Rehn Test., Attach. 19 at 5 ("However, this is not a substitute for actual air monitoring as discussed later in this document since it is presumed that this third-party effort will consist solely of periodic, visual, observations. PM2.5 is not typically visible to the eye. And, human observers cannot be present at all times at all activity areas.").

[362] *See* Proposed Section 845.500(b)(2).

[363] Ex. 2, IEPA Answers at 113 ("14.d. Do the Proposed Rules require owners or operators to investigate citizen complaints? Please explain. Response: No. [14.]e. Do the Proposed Rules require owners or operators to respond to citizen complaints? Please explain. Response: The Proposed Rules require that the owners or operators keep a log of citizen complaints and summary of corrective actions taken in the annual fugitive dust control report. [14.]f. Do the Proposed Rules require owners or operators to address the factors underlying citizen complaints? Response: No.").

enforcement based solely on complaints,[364] rather than actual monitoring of emissions, leaves communities vulnerable to harmful air pollution from fugitive dust.

The Agency's testimony in this proceeding also raised more questions than it answered about how the Agency will review and enforce the fugitive dust control plans, if at all. Agency witnesses stated that the Agency's role in reviewing the plans was limited to ensuring that owner-operators have a plan at all, and that the plan "meets the requirements of Part 845."[365] At times, the Agency implied that it would not enforce the requirements for fugitive dust plans at all, leaving enforcement of fugitive dust control measures to OSHA and the state Labor department.[366] Fugitive dust plans should be an enforceable part of the permit, and should be submitted to the agency for review and approval, as well as subject to public review and comment, prior to issuance of a permit, as required by the Coal Ash Pollution Prevention Act.[367] While the Agency has stated that it is open to amending the proposed rules to require that the most recent fugitive dust plan be "placed in the facility's operating record and available on the owner or operator's CCR website prior to filing a permit application pursuant to this Part,"[368] the proposal falls short of the Act's mandates. Rather, the rules must provide that the Agency actually review the plan components for sufficiency for dust control at the site, not just check that the plan ticks all the boxes required in Part 845, and enforce the plan as part of a CCR facility's permit.

The Agency and the Board can and must require controls of air emissions from CCR facilities, including robust fugitive dust control plans that protect communities and workers from fugitive dust, and enforce those requirements. The Agency has the authority to do so, contrary to

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[364] IEPA Post-hearing Comment at 36, Attach. 3. (Sept. 24, 2020) (replace "citizen complaint" with "member of the public").
[365] Tr. Aug. 11, 2020 at 194:8-10 ("MR. LECRONE: . . . The Agency's only role here at this point is to ensure that a plan is developed and that it meets the requirements of 845.").
[366] *See* Tr. Aug. 11, 2020 at 191:20-23 (MR. LECRONE: . . . The Agency is opposed making those plans [including fugitive dust plans] all enforceable permit conditions, primarily due to potential jurisdictional overlaps between other – our agency and other state and federal agencies."); Tr. Aug. 11, 2020 at 194:10-13 ("Implementation of that plan and/or failure to implement that plan kind of falls outside the scope of the 845 rule as drafted."); Ex. 2, IEPA Answers at 111 ("Will the Agency review owners' and operators' choice of fugitive dust control measures to ensure that the measures actually 'minimize CCR from becoming airborne at the facility'? Response: The Agency will review Fugitive Dust Control Plans for compliance with Part 845. Specifics related to worker safety are the jurisdiction of OSHA.").
[367] See 415 ILCS 5/22.59(g)(3) (requiring the Board to adopt rules that "specify which types of permits include requirements for closure, post-closure, remediation and all other requirements applicable to CCR surface impoundments") (emphasis added).
[368] IEPA Post Hearing Comment, Attach. 3, at 36; *see also* Tr. Aug. 21, 2020 at 187.

its position in its post-hearing comment.[369] First, the Coal Ash Pollution Prevention Act grants the Agency and the Board such authority, both via its directive to ensure "responsible removal of CCR from CCR surface impoundments,"[370] and its mandate to adopt rules "*at least as* protective as" the federal coal ash rules,[371] which include fugitive dust protections for coal ash impoundments.[372] Second, the Agency and the Board are charged with carrying out the mandates of the Illinois Environmental Protection Act, which include air quality control.[373] In short, both longstanding statutory provisions and the recent amendments to the Illinois Environmental Protection Act authorize the Agency to require stronger controls of fugitive dust than what the federal CCR Rule requires.[374]

Yet the proposed rules default to the federal floor, as Proposed Section 845.500 copies the fugitive dust provision from the federal CCR Rule with few changes.[375] And while the federal Occupational Safety and Health Administration (OSHA) fugitive dust control requirements apply and will continue to apply to the CCR sites regulated under the proposed rules, the Board may also require fugitive dust controls because fugitive dust threatens

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[369] IEPA Post-Hearing Comment, Attach. 1, at 7 ("Does the Agency have the authority to require air monitoring as it deems necessary to protect nearby communities and the public from fugitive dust? Hrg. Transcript Aug. 25, 2020, p. 59. Agency Response: Statutory prohibitions against air pollution apply to owners or operators of CCR surface impoundments, but the Act doesn't authorize the Agency to mandate that sources conduct fence line air monitoring. There is no statutory or regulatory requirement, and the Illinois EPA is not inclined to push the boundaries of its authority in this rulemaking to insert such a requirement.").
[370] 415 ILCS 5/22.59(g)(10).
[371] *Id.* 5/22.59(g)(1) (emphasis added).
[372] *See* 40 C.F.R. § 257.80.
[373] 415 ILCS 5/8 ("It is the purpose of this Title to restore, maintain, and enhance the purity of the air of this State in order to protect health, welfare, property, and the quality of life and to assure that no air contaminants are discharged into the atmosphere without being given the degree of treatment or control necessary to prevent pollution."); *id.* 5/10 ("The Board . . . may adopt regulations to promote the purposes of this Title."); Tr. Aug. 25, 2020 51:24-52:6 ("MR. OZAETA: The agency is charged with carrying out the mandates of the Illinois Environmental Protection Act, correct? MS. MARTIN: . . . Yes. MR. OZAETA: And air quality is one of those mandates; is that correct? MS. MARTIN: Yes.").
[374] The Federal CCR Rule is the floor for Illinois's regulations; The Coal Ash Pollution Prevention Act directs the Board to adopt rules governing coal ash impoundments in Illinois that are "at a minimum . . . at least as protective . . . as the federal regulations or amendments thereto promulgated by the Administrator of the [US EPA] in Subpart D of 40 CFR 257 governing CCR surface impoundments." 415 ILCS 5/22.59(g)(1).
[375] The federal rule contains one provision that applies only to CCR landfills, 40 C.F.R. § 257.80(b)(2); otherwise the air criteria provisions, which concern fugitive dust, in the federal CCR rule and the Agency's Proposed Rule are the same. *Compare* 40 C.F.R. § 257.80 *with* Section 845.500.

community air quality as well as worker safety.[376] The Agency has defaulted to the floor of what is required under the federal CCR Rule and OSHA standards, but it can and must do more to ensure "responsible removal" and protect Illinois communities from fugitive dust.

Provisions for review and enforcement of Safety and Health Plans also must be strengthened. As we have learned from other coal ash cleanup efforts, coal ash workers often bear the brunt of coal ash injuries.[377] The workers who clean up coal ash are subject to increased risk of harm and accordingly must be assured extensive protections to protect their health and that of their families. Yet the proposed rule's Safety and Health plan provisions do not provide the necessary protections. The Agency's stated enforcement approach – simply checking to see if owner-operators have a safety plan without checking the plan for compliance with requirements or making sure the plan is sufficiently protective of workers[378] – will not ensure that workers are protected.

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[376] Because fugitive dust impacts extend into the community, Illinois may regulate air quality through fugitive dust control requirements even though OSHA standards also address fugitive dust, as regulations that address fugitive dust are laws of general applicability that protect workers and community members alike. *See Gade v. Nat'l Solid Wastes Mgmt. Ass'n*, 505 U.S. 88, 107 (1992); *Steel Inst. of N.Y. v. City of N.Y.*, 716 F.3d 31, 37 (2d Cir. 2013) (finding that New York City's craner regulations had "general applicability" because any crane collapse would pose a "substantial and palpable" risk to pedestrians and workers alike); *but see Assoc. Builders & Contractors Fla. E. Coast Chapter v. Miami-Dade Cty.,* 594 F.3d 1321, 1324 (11th Cir. 2010) (finding that similar crane regulations in Miami-Dade County were not laws of general applicability, as construction sites were closed to the general public).
[377] *See* Tr. Public Comments Aug. 12, 2020 77:19–78:7 (Comment of Rachel Tompkins, urging stronger worker protections in light of illnesses and deaths of workers removing coal ash after 2008 CCR spill in Tennessee); Tr. Public Comments Aug. 13, 2020 20:14–22:22 (Comment of Dr. David Main, pulmonary medicine practitioner, advocating that the rules should require personal protective measures in all instances of CCR manipulation, documentation, reporting, and health and safety training); Tr. Sept. 30, 2020 144:21–147:11 (Comment of Maria Peterson, former U.S. Department of Labor attorney, calling on the Board to strengthen safety and health plan requirements and fugitive dust protections in the proposed rule). *See also* Envtl. Groups Initial Comments at 12–13.
[378] The agency does not plan to review and enforce safety and health plans beyond checking for inclusion of requirements in Part 845. *See* Ex. 2, IEPA Answers, at 119-120 ("23. b. How much Agency staff time and resources will be dedicated to reviewing facility Safety and Health Plans? Response: The Agency will not be providing staff and resources for facility Safety and Health Plans.") Tr. Aug. 12, 2020 178: 13-18; 208:21-209:2 ("LEGGE: Will the Agency review the Material Safety Data Sheets for sufficiency and adequacy or will they review just to say they have them? MARTIN: . . . We will be reviewing that they have them, not for sufficiency."). Nor does the agency plan to review the safety data sheets included in the plan or make any determination on their sufficiency. *See* Ex. 2, IEPA Answers, at 116. ("18. b. Will IEPA verify that any owner/operator-created data sheets: i. Are at least as comprehensive and accurate as the ones adopted by OSHA? Response: The Agency is not responsible for safety data sheets. US Department of Labor Occupational Safety and Health Administration is responsible for enforcement of its own regulations."), *id.* at 116-117 ("18.d. Will the Agency verify that the owner/operator-created data

Moreover, the requirements as drafted are confusing and vague. First, the provisions regarding incorporation of Occupational Health and Safety Administration (OSHA) standards into the plan are both confusing and insufficient. For example, Proposed Section 845.530(b) states that the owner or operator must "implement the Occupational Safety and Health Administration regulations in Chapter 17 of Title 29 of the Code of Federal Regulations *for all hazards not otherwise classified as defined in 29 CFR 1910.1200(c)*" (emphasis added). Referring only to "for all hazards not otherwise classified" makes little sense here because 29 CFR 1910.1200(c) defines "hazards not otherwise classified" as certain limited health *effects*, rather than referring to particular coal ash constituents or handling of ash more generally.[379] Although the Agency in prefiled answers explained that the use of the term "hazards not otherwise classified" was based on the Agency's assumption that the CCR material would fall within that class,[380] the term confuses more than it illuminates. The Rule should clarify that owner-operators must implement all applicable OSHA regulations in Chapter CXVII of Title 29 of the Federal Register, including 29 C.F.R. §§ 1910.120 and 1926.65 (hazardous waste

sheets meet regulatory requirements? Response: No. OSHA is responsible for verifying safety data sheets meet regulatory requirements.").

379 Additional drafting errors in this section create ambiguity, including in Proposed Sections 845.530(c)(1) and (c)(2) . Proposed Section 845.530(c)(1) should be changed back to require employers to provide "a description of how the training program is designed to meet actual tasks," as it said in the stakeholder draft, rather than a description of how the "training program updates," which is considerably more vague. Drafting errors in Proposed Section 845.530(c)(2) need to be fixed to make sure that the list of training contents has parallel structure, i.e. so that the training program *includes* the items in (E) through (G), rather than making sure that employees can "respond effectively to" them.

380 Ex. 2, IEPA Answers at 117 ("In Proposed Section 845.530(b)(2), why did the Agency add the phrase 'for all hazards not otherwise classified as defined in 29 CFR 1910.1200(c)' after 'implement the Occupational Safety and Health Administration regulations in Chapter 17 of Title 29 of the Code of Federal Regulations'? Response: The Agency added the language to be clear that the Agency considers all work that occurs as a result of the WIIN Act (an amendment to RCRA) to be a part of RCRA and most of the hazards do fall outside of the traditional 'hazardous waste' definition. The CCR material can be dealt with as an individual material per the site with a site specific characterization most likely falling within the 'hazards not otherwise classified' or the hazardous constituents in the site specific CCR material can be identified these include, but are not limited to, arsenic, cadmium, and silica. The Agency is just pointing out the two ways in which to comply with the federal regulation."); *see also* Tr. Aug. 12, 2020 211:10–212:8.

operations),[381] 1910.141 (sanitation),[382] and 1910.1200 (hazard communication and training),[383] as well as regulations for all toxic and hazardous chemical constituents identified in the CCR pursuant to Proposed Sections 845.230(a)(15) and 845.230(d)(2)(C), OSHA regulations for which are found in 29 C.F.R. §§ 1910.1000-1096.[384] The Proposed Rule as currently written confuses the reader as to which OSHA regulations may apply.

In sum, the fugitive dust control requirements of the proposed rules must be strengthened by including specific minimum control measures, dust pollution monitoring requirements, and Agency and public review and oversight. The Agency must also clarify vague language in the Safety and Health Plan provisions, and the Agency must enforce the requirements in the plans. The Coal Ash Pollution Prevention Act demands protective requirements including responsible removal,[385] and given the risks from inhaling coal ash dust, Illinois workers and communities deserve no less.

B. <u>The closure alternatives analysis in proposed Section 845.710 should require consideration of transportation alternatives.</u>

The closure alternatives analysis required by proposed Section 845.710 does not explicitly require any analysis of transportation alternatives. By not requiring consideration of multiple modes of transporting ash during closure by removal, the proposed rules fail to protect

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[381] *See* IEPA Statement of Reasons at 21 (Mar. 30, 2020) ("For worker exposure safety, the owners and operators must implement The United States Department of Labor's Occupational Safety and Health Administration ("OSHA") standards in 29 CFR 1910.120 and 29 CFR 1926.65."); Ex. 1, Martin Test. at 2 ("[O]ther federal regulations, 29 CFR 1910 and 29 CFR 1926, provide air criteria requirements for site worker safety."); Ex. 2, IEPA Answers at 118 ("Because Part 257 and now 845 are amendments to RCRA, 29 CFR 1910.120 is applicable for work with the CCR material.").
[382] Ex. 2, IEPA Answers at 118 ("[19.]e. Why did the Agency decline to add a requirement, suggested by ELPC, Prairie Rivers Network, and Sierra Club, that the owner or operator provide certain measures for workers, including onsite changing rooms with regularly maintained lockers and showers for workers engaged in the handling, movement, cleanup or excavation of CCR; reasonable time for workers to shower and change into or out of work clothes and protective gear; and onsite enclosed areas or areas shielded from CCR fugitive dust for workers to take breaks and eat meals? Response: It is already required in 29 CFR 1910.141–Sanitation.").
[383] Ex. 2, IEPA Answers at 116 ("29 CFR 1910.1200 is the federal regulation for safety data sheets. Each owner/operator is responsible for implementing 29 CFR 1910.1200 as it directs in 29 CFR 1910.1200").
[384] OSHA regulations of toxic substances that are likely to be relevant to CCR sites in Illinois include 29 C.F.R. §§ 1910.1018 (inorganic arsenic), 1910.1024 (beryllium), 1910.1025 (lead), 1910.1027 (cadmium), and 1910.1053 (respirable crystalline silica). *See* Ex. 1, Martin Test.at 2–3 ("In 845.500(b) Illinois EPA is addressing specific hazardous substances that are found within the CCR materials. Specifically, these materials are arsenic, beryllium, lead, cadmium and silica.") and 3–5 (discussing requirements of 29 C.F.R. §§ 1910.1018, .1024, .1025, .1027, and .1053).
[385] S*ee* 415 ILCS 5/22.59(g)(10).

communities near ash sites and along transportation routes. The alternatives analysis should be required to consider, at a minimum, transport of removed ash by rail, barge, and low-polluting (including, where feasible, electric) trucks, or a combination thereof.

Transport by train or barge could have very different air pollution impacts – considering CCR fugitive dust, exhaust, and impacts on traffic patterns for non-CCR related traffic – than transport by truck,[386] and neither the Agency nor the public can meaningfully evaluate the closure by removal option without understanding the potential impacts of the transport of the excavated ash.

Transport of removed ash by rail and barge is likely to be an option for many CCR impoundments, given historic use of those transportation networks for delivery of coal to the power plants that generated the ash.[387] In closure plans, trucks are typically the only transportation method assessed as part of analysis of closure by removal.[388] However, several CCR surface impoundment in Illinois have relatively easy access to rail.[389]

Using free spatial data available through ESRI's online database, Andrew Rehn mapped the approximate locations of rail spurs relative to coal ash impoundments and landfills.[390] Mr. Rehn's map shows that Waukegan, Will County, Joliet 9 (Lincoln Stone Quarry), Joliet 29, Hennepin, Edwards, Powerton, Duck Creek, Havana, Meredosia, Pearl Station, Dallman, Kincaid, Coffeen, Wood River, Venice, Newton, Baldwin, Prairie State Generating Station, Marion, and Joppa all have rail spurs either located on the property (in most cases) or less than a mile way (in a few cases).[391] In addition, many of the sites are along major rivers with significant barge traffic, including the Illinois and the Mississippi, indicating that transporting CCR by barge is also likely a reasonable alternative to consider at many CCR sites in Illinois.[392]

Although Mr. Rehn's map is not, nor is it intended to be, a definitive statement on the feasibility of transport of ash by rail or barge at any given impoundment,[393] the map makes clear that these options are potentially viable at many sites. Requiring owner/operators to evaluate

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[386] *See* Ex. 16, Rehn Test. at 10.
[387] *See* Ex. 17, Rehn Answers at 4 ("I am aware that coal is often brought to coal-fired power plants via train or barge, and one issue that I would like to see explored in an alternatives analysis is whether they would be able to reverse that process."); Tr. Sept. 29. 2020 290:4-22 (Andrew Bittner stating that he knows "of a number of [CCR] sites" served by rail and that he is aware of at least one site where closure by removal was performed using barge).
[388] Ex. 16, Rehn Test. at 10.
[389] *Id.*
[390] *Id.*
[391] *See* Attach. 18 to Ex. 16, Rehn Test.
[392] Ex. 16, Rehn Test. at 10.
[393] *See* Ex. 17, Rehn Answers at 4-5, 19.

transportation alternatives in the closure alternative analysis is the right approach because they will have site-specific information that may not be available to members of the public, such as Mr. Rehn, or the Agency.[394] Such analyses would provide the Agency and the public information they need to make informed decisions about how best to protect communities in and around coal ash ponds during closure.[395]

Similarly, the proposed rules should also mitigate potential harms from use of diesel trucks where rail and barge are not feasible by requiring consideration – and, if viable, use – of low-emission and zero-emission trucks for removal. Specifically, to minimize exhaust pollution from trucks, the closure alternatives analysis should include an evaluation of whether electric trucks can haul some or all of the excavated ash, and, if so, a mandate that such trucks be used to transport excavated ash. Where electric trucks are not feasible, the rules should require that low-emission trucks be used to haul coal ash. In short, there are different types of trucks, some less-polluting than others, and the required consideration of transportation alternatives should not be limited to evaluation of dirty trucks, rail and barge.

Requiring the closure alternative analysis to include an analysis of transportation alternatives is well within the Agency's authority. The Agency is charged with carrying out the mandates of the Illinois Environmental Protection Act, and air quality is one of those mandates.[396] The Agency also has the authority to enforce fugitive dust restrictions that protect communities and the public from CCR dust, and the Agency already administers fugitive dust regulations that concern trucks and transport.[397] Other states, such as Virginia, also specifically require an analysis of transportation options, such as rail and barge, for transporting CCR.[398]

Consistent with that authority, according to Mr. Dunaway, the Agency is already expecting every closure alternative analysis to include a review of the specific types of transportation available for closure by removal for each impoundment.[399]

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394 *See id.*
395 *See* Tr. Aug. 13, 2020 232:21-233:3 ("MS. BUGEL: Would one way to obtain site specific information about what [types of transportation alternatives are] available would be to require owners and operators to explore the alternatives in their closure alternatives analysis? MR. DUNAWAY: Dunaway. That would be one way.")
396 Tr. Aug. 25, 2020 51:17-52:6.
397 Tr. Aug. 25, 2020 55:19-56:9.
398 *See* Exhibit 44, Senate Bill 1355, 2019 Gen. Assemb. (Va. 2019) and Exhibit 45, H.R. 443, 2020 Gen. Assemb. (Va. 2020).
399 Tr. Aug. 13, 2020 230:19-231:3 (MS. BUGEL: Would it be your intention to request an analysis of the transportation options if you receive a closure alternatives analysis that does not include that analysis? MR. DUNAWAY: Lynn Dunaway. I would expect those analysis would be in there. If they're not, it's something I believe the rule calls for and I would ask for it"); Tr. Aug. 13, 2020 229:20-230:3 ("MR. DUNAWAY: This is Lynn Dunaway. Okay. Lynn Dunaway. The Agency will thoroughly review closure

However, proposed Section 845.710 does not include an explicit requirement that an owner or operator include an analysis of transportation alternatives.[400] The language in proposed Section 845.710 should be more explicit to ensure clarity regarding what must be included in the closure alternatives analysis and to minimize Agency resources needed to follow up with applicants and request more information.[401]

For these reasons, the closure alternatives analysis in proposed Section 845.710 should explicitly require consideration of transportation alternatives.

V. The Proposed Rules Fail to Provide Essential Permitting Authority Oversight.

The proposed rules provide neither essential permitting authority oversight nor a permitting scheme that complies with the Coal Ash Pollution Prevention Act's requirements. The proposed rules fail to make clear that all requirements applicable to coal ash surface impoundments shall be enforceable conditions of permits. Critical plans and assessments, as well as documents underlying those plans and assessments, are not required by the proposed rules to be submitted as part of a permit application. Without such requirements, the proposed rules fail

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alternatives analysis. Every closure alternatives analysis has to include closure by removal and since closure by removal requires identification of transportation methods, the Agency will thoroughly review the transportation methods"); *see also* Ex. 2, IEPA Answers at 59 ("The Agency has not reviewed specific types of transportation available for closure by removal at the various impoundments throughout the state. The Agency has not ruled any type of transportation out. This will be thoroughly reviewed for each impoundment in the closure alternatives analysis").

[400] *See* Proposed Section 845.710.

[401] *See* Ex. 19, Payne & Ian Magruder Test. at 31 (recommending that the Agency require modeling documentation to include all information necessary to understand and review the model so that the Agency and the public have a complete understanding of the source of data and rationale for model set up to review groundwater models used to predict closure performance); Ex. 16, Rehn Test. at 7:

> In part, this may be due to the way I've seen Illinois EPA regulate coal ash sites, which is to request more information about industry proposals until the company refines their solution to something that Illinois EPA can accept. If this back and forth becomes a stalemate, Illinois EPA might deploy its only prescriptive tool – an enforcement action. In my opinion, this regulatory method incentivizes industry to do a lackluster job in their initial offering, trying to find the cheapest option that will get approval and having no real reason to do a comprehensive analysis. Industry can start low and slowly raise the bar until Illinois EPA approves. The solution to this problem is rules that establish comprehensive requirements for the alternatives analysis such that all the options are fully vetted from the outset. If the Agency and the public have the opportunity to review the full set of closure or corrective action options in one comprehensive document, they will be far better equipped to evaluate which options best protect public health and the environment and require that the best option be chosen.

to ensure necessary Agency oversight and public participation. Certification by a third party is not sufficient to meet the statutory requirements. All plans, proposals, and assessments, as well as supporting documentation, for all coal ash surface impoundments, must be submitted as part of a permit application to ensure the Agency and public has access to all necessary information.

US EPA has explained that the 2015 Federal Coal Ash Rule was promulgated to be self-implementing with the understanding that there would be no permitting oversight allowing for essential site-specific analysis.[402] The WIIN Act calls for increases in oversight and enforcement, authorizing Illinois to replace the self-implementing 2015 Federal Coal Ash Rule with a permitting scheme where regulatory requirements are administered and enforced through permits. The WIIN Act also requires state permit programs to ensure that all CCR units achieve compliance with criteria at least as protective as the 2015 Federal Coal Ash Rule and that state permit programs must be "a permit program or other system of prior approval and conditions," meaning that state permit programs must require prior state approval before any continued operation, closure, or corrective action can occur.[403]

To address the hole in regulatory oversight left by the 2015 Federal Coal Ash Rule, the Coal Ash Pollution Prevention Act aimed to establish a comprehensive permitting program – mandating that all requirements applicable to CCR impoundments be included in permits;[404] that the Agency receive significant funding to implement the permitting program;[405] and that the program include robust, meaningful opportunities for public participation.[406] Because the "requirements applicable to CCR surface impoundments" include completion and/or compliance with specific assessments, plans, and demonstrations, the Coal Ash Pollution Prevention Act and the Environmental Protection Act, require that completion of those plans and assessments and compliance with the plans, once approved by the Agency, be enforceable conditions of permits.

In order to ensure Agency oversight, transparency, and meaningful public participation and not hinder enforcement, the documents essential for determining compliance with the requirements for CCR surface impoundments—including all plans and demonstrations mentioned above, together with other assessments and financial assurance documents required by the Federal Coal Ash Rule, the Coal Ash Pollution Prevention Act, and these rules—must be required to be submitted in permit applications.

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[402] 80 Fed. Reg. 21,302, 21,311 (April 17, 2015); *USWAG*, 901 F.3d at 437 (citing counsel for EPA's oral argument explanation that certain provisions of the 2015 Federal Coal Ash Rule "cry out for site specific enforcement").
[403] 42 U.S.C. § 6945(d)(1)(B).
[404] 415 ILCS 5/22.59(g)(3) requires that the rules "specify which types of permits include requirements for closure, post-closure, remediation and all other requirements applicable to CCR surface impoundments."
[405] 415 ILCS 5/22.59(j) specifies fees to be paid by owners and operators of CCR surface impoundments, while 415 ILCS 5/22.59(k) specifies that those fees are to be deposited into the "Environmental Protection Permit and Inspection Fund."
[406] *See* 415 ILCS 5/22.59(a), (a)(5), and (g)(6).

A. The Rules Must Require All Plans, Assessments, and Supporting Documentation be Provided As Part of a Permit Application.

The proposed rule covering operating permits (proposed section 845.230) contains a list of important assessments and plans covering the operation of the CCR surface impoundment, but instead of requiring that the assessments and plans be submitted as part of a permit application, it just requires a certification by a qualified professional engineer that the plans or assessments meet the requirements of the rule. The proposed rules' failure to require submission of the underlying assessments, plans, and their supporting documents means that the public has no opportunity to review and comment on their adequacy in the permitting process, which conflicts with the public participation requirements of the Coal Ash Pollution Prevention Act.

The proposed rule for operating permits (proposed section 845.230) does not require a CCR permit applicant to submit, as part of its permit application, any of the following essential information:

- Composite liners and design criteria
    - For existing CCR impoundments, the proposed rules do not require as part of a permit application any documentation supporting either a certification that a composite liner meets the design criteria requirements or a statement that that the CCR surface impoundment does not have a liner that meets the requirements.[407]
- Initial hazard potential classification assessment
    - For existing CCR surface impoundments, the proposed rules do not require as part of a permit application the initial hazard potential classification assessment or the certification of the initial hazard potential assessment.[408]
    - For new or expanded CCR impoundments, the proposed rules do not require as part of a permit application any documentation supporting the certification that the initial hazard potential assessment was completed according to the requirements.[409]
- Initial Emergency Action Plan
    - For both existing and new or expanded CCR impoundments, the proposed rules do not require as part of a permit application the Emergency Action Plan. Only

[407] *See* Proposed Section 845.220(d)(2)(K) (only requires a certification that liner meets requirements of Proposed Section 845.400(b) or (c) but does not require that documents supporting that certification be included in an application).
[408] *See* Proposed Section 845.230(d) (no requirement to submit either the hazard potential classification assessment or a certification that the hazard potential classification meets the requirement of the rules).
[409] *See* Proposed Section 845.230(a)(6) (only requires certification but does not require the actual assessment be submitted nor the documents supporting certification).

the initial emergency action plan certification is required to be submitted in the initial and operating permit renewal applications.[410]

- Initial structural stability assessment
    - For existing CCR surface impoundments, the proposed rules do not require as part of a permit application the initial structural stability assessment or the certification of the initial structural stability assessment.[411]
    - For new or expanded CCR impoundments, the proposed rules require only the certification must be submitted in operating permit applications but do not require either the assessment itself or the documents supporting certification.[412]
- Initial safety factor assessment
    - For existing CCR surface impoundments, the proposed rules do not require as part of a permit application the initial safety factor assessment or the certification of the initial safety factor assessment.[413]
    - For new or expanded CCR impoundments, the proposed rules do not require as part of a permit application any documentation supporting the initial safety factor assessment. Only the initial safety factor assessment certification is required to be submitted in operating permit applications.[414]
- Fugitive dust control plan
    - For existing impoundments, the proposed rules do not require as part of a permit application the Fugitive Dust Control Plan. Only the initial fugitive dust control plan certification is required to be submitted in the initial and operating permit renewal applications.[415]

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[410] *See* Proposed Section 845.230(a)(7) (for new or expanded CCR surface impoundments, only requires certification of emergency action plan but does not require actual emergency action plan nor documents supporting certification); Proposed Section 845.230(d)(2)(F) (same deficiency for existing CCR surface impoundments).

[411] *See* Proposed Section 845.230(d) (no requirement to submit either the structural stability assessment or a certification that the structural stability assessment meets the requirement of the rules).

[412] *See* Proposed Section 845.230(a)(8) (only requires certification that the structural stability assessment meets the requirements of Proposed Section 845.450(c) but does not require either the actual assessment be submitted as well nor does it require that the documents supporting certification be provided as part of permit application).

[413] *See* Proposed Section 845.230(d) (no requirement to submit either the safety factor assessment or a certification that the safety factor assessment meets the requirement of the rules).

[414] *See* Proposed Section 845.230(a)(9) (only requires certification that the safety factor assessment meets the requirements of Proposed Section 845.450(c) but does not require either the actual assessment be submitted as well nor does it require that the documents supporting certification be provided as part of permit application).

[415] *See* Proposed Section 845.230(d)(2)(G) (only requires certification that fugitive dust control plan meets requirements of Proposed Section 845.500(b)(7) but no requirement to submit the actual plan nor the documents supporting certification).

- Initial inflow design flood control system plan
    - For existing CCR surface impoundments, the proposed rules do not require as part of a permit application the initial inflow design flood control system plan or the certification of the initial inflow design flood control system plan.[416]
    - For new or expanded impoundments, the proposed rules do not require as part of a permit application any documentation supporting the initial inflow design flood control system plan. Only the initial inflow design flood control system plan certification is required to be submitted in operating permit applications.[417]
- Safety and Health Plan
    - For any permit application, the proposed rules do not require as part of a permit application the safety and health plan.[418]

These essential plans and assessments, as well as their supporting documentation, include fundamental protections that must not be excluded from the permitting process or public participation. Fugitive Dust Control Plans are a good example. As discussed above, fugitive CCR dust poses a grave threat to workers, passersby, and affected communities if not properly controlled, and many instances of harm from CCR dust have been documented, including here in Illinois.[419] Requiring submission of the Fugitive Dust Control Plan in permit applications for existing CCR impoundments, and incorporating the approved plan as an enforceable part of the permit, is essential to provide the oversight necessary to ensure that the Fugitive Dust Control Plan is adequately protective.

Requiring submission of the Inflow Design Flood Control Plan, as well as incorporating the approved plan into a permit, is also necessary because flood control is critical at CCR surface

[416] *See* Proposed Section 845.230(d) (no requirement to submit either the inflow design flood control system plan or a certification that the plan meets the requirement of the rules).
[417] *See* Proposed Section 845.230(a)(11) (only requires certification that inflow design flood control system plan meets requirements of Proposed Section 845.230(c)(3) but does not require submission of the plan itself or the documents supporting certification).
[418] *See* Proposed Section 845.230(a) (for new or expanded CCR surface impoundments, no requirement to either submit the safety and health plan required by Proposed Section 845.530 or a certification that the plan meets the requirements of Proposed Section 845.530); Proposed Section 845.230(d)(2) (same deficiency for existing CCR surface impoundments).
[419] Ex. 1, Prefiled Test. of Lauren Martin at 2 (June 2, 2020) ("Worker safety protections, when properly implemented, will also protect the surrounding communities by controlling the hazards within the work site. Worker safety protections on site, by extension, prevents the hazardous materials from traveling offsite in quantities that could impact the health and wellbeing of the surrounding community."); Tr. Aug. 25, 2020, at 82:12-83:2 (Ms. Martin affirming that this statement in her testimony "remain[s] true"); *see also* Tr. Aug. 12, 2020, 158:24-159:4 ("MS. GALE: . . . Is the Agency concerned about drying out that CCR such that it becomes a fugitive dust? MR. BUSCHER: There is always that concern.").

impoundments.[420] Floods can lead, and have led, to devastating outcomes at CCR impoundments and landfills in the US.[421] With many of Illinois' CCR surface impoundments sitting adjacent to flood-prone rivers and lakes, Agency review and approval of these plans is critical.[422]

It is likewise essential that the Agency review and approve updated hazard potential classification assessments, structural stability assessments, and safety factor assessments for coal ash impoundments. The Agency must have an up-to-date understanding of the stability of these sites in order to, among other things, assign them a proper closure priority classification or order immediate action to prevent collapse. The Agency acknowledged that real harms can occur if structural stability is not maintained.[423] Conditions can and do change quickly as evidenced by

[420] Ex. 14, Hutson Test. at 10 ("Hydrologic dangers to waste disposal sites located on floodplains were illustrated in 2018 when rising floodwaters in Wilmington, North Carolina inundated CCR storage and disposal units at Duke Energy's L.V. Sutton Steam Plant. Flood waters from storms upstream of the plant sent flood waters from the Cape Fear River through current and former ash impoundments, breached an ash landfill, and released an unknown quantity of ash.").

[421] Ex. 14, Hutson Test. at 10: "Storm-induced high water events are capable of overtopping berms and increase the potential for catastrophic release of wastes. Rising water elevations caused by even minor high water events will re-wet CCR contained in the unlined disposal unit and renew production of leachate each time. Sites located on active floodplains are subject to hydrologic and geomorphic processes which, over time, will damage facilities and eventually cause catastrophic releases of stored wastes. Locating waste containment structures within the 100-year floodplain should be viewed, at best, as unacceptable waste management planning and a practice that will facilitate contamination of waters of the state and have potentially catastrophic results for future residents. Large flood events will eventually create flood conditions that will overtop the berms and increase the potential for catastrophic release of wastes. Over the long term, capping CCR impoundments in place on the floodplain is neither secure nor permanent."

[422] Ex. 14, Hutson Test. at 10: "River channels are not stationary features. Lateral and/or downstream channel migration or sudden switches of the channel location, likely initiated during a flood event, will eventually impinge on and undercut containment structures. An active floodplain along a meandering river can never be an acceptable location for establishing or maintaining a permanent waste disposal facility. The addition of more coal ash to waste disposal units in such locations is equally unacceptable. The Illinois CCR rules should drive down the volume of waste subject to eventual release during flood events, and prohibiting placement of additional waste on floodplains is an important first step."

[423] Tr. Aug. 12, 2020 102:11-104:16: (MS. SHAW: "The Agency believes that keeping the CCR and any liquid that may be present within the impoundment would be to protect the environment and health of people. MS. CASSEL: Can you tell me what risks would be posed if structural stability of the impoundments is not – is not maintained? MR. LECRONE: This is Darin LeCrone. The structural stability and maintaining that structural stability can be a physical safety issue as well as protective of human health and the environmental conditions if those berms were to fail. MS. CASSEL: Can you elaborate a little, Mr. LeCrone, if you would, or Ms. Shaw about what kinds of impacts it could have to physical safety or health or the environment should they fail, should a berm fail? MR. LECRONE: This is Darin LeCrone. It would be very site specific depending on the exact location and construction methods of that impoundment whether its above grade, below grade, more of a valley type construction or

the Vermilion plant, where the erosion of the riverbank has progressed significantly in recent years.[424] Review and approval of Emergency Action Plans, which set out where ash-saturated water would break through berms in the potentially catastrophic event of a spill[425] and contain important safety information for the public, are also essential for similar reasons.

Mark Hutson, a professional geologist with over 40 years of experience and a former geologist at the Illinois Environmental Protection Agency, explained that:

> [S]tructural stability assessments, safety factor assessments, and inflow flood control system plans must be provided to IEPA, made available for public review, and approved by IEPA. Regulators cannot make informed decisions about the level

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something, but, in general, you know, like any other kind of – of – like anything that is behind a dam or any kind of structure, you don't want it to fail. You put people at risk downstream. Those risks are going to be site specific. The risks of failure for any given impoundment are going to be very site specific as well.")

[424] Ex. 16, Rehn Test. at 6 ("[T]he eroding river at the Vermilion site is an example of why structural stability cannot be a one-time analysis. As environmental factors change, so do the stability risks.").

[425] Ex. 5, 80 Fed. Reg. 21302, 21,457 (Apr. 17, 2015). ("Four major releases of CCR sludge associated with surface impoundment dike or pipe failure resulted in significant coal slurry releases, causing fish kills and other ecologic damage, and in some instances damage to infrastructure. In the Clinch River spill, for instance, it was estimated that 217,000 fish were killed in a 90-mile stretch of the river in Virginia and Tennessee. The Clinch River plant coal ash had a high free lime content, which reacted with water in the settling pond to form an alkaline calcium hydroxide. As a result, during the release, pH was elevated to levels as high as 12.7. The high-toxicity shock also decimated benthic macro-invertebrate populations for a distance of over three miles below the spill site, and snails and mussels were eliminated for over 11 miles below the Clinch River power plant. As demonstrated in the aftermath of the 2008 coal ash spill in TVA Kingston, Tennessee, large impoundment dike breach incidents result in impacts to soil and river sediments. In a study conducted few months after the spill, Emory River's downstream sediments showed high mercury concentrations similar to those detected in the coal ash (115-130 μg/kg).[FN220] According to this study, the ecological effects of mercury in the coal ash and sediments depend on the chemical mobility of mercury in the solids and the potential for mercury methylation in the impacted area. Previous studies have shown that sulfate addition can promote methylation in freshwater ecosystems by stimulating sulfate reducing bacteria, the primary organisms responsible for producing methylmercury in the environment. In coal-ash-containing waters, a 10- to 20-fold increase in SO_4^{-2} concentrations was observed in the Emory River Cove area relative to unaffected upstream sites. Therefore, the methylation potential of mercury from this material could be high because the coal ash also provides an essential nutrient (SO_4^{-2}) that encourages microbial methylation. In addition, leaching of contaminants from the coal ash caused contamination of surface waters in areas of restricted water exchange and slight elevation down gradient. The accumulation of arsenic-rich fly ash in bottom sediment in the Emory River's aquatic system could cause fish poisoning via both food chains and decrease of benthic fauna that is a vital food source. Another recent study estimates that the damage to fish and other wildlife incurred by both permitted and unpermitted CCR effluent discharge at some 22 sites amounts to over $2.3 billion.")

of risk posed by a unit in the absence of assessments and plans pertaining to the structural stability of the site.[426]

B. The Rules Must Require All Plans and Assessments be Enforceable Conditions of Permits.

The Agency's failure to require that all requirements applicable to CCR surface impoundments be included in a permit, and that all documents pertaining to compliance with those requirements are submitted in permit applications and subject to Agency review and approval, is in violation of the public participation mandate of the Coal Ash Pollution Prevention Act and weakens the Agency's oversight of CCR surface impoundments.[427] Without agency review and, if appropriate, approval of site-specific proposals for compliance with applicable law, the "self-implementing" approach of the federal CCR rule—the approach that both the WIIN Act and the Coal Ash Pollution Prevention Act were enacted to avoid—continues.

Relying on third-party certifications cannot satisfy the Agency's duty and will likely result in numerous deficiencies as well as significant variations in quality of information provided, amongst other likely issues. For example, the modeling provided by consultants to owners or operators might be inadequate. As groundwater modeling experts Scott Payne and Ian Magruder explained:

> Our review of the modeling documentation prepared for Hennepin, Meredosia, and Wood River indicates it is not sufficient for regulations to only require that modeling be done. The modeling reports prepared in support of those models indicate serious deficiencies in the modeling approach and calibration when regulatory requirements for modeling are not specific. We recommend that minimum modeling requirements be specified in the rule....[428]
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> . . . .

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[426] Ex. 14, Hutson Test. at 11.
[427] *See, e.g., Waterkeeper Alliance, Inc. v. U.S. E.P.A.*, 399 F.3d 486, 498-502 (2d Cir 2005) (EPA's Concentrated Animal Feeding Operation ("CAFO") rule violated the Clean Water Act's mandate to ensure compliance with applicable requirements when it failed to require permitting authorities to review CAFOs' nutrient management plans); *Envtl. Def. Center, Inc. v. U.S. E.P.A.*, 344 F.3d 832, 855-56 (9th Cir. 2003) (holding that EPA's rule for storm water management violated the Clean Water Act when it failed to require permitting authorities to review operators' site-specific "minimum measures" to reduce storm water discharges, and concluding that "programs that are designed by regulated parties must, in every instance, be subject to meaningful review by an appropriate regulating entity to ensure that each such program reduces the discharge of pollutants to the maximum extent practicable").
[428] Ex. 20, Payne & Magruder Answers at 17.

> We believe the modeling performed for the three sites we reviewed (Hennepin, Meredosia, and Wood River) speaks for itself. The models are poorly calibrated as demonstrated in the comparison between modeled and observed water levels and concentrations. It is clear that the poor calibration is partly a result of the models not sufficiently reflecting actual site conditions or an accurate site conceptual model.[429]

Owners or operators of CCR surface impoundments might request that consultants ignore important issues or make erroneous assumptions because the answers would be unfavorable to the outcome desired by the owners or operators. As professional geologist Mark Hutson explained: "in practice, many facilities are not particularly interested in developing sufficient data to define the location, depth, or rate of movement of the leading edge of contaminant plumes, and do not take the measures necessary to do so."[430]

Expert consultants can also make mistakes like anyone else and there is a benefit in having that worked checked by others[431], and if the underlying plans, assessments, or demonstrations and their supporting documents are not submitted along with the certifications, then there is no ability for the Agency or the public to provide feedback on the adequacy of those plans, assessments, or demonstrations.

The rules must ensure that the Agency, or another agency with appropriate expertise, reviews and approves all required plans, proposals, and assessments, as well as supporting documentation, for all CCR surface impoundments, and that all requirements applicable to those impoundments are included in permits. The Agency cannot just rely on the certifications of third-party consultants contracting with CCR surface impoundments because that outcome is akin to the self-implementing nature of the original 2015 federal CCR rules that the WIIN Act and the Coal Ash Pollution Prevention Act specifically reject.

Allowing owners or operators of CCR surface impoundments to meet the requirements of the proposed rules through third party certifications creates an untenable situation where the regulated community is partially responsible for regulating itself, which is not the outcome envisioned by the Coal Ash Pollution Prevention Act. And because the proposed rules merely require submission of certifications and not the underlying assessments, plans, or supporting

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[429] *Id.*, at 26.
[430] *See* Ex. 15, Hutson Answers at 11.
[431] Tr. Sept. 29, 2020 263:2-12 (Testimony of Hagen) ("[O]ftentimes when we do any work all of our work is checked by someone else. So I don't have any problem answering that our work is checked and when I do calculations, I have someone check them. When someone else does calculations, we have those checked. When groundwater models are developed, we have people crosschecking those groundwater models.")

documentation, there is no method for the Agency to second-guess those certifications. The Agency must be responsible for reviewing and approving all requirements of the proposed rules and not abdicate that responsibility by allowing owners or operators of CCR surface impoundments to certify-away their legal obligations.

Finally, to make sure closure is carried out properly and transparently, the rules should require additional progress reports for closure in place. For closure by removal, the proposed rules require monthly progress reports,[432] but the rules include no such requirement for closure in place; rather, the only report required is for completion of closure.[433] Instead, the rules should require at least quarterly reports on the progress of closure in place to ensure the Agency is informed of any pitfalls and can timely put in place course corrections – including potential closure permit modifications – needed to address any problems encountered.

C. Proposed Changes to Section 845.230

To ensure that the IEPA has sufficient permitting authority, permits are enforceable, and the public has an opportunity to review and comment on all aspects of a permit application, the proposed Part 845 Rules should be amended as follows (original black text is the current language of the proposed rule, underlined blue text are additions, and ~~crossed out red text~~ are deletions):

1. *Proposed Changes to Section 845.230(a)*

Proposed Section 845.230(a) should be amended to read as follows:

a) Initial operating permit for a new CCR surface impoundments and any lateral expansion of a CCR surface impoundment.

1) A demonstration that the CCR surface impoundment as built meets the location standards in the following sections:

A) Section 845.300 (Placement Above the Uppermost Aquifer);

B) Section 845.310 (Wetlands);

C) Section 845.320 (Fault Areas);

D) Section 845.330 (Seismic Impact Zones); and

E) Section 845.340 (Unstable Areas);

[432] Proposed Section 845.740(d).
[433] Proposed Section 845.750(e).

2) Certification from a qualified professional engineer that the composite liner or if applicable, the alternative composite liner has been constructed in accordance with the requirements of this Section 845.400(b) or (c);

3) Certification from a qualified professional engineer that the leachate collection system has been constructed in accordance with the requirements of Section 845.420, if applicable;

4) Evidence that the permanent markers required by Section 845.130 have been installed;

5) Documentation that the CCR surface impoundment, if not incised, will be operated and maintained with one of the forms of slope protection specified in Section 845.430;

6) Initial hazard potential classification assessment and accompanying certification, required by Section 845.440(a)(2);

7) Initial Emergency Action Plan and accompanying certification, required by Section 845.520(e);

8) Initial structural stability assessment and accompanying certification, required by Section 845.450(c);

9) Initial safety factor assessment and accompanying certification, required by Section 845.460(b);

10) Fugitive dust control plan and accompanying certification, as required by Section 845.500(b)(7);

11) Initial inflow design flood control system plan and accompanying certification, as required by Section 845.510(c)(3);

12) Proposed groundwater monitoring program that includes a minimum of eight independent samples for each background and downgradient well as required by Section 840.650(b);

13) Preliminary written closure plan, as specified in Section 845.720(a);

14) Initial written post-closure care plan, as specified in Section 845.780(d), if applicable;

15) An analysis of the chemical constituents found within the CCR to be placed in the CCR surface impoundment; ~~and~~

16) An analysis of the chemical constituents of all waste streams, chemical additives and sorbent materials entering or contained in the CCR surface impoundment;

17) A certification that the owner or operator meets the financial assurance requirements of Subpart I, of this Part;[434]

18) Safety and health plan, as required by Section 845.530;

19) Supporting documentation for the plans and assessments in Section 845.230(a)(6) – (a)(11) and Section 845.230(a)(18) must be provided as part of the permit application; and

20) The Emergency Action Plan, fugitive dust control plan, and inflow design flood control system plan shall be enforceable conditions of any operating permit.

2. *Proposed Changes to Section 845.230(d)*

Proposed Section 845.230(d) should be amended to read as follows:

d) Initial Operating Permit for Existing, Inactive and Inactive Closed CCR Surface Impoundments

1) The owner or operator of an existing, inactive or inactive closed CCR surface impoundment who has not completed post-closure care must submit an initial operating permit application to the Agency by September 30, 2021;

2) The initial operating permit application for existing CCR surface impoundments that have not completed an Agency approved closure prior to July 30, 2021, must contain the following information and documents on forms prescribed by the Agency:

A) The history of construction specified in Section 845.220(a)(1);

B) An analysis of the chemical constituents found within the CCR to be placed in the CCR surface impoundment;

[434] IEPA proposed this language in response to Environmental Groups' suggestions, and we agree with it. *See* IEPA Post-Hearing Comments, Attach. 2 at 1 (Sept. 24, 2020).

C) An analysis of the chemical constituents of all waste streams, chemical additives and sorbent materials entering or contained in the CCR surface impoundment;

D) A demonstration that the CCR surface impoundment as built meets or an explanation of how the CCR surface impoundments fails to meet the location standards in the following sections:

i) Section 845.300 (Placement Above the Uppermost Aquifer);

ii) Section 845.310 (Wetlands);

iii) Section 845.320 (Fault Areas);

iv) Section 845.330 (Seismic Impact Zones); and

v) Section 845.340 (Unstable Areas);

D) Evidence that the permanent markers required by Section 845.130 have been installed;

E) Documentation that the CCR surface impoundment, if not incised, will be operated and maintained with one of the forms of slope protection specified in Section 845.430;

F) Initial Emergency Action Plan and accompanying certification, required by Section 845.520(e);

G) Fugitive dust control plan and accompanying certification, as required by Section 845.500(b)(7);

H) Groundwater monitoring information:

i) a hydrogeologic site characterization meeting the requirements of Section 845.620;

ii) design and construction plans of a groundwater monitoring system meeting the requirements of Section 845.630;

iii) a groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by Section 845.640; and

iv) proposed groundwater monitoring program that includes a minimum of eight independent samples for each background and downgradient well as required by Section 845.650(b);

I) Preliminary written closure plan, as specified in Section 845.720(a);

J) Initial written post-closure care plan, as specified in Section 845.780(d), if applicable;

K) A certification as specified in Section 845.400(h), or a statement that the CCR surface impoundment does not have a liner that meets the requirements of Section 845.400(b) or (c); and

L) History of known exceedances of the groundwater protection standards in Section 845.600, and any corrective action taken to remediate the groundwater.

M) A certification that the owner or operator meets the financial assurance requirements of Subpart I, of this Part;[435]

N) Hazard potential classification assessment and accompanying certification, required by Section 845.440(a)(2);

O) Structural stability assessment and accompanying certification, required by Section 845.450(c);

P) Safety factor assessment and accompanying certification, required by Section 845.460(b);

Q) Inflow design flood control system plan and accompanying certification, as required by Section 845.510(c)(3);

R) Safety and health plan, as required by Section 845.530;

S) Supporting documentation for the plans in Section 845.230(d)(2)(F) – (d)(2)(G) and Section 845.230(d)(2)(M) – (d)(2)(Q) must also be provided as part of the permit application; and

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[435] IEPA proposed this language in response to Environmental Groups' suggestions, and we agree with it. IEPA Post-Hearing Comments, Attach. 2 at 1 (Sept. 24, 2020).

T) The Emergency Action Plan, fugitive dust control plan, and inflow design flood control system plan shall be enforceable conditions of any operating permit.

U) For CCR surface impoundments required to close under Section 845.700, the proposed closure prioritization categorization required by Section 845.700(g).

3) The initial operating permit application for an existing CCR surface impoundment where an Agency approved closure has been completed prior to July 30, 2021, and where the impoundment is not an inactive closed CCR surface impoundment, must contain the following information and documents on forms prescribed by the Agency:

A) The history of construction specified in Section 845.220(a)(1);

B) Evidence that the permanent markers required by Section 845.130 have been installed;

C) Documentation that the CCR surface impoundment, if not incised, will be operated and maintained with one of the forms of slope protection specified in Section 845.430;

D) Emergency Action Plan and accompanying certification, required by Section 845.520(e);

E) Groundwater monitoring information:

i) a hydrogeologic site characterization meeting the requirements of Section 845.620;

ii) design and construction plans of a groundwater monitoring system meeting the requirements of Section 845.630;

iii) a groundwater sampling and analysis program that includes selection of the statistical procedures to be used for evaluating groundwater monitoring data as required by Section 845.640; and

iv) proposed groundwater monitoring program that includes a minimum of eight independent samples for each background and downgradient well as required by Section 845.650(b);

F) Written post-closure care plan, as specified in Section 845.780(d), if applicable;

G) History of known exceedances of the groundwater protection standards in Section 845.600, and any corrective action plan taken to remediate the groundwater.

4) The initial operating permit application for inactive closed CCR surface impoundments must contain the following information:

A) Evidence that the permanent markers required by Section 845.130 have been installed;

B) Groundwater monitoring program;

C) Written post-closure care plan, as specified in Section 845.780(d); and

D) History of known exceedances of the groundwater quality standards in 35 Ill. Adm. Code 620, whether the owner or operator has obtained a groundwater management zone, and any corrective action taken to remediate the groundwater.

VI. The Proposed Rules Do Not Ensure Meaningful Public Participation, as Required by the Coal Ash Pollution Prevention Act.

Meaningful public participation is a necessary requirement of the permitting process and is required by the Coal Ash Pollution Prevention Act.[436] Public participation is a key safety valve that helps to ensure compliance and minimizes risk to the environment. When agencies lack resources to ensure that industry meets all permit requirements, the public can step in to protect the environment and communities. Moreover, community members often have local knowledge that can help regulators make better-informed decisions about a site. Public participation in permitting serves the same goals as public participation in rulemaking; in both contexts, the public can voice their concerns and provide new information to the government body making a determination.[437] As Andrew Rehn explained at the hearing: "The main point of my written

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[436] *See* 415 ILCS 5/22.59(g)(6); *see also* 415 ILCS 5/22.59(a)(1)

[437] *See Conn. Light & Power Co. v. Nuclear Reg. Comm'n*, 673 F.2d 525, 530 (D.C. Cir. 1982) ("The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process. If the notice of proposed rule-making fails to provide an accurate picture of the reasoning that has led the agency to the proposed rule,

testimony is to demonstrate the value of disclosing as much information to the public as possible so the public can see the full basis for any decision."[438]

The Coal Ash Pollution Prevent Act is clear: the Board must adopt regulations governing coal ash surface impoundments that provide "meaningful" public participation in the permitting process.[439] Meaningful public participation requires that all documents underlying permitting applications and decisions be available for the public to review and comment.[440] This is so because, without an opportunity to review and comment on the full permit application, residents cannot adequately scrutinize whether the activities happening in their communities put them, or their environment, at risk, nor can they offer input that may help minimize any such risk. For instance, Jo Lakota, a descendent of Walla Walla and Lakota heritage and resident of Peoria, has found that "[t]ransparency is nonsexist" and "information has not been forthright and accessible to the public"[441] In talking to her community, Jo Lakota has seen that people who are sustenance fishing or recreating in the Kickapoo Creek by the Edwards Plant are not aware or informed about the "dangers and damage," but "[w]hen they consider that the health issues of family

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interested parties will not be able to comment meaningfully upon the agency's proposals. As a result, the agency may operate with a one-sided or mistaken picture of the issues at stake in a rule-making"); *see also Senn Park Nursing Ctr. v. Miller*, 455 N.E.2d 153, 158 (Ill. App. Ct. 1st Dist. 1983) ("We note first that public participation 'in the rule-making process is essential in order to permit administrative agencies to inform themselves and to afford adequate safeguards to private interests.'") (internal citations omitted).

[438] Tr. Sept. 29, 2020 64:14-18.

[439] *See, e.g.*, 415 ILCS § 5/22.59(a)(5) ("The General Assembly finds that: . . . (5) meaningful participation of State residents, especially vulnerable populations who may be affected by regulatory actions, is critical to ensure that environmental justice considerations are incorporated in the development of, decision-making related to, and implementation of environmental laws and rulemaking that protects. . . ."); § 5/22.59(a) ("[T]he purpose of this Section is to promote a healthful environment, including clean water, air, and land, meaningful public involvement. . . ."); § 5/22.59(g)(6) (Board shall adopt rules that "must, at a minimum: . . . specify meaningful public participation procedures for the issuance of CCR surface impoundment construction and operating permits. . . .").

[440] *See, e.g., Waterkeeper All., Inc. v. U.S. E.P.A.*, 399 F.3d 486, 503 (2d Cir. 2005) (EPA's CAFO Rule's permitting scheme deemed illegal because it conflicted with the Clean Water Act's public participation mandate by not explicitly providing the public the ability to review and comment on nutrient management plans); *Nat'l Wildlife Fed'n v. Marsh*, 568 F. Supp. 985, 993-994 (D.D.C. 1983) (holding that the Army Corps of Engineers violated public participation requirements in issuing a Clean Water Act permit with a permitting process that denied public access to certain documents underlying permitting decision, and noting, "[o]nly when the public is adequately informed can there be any exchange of views and any real dialogue as to the final decision. And without such dialogue any notion of real public participation is necessarily an illusion. . . .") (internal citations omitted); *Gerber v. Norton*, 294 F.3d 173, 177 (D.C. Cir. 2002) (holding that the Fish and Wildlife Service violated public participation requirements under the Endangered Species Act when it failed to provide the public a site map of proposed conservation area during a permit's public comment period).

[441] Ex. 40, Prefiled Testimony of Jo Lakota at 2 (Aug. 27, 2020) (hereinafter "Lakota Test.").

members and neighbors may be a result of this pollution, they are hurt and outraged."[442] Similarly, Dulce Ortiz of Waukegan, an environmental justice community, does not let her children go swimming or fishing in the Lake due to the exposure to pollution.[443] Both witnesses call on the regulations to make the information more accessible to the public.[444]

Public participation is important because it can raise issues that the Agency is unaware of. As Andrew Rehn explained: "Public input is a necessary part of the regulatory process. I've seen firsthand how public input can help inform Illinois EPA's and other agencies' regulatory decisions in ways that lead to better protection of communities and the environment."[445] Mr. Rehn went on to list numerous examples of regulatory action spurred by public participation in the regulatory and enforcement process.[446]

Groundwater modeling experts Scott Payne and Ian Magruder explain how the public can provide useful information to regulators:

> Model documentation should be adequate such that the public can provide third party review of the model. Members of the public often have irreplaceable knowledge of local hydrogeology, soil, geology/seismic, and climatic conditions which are relevant to site characterization and modeling. It is our professional experience that state natural resource agencies and geologic surveys and researchers at nearby colleges and universities often have the most accurate and indepth knowledge of these site-specific conditions. Consultants who work for coal plant owner/operators may be from out-of-state and lack this site-specific knowledge. Public review and comment is needed for IEPA to have all available relevant information to ensure local site-specific knowledge is included in model development, sensitive receptors are identified, and models are thoroughly reviewed.[447]

The rules must be modified in ways that promote more public participation and reduce barriers to that participation, otherwise the "meaningful" public participation mandate of the Coal Ash Pollution Prevention Act will not be fulfilled.

A. <u>The Proposed Rules Fail to Make Key Documents Available for Public Review and Comment because they are Not Included in Permit Applications.</u>

First, as detailed throughout these comments, the proposed rules fail to require that numerous key documents – all of which are, or contain, requirements applicable to CCR surface

[442] Ex. 40, Lakota Test. at 2.
[443] Ex. 12, Prefiled Testimony of Dulce Ortiz at 2 (Aug. 27, 2020) (hereinafter "Ortiz Test.").
[444] Ex. 12, Ortiz Test. at 3; Ex. 40, Lakota Test. at 3.
[445] Ex. 16, Rehn Test. at 8-9.
[446] *Id*.
[447] *See* Ex. 19, Payne & Magruder Test. at 31-32.

impoundments – be included as part of permit applications and thus be subject to public review and comment. Those documents include, but are not limited to, the assessments and plans detailed in Section V.C, *supra*; Alternate Source Demonstrations ("ASDs"); and documents supporting those plans, assessments, and other components that are required to be submitted in permit applications, such as a closure alternatives analysis. *See*, *e.g.*, Proposed Sections 845.220, 845.230(a); 845.710(b).

The rules also do not provide for public review and comment on closure prioritization designations under proposed Section 845.700(g). Those designations determine when closure permit applications must be submitted. Given the high risks of continued operation of an unlined impoundment[448] or one that fails location standards,[449] the legislature's mandate to prioritize closure of ash ponds that are in environmental justice communities or pose a high risk,[450] and the legislature's statement that public participation – particularly of vulnerable populations – is critical to ensure consideration of environmental justice concerns,[451] this omission must be fixed by requiring those proposed designations to be included in applications for operating permits. Our proposed language for that is included in Section V(C) of these comments.

The rules must be modified to ensure all documents that contain or represent requirements applicable to CCR surface impoundments, as well as supporting documentation, be included in permit applications to ensure the meaningful public participation that the Coal Ash Pollution Prevention Act requires. Andrew Rehn, a water resources engineer who reviews permits and coal ash closure plans, explained that "The public should not need assistance from a full-time staff person at a non-profit in order to properly engage in the regulatory process. The process should be set up so that community members are able to easily access the necessary information on their own."[452]

While the changes we proposed above in Section V.C, supra, resolve some of these concerns, more changes are necessary to ensure the public can review ASDs, and those changes will be proposed at the end of this section. Mark Hutson, a professional geologist with over 40 years of experience and a former geologist at the Illinois Environmental Protection Agency, opined that public input can help the Agency make better-informed decisions on permitting matters, including ASDs: "[I]n my opinion, the input that can be gained from having outside

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[448] *See* IEPA Statement of Reasons, Attach. C (*USWAG*).
[449] *See* Ex. 15, Hutson Answers at 17.
[450] 415 ILCS 5/22.59(g)(9).
[451] 415 ILCS 5/22.59(a)(5); *see also* Tr. Aug. 13, 2020 at 186:17-22 (Testimony of C. Pressnall) ("MR. PRESSNALL: I don't think any screening tool includes every possible environmental justice community. MS. COURTNEY: Including the IEPA screening tool? MR. PRESSNALL: I reckon.")
[452] Ex. 16, Rehn Test. at 4.

people look at the ASD's is a valuable source of information and can be of assistance to the Agency."[453]

Mr. Hutson also explained: "Since ASDs potentially represent a significant change in our understanding of the site, and ASDs seem to be often offered in an attempt to avoid corrective action requirements, I recommend that Illinois treat an ASD as a permit change requiring notification of the public and approval by IEPA."[454] Therefore, ASDs need to be considered an amendment to an existing permit in order to trigger the public participation requirements and ensure the public has the right to review this important document, as required by the Coal Ash Pollution Prevention Act. We propose changes to Section 845.280(c) below that address these concerns.

B. The Proposed Rules Do Not Provide Adequate Notice of Pre-Application Meeting, Requirements to Ensure Meaningful Public Engagement at Pre-Application Meeting, Opportunity to Review Permitting Documents, or Public Comment Timeframes.

1. *Inadequate Time to Review Documents Prior to Pre-Application Meeting*

The proposed rules provide inadequate opportunity for review of the documents in permit applications. Proposed Section 845.240(e) would only provide 14 days for the public to review extensive application materials for construction permit applications prior to the pre-application public meeting. *See* Proposed Section 845.240(e). Given the likely length and complexity of those materials, more time is needed for public participation in that public meeting to be meaningful. The Agency has acknowledged that the documentation for the construction permits can include complex and technical documents.[455] We propose changes to Section 845.240(e) below that address these concerns.

2. *Inadequate Posting Requirements for Public Notice for Pre-Application Meeting.*

The Proposed Rules should also allow for the notice to reach as many residents as possible. Because people access information in different ways, notice should also be placed in print media and provided to local officials, as not everyone has access or utilizes television or radio or may not see the posted notices. This also means that the public can understand the notice and documentation, so they can meaningfully participate, as required by the Coal Ash Pollution Prevention Act. Jo Lakota noted in her written testimony that people "do not get enough information from a sign" and "[n]otice and information has to be in lay terms or simpler language."[456] This is where a factsheet or summary of information would be necessary to get

[453] Tr. Sept. 24, 2020 41:18-22.
[454] Ex. 14, Hutson Test. at 17.
[455] Tr. Aug. 12, 2020 59:19-24.
[456] Ex. 40, Lakota Test. at 3.

residents to be able to engage meaningfully. We propose language to amend Section 845.240 below that address these concerns.

3. *Inadequate Requirements to Ensure that the Pre-Application Public Meeting is Meaningful*

Similarly, the Proposed Rules fail to provide adequate requirements in regard to the pre-application meetings under Part 845.240. The Agency mentioned that, regarding the pre-application meeting, the Agency's "intent is for this to involve the public in what is going to be constructed and why and what the purpose of it is prior to filing the application."[457] Accordingly, the public should be afforded the opportunity to meaningfully engage in these meetings.

The format of the pre-application public meeting should allow for dialogue among the public and with the owner or operator at the public meeting. The Agency indicated that it is not opposed to requiring documentation of meaningful public participation at the meeting – or that the owner/operator considered public comment received at the public meeting – and such a requirement would not interfere with the agency's ability to implement the problem.[458] The need for more stringent requirements around public meetings and meaningful dialogue with the public is demonstrated by at least one meeting held under the federal CCR rule, which appeared to be more for the purpose of "checking the box" than meaningfully engaging with the public.

Citing 40 C.F.R. § 257.96(e), Midwest Generation hosted a meeting to present the Assessment of Corrective Measures for Lincoln Stone Quarry to the public on August 27, 2019.[459] At that meeting, Midwest Generation offered a presentation on posterboards placed on easels around the meeting room, and the format of the meeting was one-on-one dialogue between individual members of the public and representatives of the company stationed at various points around the room next to individual posterboards.[460] As can be seen from reviewing that presentation, it discusses the options for remedy beginning on pdf page 14.[461] The presentation does not contain a comparison with projections, based on sound science, of the impacts (including groundwater contamination) of different closure methods over time.[462] It does not identify any benefits from the removal option for remedy, in particular, omitting the extent to which ash contact with water would be reduced by removal.[463] Nor does it identify any of the

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[457] Tr. Aug. 12, 2020 13:19-22.
[458] Tr. Aug. 12, 2020 10:7-18.
[459] Ex. 51, Environmental Groups' Attachments 1-6 of Prefiled Questions to Sharene Shealy, Attach. 1, Letter from William Naglosky to Jennifer Cassel (Sept. 6, 2019) (hereinafter "Envtl. Groups' Attachments").
[460] *See* Ex. 51, Attach. 6.
[461] *Id*. at 14.
[462] *Id*. at 14-19.
[463] *Id*. at 17-19.

downsides of closure in place with an artificial turf cover system.[464] The presentation presents only the upsides from the company's preferred remedy and only the downsides from the company's least-favored alternative.

At that meeting, the company failed to engage in any meaningful dialogue with members of the community and failed to meaningfully respond to their comments.[465] Residents of the community and members of the public asked questions at the meeting that NRG was not able to or prepared to answer.[466] Jennifer Cassel included as many of these questions as she could gather in a letter to NRG after the meeting.[467] Upon information and belief, NRG has never provided a response to any of these questions. In addition, residents of the community and members of the public asked NRG for another meeting regarding corrective action at Lincoln Stone Quarry, including a public question and answer format.[468] Despite NRG spokeswoman Pat Hammond stating to the Herald News that "the company is 'committed' to holding another meeting," upon information and belief, no such meeting was ever held or scheduled.[469] Rectifying this process is especially important given that members of the Joliet community believe "the Lincoln Stone Quarry has tried to contend that these rules do not apply to them because they are considered a landfill"[470]or are concerned about the quarry leaching contaminants into the water in the past and have an interest in this not happening again in the future.[471] In addition, waiting to incorporate public feedback *after* the alternatives analysis as required under Proposed Section 845.710(b) or the corrective action alternatives analysis under Proposed Section 845.670(e) has been completed does not solve this problem. By then, the public has missed out on the opportunity to engage with the owner or operator in a meaningful way. We propose changes below to Section 845.240(f) that address these concerns.

4. *Inadequate Public Notice of Public Comment Period and Inadequate Timeframe for Public Comment*

The Proposed Rules also fail to provide sufficiently robust notice requirements to ensure that community members know how to participate meaningfully in the permitting process. For example, the Agency's notice of the draft permit would not explain (1) how to request a public hearing, (2) the URL for the CCR website, or (3) how to be added to the Agency's listserv, so the public can stay informed about the permit. The rules should be modified to require notices to

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[464] *Id*. at 15.
[465] Ex. 51, Envtl. Groups' Attachments, Attach. 3.
[466] *Id*. at 1.
[467] *Id*.
[468] *See* Ex. 51, Environmental Groups' Attachments, Attach. 2; Ex. 51, Attach. 4,.
[469] *See* Ex. 51, Environmental Groups' Attachments, Attach. 5.
[470] Tr. Sept 30, 2020 134:20-23.
[471] Tr. Sept 30, 2020 135: 4-7.

provide that essential information. We propose changes below to Section 845.260(b) below that address these concerns.

Proposed Section 845.260(c) proposes a 30-day window for public comment on draft permits, but that 30-day window is not long enough to ensure "meaningful" public participation, as required by the Coal Ash Pollution Prevention Act. First, following the pre-application meeting, some of the information already provided will change and more documentation would be added, therefore time will be needed to review these changes and new documents. Second, as noted by Mark Hutson in his oral testimony, it takes him—an expert—a month or two to review technical documents like ASDs,[472] therefore a month is unlikely sufficient for the general public. Jo Lakota explained in her written testimony that she would need two to three more times than what is proposed because it takes time to share with and explain to people what is going on as they cannot gather all of that information from a sign.[473] Third, because the permit application exists in hard copy and in some instances a FOIA request is required to access documents, the public will likely have less than 30 days to receive the documentation, process it, and develop meaningful comment.[474] While the Agency noted that there are some instances in which the time could be extended, the Coal Ash Pollution Prevention Act requires that public participation be meaningful for all coal ash construction and operating permits. Accordingly, the rules should be clear that the public must have the full comment period to review and access the draft permit, the permit application, and all supporting documentation that is not in the permit application.

Forty-five days strikes the appropriate balance to ensure adequate time for public comment. Under RCRA, from which the Part 257 federal coal ash rules stem, there is a minimum of 45 days for public comment required for individual permits.[475] Therefore, to ensure that the public has adequate opportunity to review and comment on the draft permit, the proposed rules should require 45 days for the public comment period. We propose changes below to Section 845.260(c) that address these concerns.

The Agency stated at the hearing that it would not be opposed to the concept of requiring all documents supporting an operating or construction permit application be placed on the facility's CCR website by the time the public comment period begins.[476] We agree with this sentiment and propose changes below to Section 845.260(c) that address these concerns.

5. *Inadequate Translation for Non-English Speaking Members of the Public*

The proposed rules fail to provide adequate notice and opportunity for review of permitting documents by non-English speaking community members. Owners or operators of CCR surface impoundments are required to provide notice of a public meeting on an application

[472] Tr. Sept. 24, 2020 5:9.
[473] Ex. 40, Lakota Test. at 3.
[474] Tr. Aug. 12, 2020 79:19-82:1.
[475] 40 C.F.R. 124.10(b).
[476] Tr. Aug. 12, 2020 84:17-24.

for a construction permit, which must be circulated or broadcast in a non-English language if the community includes a significant proportion of non-English speaking residents. *See* Proposed Section 845.240(c). The proposed rules, however, include no requirement that the Agency publish non-English notices of draft permits. *See* Proposed Section 845.260(b). While people who do not speak English can make a request for translation services, non-English speakers may not even know to make that request if the notice is not in a language that they speak. Although the Agency relies upon its public participation policy in regard to translation services, that policy lacks a provision for notices to be in the non-English language when there is a significant population of non-English speakers.[477] As one public commenter from Waukegan put it during the August 13 public hearing, "one of the main reasons it took so long for me and other community members to find out about the coal plant is probably because of the lack of language access. . . it's not that we don't care. It's just that we don't know."[478] To ensure the diverse communities surrounding many CCR surface impoundments can meaningfully participate in the permitting process, the Agency should be held to at least the same standard of public outreach as the owner or operators of CCR impoundments.

In its first set of post-hearing comments, the Agency proposed new language to address the non-English language concerns identified above. We agree with the new language proposed by the Agency. The Agency proposes to add the following language to Proposed Sections 845.260(b)(2)(G) and (e)(2)(I): "A translation of the public notice into the appropriate language or languages will be made if the Agency determines that a project is located within one mile of a significant population of non-English speaking residents."[479]

We also agree with Agency's proposed changes in its post-hearing comments to Proposed Section 845.240(c) for there to be translation services at the pre-application public meetings required Section 845.240(a).[480] However, we do recommend that the request not have to be made by a non-English speaker, as someone who speaks English, might contact the owner/operator to assist the non-English speaker.

6. *Inadequate Timeframes for Posting Important Documents on Facility's CCR Website and Negative Impact on Public Ability to Meaningfully Participate in Permitting Process.*

The proposed rules also fail to provide a time requirement to ensure that the public can review documents in a CCR surface impoundments operating record. As the Agency admitted at the hearing, it envisioned that the public would have access to all the documents supporting an

[477] Tr. Aug. 12, 2020 66:6-68:9.
[478] Tr. Aug. 13, 2020 51:9-12; 52:9-10.
[479] IEPA First Post-Hearing Comments, Attach. 3 at 4 (Sept. 24, 2020).
[480] IEPA First Post-Hearing Comments, Attach. 2 at 1 (Sept. 24, 2020).

operating permit application on the owner or operator's CCR website.[481] However, the Agency also admitted that, as the rules are currently proposed, there is no requirement for when documents must be posted to the operating record.[482] The proposed rules do not require posting documents on the owner or operator's CCR website until after it has been placed in the operating record, so the failure to specify a deadline by which documents must be put in the operating record risks significant delay from when a document is created and when it is actually available to the public.

Because the Coal Ash Pollution Prevention Act requires "meaningful" public participation, the rules need to make clear when items are to be posted to the CCR surface impoundment's operating record and, thus, posted online. Without clear timelines for when posting is to occur, the public may not have all the necessary documents to review as part of the permit application's notice and comment process. We propose changes to Section 845.800(d) below that address these concerns.

The proposed rule should also be amended to reduce the amount of time an owner or operator has to post the relevant documentation in its operating record to its public CCR website required by proposed Section 845.810. As currently drafted, the rule allows up to 30 days from when it is placed in the facility's operating record to when it needs to be posted online. Because the act of placing the documentation on the facility's CCR website poses a low burden, the timeline should be reduced from 30 days to 14 days to ensure the public has quicker access to those documents and to ensure that the public can meaningfully participate in the pre-application public meeting and the public comment period. We propose changes to Section 845.810(d) below that address these concerns.

C. The Proposed Rules Must Require a Public Hearing on Permits and Provide for Agency Response to Comments.

The Proposed Rules do not ensure the opportunity for public hearing on permits or for a response to comments, as the Coal Ash Pollution Prevention Act requires.[483] Rather than provide that the Agency "must" or "shall" hold a public hearing where there is a significant degree of public interest in the proposed permit, the proposal states that the Agency "may" hold such a

[481] Tr. Aug. 11, 2020 184:6-10.
[482] Tr. Aug. 11, 2020 186:4-24; IEPA First Post-Hearing Comments, Attach. 1 at 8 (Sept. 24, 2020) ("There is no 'schedule' in the rule for placing required documentation in the operating record. The Agency expects such documentation to be placed in the operating record once generated as required by the rule. For example, once a permit application is completed, signed and submitted the Agency, copies of those applications must be placed in the operating record and then placed on the owner or operator's CCR website within thirty days of placement in its operating record").
[483] *See* 415 ILCS 5.22/59(g)(6).

hearing.[484] The opportunity for a public hearing is a directive of the Act and thus may not be left to Agency discretion, particularly where there is significant interest in the permit.[485] We propose a change to Section 845.260(d) below that addresses our concerns.

Similarly, preparation of a response to comments is not discretionary. The Act provides that the rules "must . . . specify meaningful public participation procedures for the issuance of [CCR] permits, including but not limited to . . . a summary and response of the comments prepared by the Agency."[486] The proposal that a response to comments need only be prepared when a public hearing is held[487] is inconsistent with the public participation mandate in the Coal Ash Pollution Prevention Act and should be amended to require a responsiveness summary even if no public hearing is held but written public comments are received. We propose a change to Section 845.260(f) below that addresses our concerns.

D. The Proposed Rules Do Not Provide Clarity on Third Party Appeals.

The Coal Ash Pollution Prevention Act allows third party appeals of permits if the federal permitting program allows third party appeals.[488] The proposed federal permitting program does allow third party appeals, so, if that provision is finalized, the Illinois CCR rules must allow third party appeals as well.[489] The proposed federal permitting program for CCR surface impoundments will rely on the existing appeal procedures in 40 C.F.R. 124.19, which allows any person to appeal who, among other things, "filed comments on the draft permit or participated in a public hearing on the draft permit."[490] Therefore, the deadline for appeal must, at a minimum, start only after individuals who participated in either the written public comment period or the public hearing are provided notice of a final permitting decision by the Agency.

In the Agency's September 24, 2020 post-hearing comments, they proposed to modify Section 845.270(e) to read: "All appeals must be filed with the Board within 35 days after the final action is served on the applicant."[491] While we do not disagree with the Agency's proposed change, it needs to be modified to ensure that participants of the public hearing or public

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[484] *See* Proposed Section 845.260(d).
[485] Tr. Aug 12, 2020 71:20-72:1
[486] 415 ILCS 5.22/59(g)(6).
[487] *See* Proposed Section 845.260(f),
[488] 415 ILCS 5/40(g).
[489] Ex. 6, 85 Fed. Reg. 9940, 9971 (Feb. 20, 2020) ("EPA is proposing to rely on the existing decision-making procedures in [CFR] part 124 when issuing RCRA CCR permits, consistent with procedures followed in other federal permitting programs. . . . EPA's final decision will include a response to comments and may be appealed under § 124.19.").
[490] 40 C.F.R. 124.19(a)(2).
[491] IEPA First Post-Hearing Comments, Attach. 2 at 11 (Sept. 24, 2020).

comment period are provided adequate notice, too, since they also have rights to appeal. We propose an additional change to Section 845.270(e) below that addresses these concerns.

E. The Proposed Rules Should be Amended to Reflect New Requirements for Facility's CCR Websites.

On August 28, 2020, U.S. EPA published amendments to its existing CCR rules. One of the amendments pertained to the requirements of a facility's CCR website.[492] U.S. EPA noted that some facilities had structured their websites in a manner that made public participation difficult or impossible with unnecessary barriers, such as being unable to download documents, unable to access documents without first creating accounts or providing personal information, and other methods of discouraging public participation.[493] To ensure adequate public access to a facility's CCR website, U.S. EPA amended 40 C.F.R. § 257.107(a) to read as follows:

> (a) Each owner or operator of a CCR unit subject to the requirements of this subpart must maintain a publicly accessible internet site (CCR website) containing the information specified in this section. The owner or operator's website must be titled ''CCR Rule Compliance Data and Information.'' The website must ensure that all information required to be posted is immediately available to anyone visiting the site, without requiring any prerequisite, such as registration or a requirement to submit a document request. All required information must be clearly identifiable and must be able to be immediately printed and downloaded by anyone accessing the site. If the owner/operator changes the web address (i.e., Uniform Resource Locator (URL)) at any point, they must notify EPA via the ''contact us'' form on EPA's CCR website and the state director within 14 days of making the change. The facility's CCR website must also have a ''contact us'' form or a specific email address posted on the website for the public to use to submit questions and issues relating to the availability of information on the website.

To ensure that the proposed Illinois CCR rules are as stringent as the federal rules, similar language should be required in Proposed Section 845.810, and we propose an additional change below to Proposed Section 845.810(a) to mirror the language in the recently amended 40 C.F.R. § 257.107(a).

F. Proposed Changes to Section 845.240, 845.260, 845.800, and 845.810.

To ensure that the IEPA has sufficient permitting authority, permits are enforceable, and the public has an opportunity to review and comment on all aspects of a permit application, the proposed Part 845 Rules should be amended as follows (original black text is the current

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[492] *See generally* 85 Fed. Reg. 53,516 (Aug. 28, 2020).
[493] *Id*. at 53,556.

language of the proposed rule, underlined blue text are additions, and ~~crossed out red text~~ are deletions):

1. *Proposed Changes to Section 845.240(b)*

Proposed Section 845.240(b) should be amended to read as follows:

b) The owner or operator must prepare and circulate a notice explaining the proposed construction project and any related activities and the time and place of the public meeting. Such a notification must be mailed, delivered or posted at least 30 days prior to the public meeting.[494] The owner or operator of the CCR surface impoundment must:

1) mail or hand-deliver the notice to the Agency and all residents within a one-mile radius from the facility boundary;

2) post the notice on all of the owner or operator's social media outlets and on the facility's CCR website; ~~and~~

3) post the notice in conspicuous locations throughout villages, towns, or cities within 10 miles of the facility, ~~or~~ and use appropriate broadcast media, including a major newspaper of weekly circulation, ~~(such as~~radio or television~~)~~;

4) include in the notice the owner or operator's contact information, the internet address where the information in Section 845.240(e) will be posted and the date on which the information will be posted to the site,[495]and all notifications of the pre-application meeting must include the address of the owner or operator's CCR webpage, so that the public may have available all related documentation prior to the meeting[496]; and

[494] IEPA proposed this language in response to Environmental Groups' suggestions. IEPA First Post-Hearing Comments Attach. 2 at 2 (Sept. 24, 2020). However, based on proposed changes, Commenters changed the number of days from 14 to 30 to coincide with recommended changes to Proposed Section 845.240(e) to allow for 30 days to review the documentation rather than 14 days.
[495] IEPA proposed this language in response to the Board's suggestions, and we agree with it. IEPA First Post-Hearing Comments Attach. 2 at 8 (Sept. 24, 2020).
[496] IEPA proposed this language in response to Environmental Groups' suggestions, and we agree with it. IEPA First Post-Hearing Comments Attach. 2 at 3 (Sept. 24, 2020).

5) Mailing the notice to the mayor and town council of the nearest city, town or village and requesting that they post in conspicuous locations throughout the city, town, or village.

2. *Proposed Changes to Section 845.240(c)*

Proposed Section 845.240(c) should be amended to read as follows:

c) When a proposed construction project or any related activity is located in an area with a significant proportion of non-English speaking residents, the notification must be circulated, or broadcast, in both English and the appropriate non-English language, and the owner or operator must provide translation services during the public meetings required by Section 845.240(a), if requested.[497]

3. *Proposed Changes to Section 845.240(e)*

Proposed Section 845.240(e) should be amended to read as follows:

e) At least ~~14~~ 30 days prior to a public meeting, the owner or operator of the CCR surface impoundment must post on the owner or operator's publicly accessible internet site all documentation relied upon in making their tentative construction permit application. The owner or operator of the CCR surface impoundment must also prepare a fact sheet that describes in plain language the actions the facility is proposing to take and post the fact sheet on the facility's CCR website. If the notice required by Section 845.240(c) was circulated or broadcast in a non-English language, then the fact sheet must also be prepared in the appropriate non-English language.

4. *Proposed Changes to Section 845.240(f)*

Proposed Section 845.240(f) should be amended to read as follows:

f) At the public meeting, the owner or operator of the CCR surface impoundment must:

1) ~~outline~~ present its decision-making process for the construction permit application, including, where applicable, the corrective action alternatives and the closure alternatives considered. The presentation must include a comparison of projected groundwater impacts

[497] IEPA proposed this language in response to LVEJO and Environmental Groups' suggestions, and we partially agree with it. IEPA First Post-Hearing Comments, Attach. 2 at 1-2 (Sept. 24, 2020). However, we recommend dropping IEPA's suggestion that the request be made "by non-English speakers," and instead just state "if requested" without a qualification to who can request.

for each alternative considered and an objective comparison of the pros and cons of each alternative considered~~.~~;

2) include a question and answer portion of the meeting to allow the public to ask questions, and there must be representatives from the owner or operator present that are qualified and knowledgeable enough to answer the questions posed by the public.

3) if there are questions posed by the public at the hearing that cannot be answered in person or if there are subsequent questions posed by the pubic following the meeting, the owner or operator of the facility must respond to those questions in writing within a reasonable timeframe and post the response on the facility's CCR website required by Section 845.810; and

4) explain that the Agency is creating a listserv for the facility, compile a list of interested persons at the public meeting, and transmit that list with the Agency.

5. *Proposed Changes to Section 845.260(b)*

Proposed Section 845.260(b) should be amended to read as follows:

b) Public Notice of Draft Permit

1) Not earlier than 15 days following the Agency's notification to the applicant of its tentative decision pursuant to Section 845.250 to issue or deny the permit application, the Agency shall circulate public notice of the completed application for the permit in a manner designed to inform interested and potentially interested persons of the construction, modification, operation or closure of a CCR surface impoundment and of the proposed determination to issue or deny the permit.

2) The contents of public notice of completed applications for permits shall include at least the following:

A) Name, address, and telephone number of the Agency;

B) Name and address of the applicant;

C) Brief description of the applicant's activities or operations which result in the construction, operation, modification or closure of a CCR surface impoundment;

D) A statement of the tentative determination to issue or deny the permit;

E) A brief description of the procedures for the formulation of final determinations, including the procedures for submitting comments and expiration date of the comment period; ~~and~~

F) Address and telephone number of Agency premises at which interested persons may obtain further information, request a copy of the permit application and related documents~~.~~;

G) A translation of the public notice into the appropriate language or languages will be made if the Agency determines that a project is located within one mile of a significant population of non-English speaking residents;[498]

H) The URL for the facility's CCR website required by Section 845.810;

I) A brief description of how members of the public can request a public hearing under Section 845.260(d); and

J) A brief description of how members of the public can request being added to the Agency's listserv for the facility.

3) Procedures for the circulation of public notice required pursuant to this Section shall include at least the following concurrent actions:

A) Posting on the Agency's webpage and all of the Agency's social media outlets;

B) Mailing the notice to the clerk of the nearest city, town or village requesting further posting in conspicuous locations throughout the city, town or village;

C) Requiring the applicant to post the notice near the entrance to the applicant's premises; and

D) Emailing the notice to the Agency's listserv for the facility.

6. *Proposed Changes to Section 845.260(c)*

Proposed Section 845.260(c) should be amended to read as follows:

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[498] IEPA proposed this language in response to suggestions. IEPA First Post-Hearing Comments Attach. 3 at 4 (Sept. 24, 2020).

c) Public Comment Period

1) The Agency shall accept written comments from interested persons on the draft permit determination for ~~30~~ 45 days following the circulation of the public notice pursuant to subsection (b).

2) All comments shall be submitted to the Agency and to the applicant.

3) All written comments submitted during the ~~30~~ 45-day comment period shall be retained by the Agency and considered in the formulation of its final determination with respect to the permit application.

4) The period for comment may be extended at the discretion of the Agency.

5) The Agency shall consider all timely submitted comments.

6) The applicant shall post all permit application materials on its facility's CCR website, including all underlying supporting documents, prior to the beginning of the public comment period established by the Agency.

7. *Proposed Changes to Section 845.260(d)*

Proposed Section 845.260(d) should be amended to read as follows:

d) Public Hearing

1) The Agency ~~may~~ shall hold a public hearing on the issuance or denial of a draft permit whenever the Agency determines that there exists a significant degree of public interest in the proposed permit.

2) Within the ~~30~~ 45-day public comment period, any person, including the applicant, may submit to the Agency a request for a public hearing which must include the reasons why a hearing is warranted.

3) Hearings held pursuant to this Section shall be held in the geographical area in which the CCR surface impoundment is located. When determining the hearing location, consideration shall be given to facilitating attendance of interested or affected persons and organizations and to accessibility of hearing sites to public transportation.

8. *Proposed Changes to Section 845.260(e)(2)*

Proposed Section 845.260(e)(2) should be amended to read as follows:

(2) The contents of the public notice for the public hearing shall include at least the following:

* * *

(I) A translation of the public notice into the appropriate language or languages will be made if the Agency determines that a project is located within one mile of a significant population of non-English speaking residents.[499]

9. *Proposed Changes to Section 845.260(f)*

Proposed Section 845.260(f) should be amended to read as follows:

f) When the Agency holds a public hearing or when the Agency receives any written public comments pursuant to this Section, the Agency shall prepare a responsiveness summary which includes:

[remainder of subsection (f) omitted]

10. *Proposed Changes to Section 845.270(e)*

Proposed Section 845.270(e) should be amended to read as follows:

e) Appeal

1) If the Agency refuses to grant or grants with conditions a permit under this Part, the applicant may petition the Board to appeal the Agency's final decision pursuant to Section 40 of the Act.

2) If the Agency grants or denies a permit under this Part, a third party, other than the permit applicant or Agency, may appeal the Agency's decision as provided under federal law for CCR surface impoundment permits. 415 ILCS 5/40(g).

3) All appeals must be filed with the Board within 35 days after the final action as specified in Section 845.210(e) is served on the applicant and served on the Agency's listserv for the facility.

11. *Proposed Changes to Section 845.280(c)*

Proposed Section 845.280(c) should be amended to read as follows:

[499] IEPA proposed this language in response to suggestions, and we agree with it. IEPA First Post-Hearing Comments Attach. 3 at 4 (Sept. 24, 2020).

c) The owner or operator of a CCR surface impoundment may initiate modification to its permit by submitting an application to the Agency at any time after the permit is approved and before the permit expires. An alternative source demonstration under Section 845.650(d)(4) shall be considered a permit modification.

12. *Proposed Changes to Section 845.800(d)*

Proposed Section 845.800(d) should be amended to read as follows:

d) Unless otherwise required below, ~~T~~the owner or operator of a CCR surface impoundment must place the following in the facility's operating record within 1 day of their completion or finalization:

[remainder of subsection (d) omitted]

13. *Proposed Changes to Section 845.810(a)*

Proposed Section 845.910(a) should be amended to read as follows:

a) Each owner or operator of a CCR surface impoundment subject to the requirements of this Part must maintain a publicly accessible Internet site (CCR website) containing the information specified in this Section. The owner or operator's website must be titled "CCR Rule Compliance Data and Information." The website must ensure that all information required to be posted is immediately available to anyone visiting the site, without requiring any prerequisite, such as registration or a requirement to submit a document request. All required information must be clearly identifiable and must be able to be immediately printed and downloaded by anyone accessing the site. If the owner or operator changes the web address (i.e., Uniform Resource Locator (URL)) at any point, they must notify the Agency within 14 days of making the change. The facility's CCR website must also have a ''contact us'' form or a specific email address posted on the website for the public to use to submit questions and issues relating to the availability of information on the website.

14. *Proposed Changes to Section 845.810(d)*

Proposed Section 845.810(d) should be amended to read as follows:

d) Unless otherwise required in this Section, the information must be posted to the CCR website within ~~30~~ 14 days of placing the pertinent information required by Section 845.800 in the operating record.

15. *Proposed Changes to Section 845.810(f)*

Proposed Section 845.810(d) should be amended to read as follows:

f) The owner or operator of a CCR surface impoundment subject to this Part must place all the information specified under Section 845.240(e) on the owner or operator's CCR website at least ~~14~~ 30 days prior to the public meeting.

VII. The Proposed Rules Unlawfully Incorporate Two Federal Proposals to Weaken Coal Ash Protections that Have Not Been Finalized.

As discussed in the Environmental Groups Initial Comments, the Agency's proposed rule unlawfully incorporates provisions from two proposed Trump Administration rollbacks of portions of the Federal Coal Ash Rule that may never be finalized: (i) the "Phase II" Proposal,[500] published on August 14, 2019,[501] and (ii) the "Part B" Proposal,[502] published in March 2020.[503] Because these provisions would weaken federal coal ash protections below current minimum standards, the Agency's inclusion of them in its proposed rule when they have not been finalized at the federal level is inconsistent with both the Coal Ash Pollution Prevention Act, which directs the Board to adopt rules governing coal ash impoundments in Illinois that are "at a minimum . . . at least as protective" as current federal regulations,[504] and the WIIN Act, which only allows US EPA to approve state coal ash programs that are "at least as protective as" current federal regulations.[505]

Although US EPA has recently taken actions to finalize some of the Trump Administration rollbacks, the provisions that the Agency incorporated into the proposed rule have still not been finalized, and recent US EPA actions indicate that they are unlikely to be finalized during the current presidential term. In addition, evidence now in the record of this proceeding further underscores why incorporating these harmful proposed rollbacks incorporated into Illinois regulations would make them less protective than current federal regulations.

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[500] EPA, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Enhancing Public Access to Information; Reconsideration of Beneficial Use Criteria and Piles, 84 Fed. Reg. 40,353 (Aug. 14, 2019) (hereinafter "Phase II Proposal").
[501] *Id.* at 40,355-56, 40,362.
[502] EPA, Hazardous and Solid Waste Management System: Disposal of CCR; A Holistic Approach to Closure Part B: Alternate Demonstration for Unlined Surface Impoundments; Implementation of Closure, 85 Fed. Reg. 12,456 (Mar. 3, 2020) (hereinafter "Part B Proposal").
[503] *See* Envtl. Groups Initial Comments at 23-27.
[504] 415 ILCS 5/22.59(g)(1).
[505] 42 U.S.C. § 6945(d)(1)(B); *See* Envtl. Groups Initial Comments at 23-24..

A. The Proposed Federal Rollback Provisions Included in the Agency's Proposed Rule Have Not Been Finalized and May Never Be Finalized.

As discussed in our June 15, 2020 comments, the Agency's proposed rule includes provisions modeled off of US EPA's Phase II Proposal that would allow CCR to be "temporarily stored" in piles.[506] US EPA has not yet finalized the majority of provisions in this proposal, however, including the provisions pertaining to the "temporary" storage of CCR in piles.[507] Recent US EPA actions indicate that it does not intend to do so during the current presidential term. In its Spring 2020 Unified Regulatory Agenda, the Trump Administration announced that plans to finalize Phase II were delayed indefinitely, pending review of comments on the Phase II Proposal.[508] More recently, on October 5, 2020, US EPA sent a draft Notice of Data Availability ("NODA") to the White House Office of Management and Budget.[509] Once released, this NODA will make available to the public additional information that US EPA has received from stakeholders concerning the Phase II Proposal and open a public comment period on that information. Accordingly, US EPA will not be finalizing the relevant provisions of the Phase II Proposal during the current presidential term, and thus may never finalize them.

Similarly, while US EPA recently finalized a portion of its Part B Proposal,[510] the provisions of Part B that the Agency incorporated into its proposed rule that would allow more coal ash to be placed in unlined impoundments before they are closed have not yet been finalized.[511] Although US EPA states in the final, pre-publication version of the Part B rule that "[p]rovisions from the proposed rule that are not addressed in this rule will be addressed in a subsequent rulemaking action,"[512] it is unlikely that US EPA will have time to take any additional actions concerning the Part B Proposal within the current presidential term, and thus such actions may never occur.

Because these provisions of the Phase II and Part B Proposals would weaken federal coal ash protections and are not currently part of federal coal ash regulations – and may never be – the

[506] *See* Envtl. Groups Initial Comments at 25-26 (citing proposed Sections 845.120, 845.740(b)(4)(B)).
[507] In the recently published Part A rule, US EPA did finalize two provisions from the Phase II Proposal that relating to requirements for annual groundwater monitoring and corrective action reports and publicly accessible internet sites. US EPA, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; A Holistic Approach to Closure Part A: Deadline To Initiate Closure, 85 Fed. Reg. 53,516, 53,554-57 (Aug. 28, 2020).
[508] *See* https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202004&RIN=2050-AG98 (stating that the date of a final Phase II rule is "To Be Determined").
[509] https://www.reginfo.gov/public/do/eoDetails?rrid=131209.
[510] US EPA, Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; A Holistic Approach to Closure Part B: Alternate Demonstration for Unlined Surface Impoundments: Final Rule (pre-publication version Oct. 15, 2020), https://www.epa.gov/sites/production/files/2020-10/documents/ccr_part_b_frn_rin_2050-ah11_op_for_signature_10_15_20_admin_0.pdf ("Pre-Publication Part B").
[511] *See* Envtl. Groups Initial Comments at 26-27.
[512] Pre-Publication Part B at 7.

Board should decline to adopt these proposed Trump Administration rollbacks in Illinois regulations.

B. Evidence in the Record Further Demonstrates Why Incorporating These Proposed Rollbacks Into Illinois Regulations Would Make Them Less Protective than Current Federal Regulations.

Evidence in the record of this proceeding further underscores why these proposed rollbacks of federal coal ash protections are less protective than current federal regulations and must not be incorporated into the final rule adopted by the Board. For example, environmental groups' witness Mark Hutson testified that:

> [a]ddition of CCR during closure of unlined impoundments in contact with groundwater is simply adding contaminant mass to the source of groundwater contamination. The added waste would extend the duration over which contaminants can be released to the environment, may increase the concentration of released contaminants, and have the practical effect of limiting the range of remedial options available to address contamination. [513]

Hutson also testified that impoundments located in unstable areas, including floodplains, are also an unacceptable location for addition of CCR during closure. [514] The same is true of units that violate the aquifer location restriction. [515]

Although Dynegy's witness Andrew Bittner attempts to argue that consolidation of coal ash during impoundment closure-in-place does not create unacceptable risks, his arguments are not persuasive. Bittner testifies that additional coal ash placed above the water table would not affect post-closure hydraulic flux, leachate concentrations, or time to achieve groundwater protection standards,[516] but Bittner conceded on cross-examination that his opinion assumed a fully functioning cap that had not deteriorated.[517] As Mark Hutson pointed out, however, caps do in fact deteriorate over time, and "[e]ven the best caps will not last indefinitely."[518] Moreover, Bittner acknowledged that if there are differences in the chemical composition between the consolidated coal ash and the originally impounded coal ash, it could lead to differences in

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[513] Ex.14, Hutson Test. at 21.
[514] *Id.*
[515] *Id.* at 19.
[516] Ex. 37, Bittner Test. at 30-31.
[517] Tr. Sept. 29, 2020 294:3-22, 297:2-23, 300:8-12.
[518] Ex.14, Hutson Test. at 24.

leachate concentration discharged to groundwater,[519] and he conceded on cross-examination that he had not researched the extent to which this was true for Illinois coal ash sites.[520]

Ultimately, Bittner's testimony does not fully or adequately address Mark Hutson's concerns that addition of CCR during impoundments closure will increase long-term risks. Because this provision of the Agency's proposed rule is less protective than current federal regulations, it cannot lawfully be included in the final Illinois regulations adopted by the Board.

Similarly, as discussed above and in Envtl. Groups Initial Comments, the provisions allowing CCR to be "temporarily" stored in piles are also less protective than current federal regulations and must be rejected by the Board.[521]

The Board should eliminate from the proposed rule the provisions in Section 845.740(c)(4) that allow for "temporary" storage of removed coal ash in piles, as well as the provisions in Section 845.750(d) that allow for further placement of coal ash in impoundments during closure-in-place. Each of these provisions, if included, would make the Illinois rules less protective than current federal regulations, which would both violate the Coal Ash Pollution Prevention Act and make the Illinois program unlawful to approve under the WIIN Act.

VIII. Conclusion

For far too long, coal ash escaped the basic protections required of almost all other types of waste. Berms at coal ash ponds have been leaching for decades and, for most of that time, there has been neither the political will nor the regulatory structures needed to staunch the flow of dangerous pollution into our waters and onto our lands.[522] As former Illinois EPA geologist Mark Hutson explains,

> Wastes generated by coal combustion have for decades been exempted from environmental regulations that other waste streams have long ago become accustomed to complying with. It is not the characteristics of CCR that has caused separate treatment relative to regulatory consideration. CCR has been treated differently than other industrial wastes because the industry was successful in separating fossil fuel combustion wastes from regulations that pertain to other wastes. In my opinion, these rules should have been imposed many years ago when other industries were regulated.[523]

[519] Ex. 37, Bittner Test. at 30 n.8.
[520] Tr. Sept. 29, 2020 298:11-302:1.
[521] *See* Section III(E)(2) of these comments; Envtl. Groups Initial Comments at 25-26.
[522] *See* Tr. Sept. 29, 2020, 20:24-22:4 (Testimony of Mark Hutson):
[523] Exhibit 15, Hutson Answers at 42.

It is difficult to believe, Mr. Hutson reiterates, that after his 40-year plus career as a geologist at waste disposal and groundwater contamination sites, whether to leave coal ash in contact with water or in a floodplain is still in question. In Mr. Hutson's words, "After all this time, we are essentially discussing whether rules relating –regulating disposal of industrial wastes containing soluble materials should allow waste to be disposed in unlined pits, submerged in groundwater and located on a floodplain. I do not believe that the young geologist working for IEPA in 1978 would have believed this would even be a topic of conversation in 2020."[524]

Let us not extend the conversation any further. With these rules, we ask the Board to put in place the protections necessary to safeguard Illinois and ensure clean and safe water, air, and land for generations to come.

Dated: October 30, 2020

Respectfully Submitted,

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[524] Tr. Sept. 29, 2020 22:22-23:7 (Testimony of Mark Hutson).

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LIST OF ATTACHMENTS FOR ENVIRONMENTAL GROUPS' FINAL COMMENTS (via separate transmission)	
	Group 1
Attachment #	**Description**
1	Alexander Livnat, *Damage Case Compendium, Technical Support Document, Vol. IIa: Potential Damage Cases* (U.S. EPA Dec. 18, 2014) (Excerpt).
2	Alexander Livnat, *Damage Cases: Fugitive Dust Impact* (U.S. EPA Dec. 18, 2014).
3	Alexander Livnat, Damage Case Compendium, Technical Support Document, Vol. IIb: Potential Damage Cases (U.S. EPA Dec. 18, 2014).
	Group 2
4	KPRG and Associates, Inc., Annual Groundwater Monitoring and Corrective Action Report – 2019 Ash By-Pass Basin and Ash Surge Basin (Jan 31, 2020).
5	Victor Alvarado Guzmán, *Lucha de las comunidades logra convertir en ley prohibición del depósito de cenizas,* El Patriota de Sur, Jan. 2, 2020.
6	Mark Hutson, *Responses to EPA Solicitation for Comments on: Enhancing Public Access to Information; Reconsideration of Beneficial Use Criteria and Piles* (GEO-HYDRO INC. Oct. 14, 2019).
7	Illinois EPA, *Other Coal Ash Sites* (Sept. 2011).

CERTIFICATE OF SERVICE

The undersigned, Jennifer Cassel, an attorney, certifies that I have served by email the Clerk and by email the individuals with email addresses named on the Service List provided on the Board's website, *available at* https://pcb.illinois.gov/Cases/GetCaseDetailsById?caseId=16858, a true and correct copy of the **ENVIRONMENTAL LAW & POLICY CENTER, PRAIRIE RIVER NETWORK, SIERRA CLUB, AND LITTLE VILLAGE ENVIRONMENTAL JUSTICE ORGANIZATION'S FINAL POST-HEARING COMMENTS**, before 5 p.m. Central Time on October 30, 2020. The number of pages in the email transmission is 630 pages.

Dated: October 30, 2020

Respectfully Submitted,

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The following are attachments to the Environmental Groups' Final Comments

ATTACHMENT 1

investigation, and the facility took action to remediate ground water contamination and prevent further contamination."[601]

EPA has recently redesignated this Proven Damage Case to a Potential Damage Case:[602] "Onsite groundwater exceeded MCL for arsenic and selenium. Administrative action required groundwater investigation without explicit finding of specific damage."

References

EPA (2007): Coal Combustion Waste Damage Case Assessments, Case #15 and a reference therein (Memorandum from SAIC to Dennis Ruddy regarding Rationale and Conclusions Regarding Commenter-Identified Fossil Fuel Combustion Waste Damage Cases, April 20, 2000). http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2006-0796-0015

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[591] Wisconsin DNR (1976). The consists of 0-5 feet of topsoil (loess and alluvium); 1-18 feet of sandy silt-silty sand (alluvium; permeability in the range of 10^{-2} and 10^{-5}cm/sec); and approximately 145 feet of alternating sand and gravel layers, with occasional silt (outwash; permeability in the range of 10^{-1} and 10^{-5}cm/sec). For the soil and geohydrologic properties of Grant County, see USGS (2007).
[592] 'Significant contamination of groundwater (iron and sulfate) in the disposal area' is mentioned in Wisconsin DNR (ibid), suggesting that groundwater impact preceded 1979, and cited again in DNR (1986), discussing the February 1986 Nelson Dewey Exceedance Report.
[593] Overall, ᵗhe impact of the ash pond was greater than that of the slag pond. According to Zillmer and Fauble (2004), In EPA-HQ-RCRA-2009-0640-6416, Appendix, Section D, the reported values are: arsenic - range: 5.5-800 µg/L; mean: 197 µg/L; selenium - range: 10-320 µg/L; mean: 78.8 µg/L; sulfate - range: 75-2100ppm; mean: 1144ppm; and boron - range: 2.3-28.4ppm; mean: 9.23ppm. There are also exceedances of manganese - range: 0.72-1.2ppm.
Cherry et al., (2000) report additional exceedances, including of primary MCLs, but with the exception of cadmium (up to 140 µg/L), it is not evident whether the values they report represent maximum constituent levels in groundwater wells or in the ash ponds.
[594] The PAL either is 10 percent, 20 percent, or 50 percent of the enforcement standard, as specified by statute based on the health-related characteristics of the particular substance. Ten percent is used for cancer-causing substances, 20 percent for substances with other health effects, and 50 percent for substances having aesthetic or other public-welfare concerns.
[595] Stonefield Historic Site, showcasing Wisconsin's rural history in the early 20th Century.
[596] Wisconsin DNR (1986): Two quarters of expanded groundwater monitoring to include dissolved metals, continued analysis of groundwater quality to assess whether off-site sulfate contamination exceeds PAL levels, which might trigger operational changes (e.g., a switch to dry handling), and an analysis of alternative capping systems and long-term operational effects of the ash basin, and the submittal to DNR of annual groundwater quality reports, the environmental effects of sluicing versus dry ash handling and evaluation of an alternative low-permeability cap.
[597] Wisconsin DNR (1993). In response to Nelson Dewey's failure to comply with NR 140, Wis. Adm. Code (public health or welfare related groundwater quality Enforcement Standard (ES) and Preventive Action Limits (PALs), Tables 1 and 2 in http://dnr.wi.gov/topic/drinkingwater/documents/haltable.pdf, DNR required that the Plant prepare an Environmental Contamination Assessment report; the DNR stated that upon the review of that report it may require additional responses, such as changing the design or construction of the facility or taking remedial action to restore groundwater quality.
[598] Wisconsin DNR (1996).
[599] USWAG's comment to the 2007 NODA docket: EPA-HQ-RCRA-2006-0796-0432, Appendix C.
[600] Based on the information and documentation cited, USWAG requests that EPA identify the Nelson Dewey Site as a site where the previously alleged "proven damage" has been resolved to the satisfaction of the State through implementation of the modifications and site closure measure.
[601] EPA (2007).
[602] ICF (2010).

ICF (2010): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix A, Case #15. ICF, 10/2010.

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PTa39. Wisconsin Electric Power Company (WEPCO) Port Washington Facility[603]/ Druecker Quarry Fly Ash Site, Ozaukee County, Wisconsin

Type: Sand and Gravel Pit and Limestone Quarry.

Brief Description: WEPCO placed 40- to 60-foot-deep column of fly ash[604] in the unlined[605] Druecker sand and gravel pit[606] from 1948 to 1971. This 15-acre coal ash fill in and adjacent to a former limestone quarry received approximately 735,000 cubic yards of coal ash. Some ash in the quarry is below the water table. A well located about 250 feet south of the old quarry was reportedly impacted. [607]

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[603] According to EPA letter (undated) and EPA Press Release (2003), WEPCO's Port Washington facility consisted of five coal-fired, steam-generating units with an original design capacity of 80 MW when they were placed in service between 1935 and 1950. Due to age-related deterioration and loss of efficiency, Unit 5 was shut down completely and by 1987, WEPCO was faced with removing the remaining units from service as they reached their planned retirement dates beginning in the early 1990s, unless it undertook a costly "life extension" program to restore the physical and economic viability of the units and extend their useful life for about 20 years. In a series of applicability determinations in 1988 and 1989, EPA ruled that the renovations planned under WEPCO's life extension program would be subject to both the New Source Performance Standards (NSPS) provisions and the Prevention of Significant Deterioration (PSD) provisions of the of the Clean Air Act (CAA). WEPCO did not want to be constrained by new source requirements, and so sought review in the Court of Appeals.

On January 19, 1990, the U.S. Court of Appeals for the Seventh Circuit in Wisconsin Electric Power Co. v. Reilly, Nos. 88-3264 and 89-1339, issued its decision regarding a challenge by WEPCO to the two final determinations issued by the EPA, deciding that WEPCO's proposed renovations to its Port Washington power plant would be subject to NSPS and PSD requirements. On April 29, 2003, the U.S. EPA and the DOJ announced a major CAA settlement with WEPCO, also known as We Energies (WE), to resolve CAA violations at several of the company's coal-fired power plants. Under the settlement agreement, the WEPCO coal-fired units that were at issue in the WE decision will be shut down or controlled in 2004 under the settlement. Subsequently, the coal-fueled units at the Port Washington Generating Station were replaced with two 545-MW, high-efficiency natural gas-fueled units. The first unit achieved commercial operation in July 2005 and the second unit was placed into service in May 2008 (http://www.we-energies.com/home/projects/port_gen_station.htm).

[604] According to EPRI (2010), however, this ash consists of coarse bottom ash.

[605] EPRI (ibid).

[606] Located north of Port Washington, and about 9 miles northeast of Cedarburg, the site of the Cedar Sauk proven damage case.

[607] According to Wisconsin's Bureau for Remediation and Redevelopment Tracking System (BRRTS), the remediated quarry site is located at 1745 Shady Lane (SE 1/4 of the NW 1/4 of Sec 09, T11N, R22E), about 1,500 feet SWS of the intersection of Lake Drive and 'County Highway Kw', and is transversed by the tracks of the

The sand and gravel pit was sited in a hummocky end-moraine of the Ozaukee Member of the Kewaunee Formation, Wisconsinian (Late Pleistocene) aged glacial deposits,[608] with thicknesses ranging between less than 50 feet and zero. [609] Underlying the glacial deposits is a relatively thick deposit of Silurian dolostone of the Niagaran Series. [610] The Niagara Dolomite and the glacial till form a hydraulically well-connected, joint unconfined aquifer. In the Quarry's area, the probability of a well to yield 100-500 gl/minute is good. The quality of the Niagara aquifer's water in the area is one of the best in Ozaukee County, with sulfate levels below 25 mg/L, TDS below 300 mg/L, and hardness of about 250 mg/L.[611]

Values of hydraulic conductivity ranging from 0.01 to 585 ft/d (median: 3.2 ft/d) were determined from specific-capacity data for 534 wells in the Niagara aquifer of Ozaukee and Washington counties. The upper few feet of the aquifer generally have a greater hydraulic conductivity than the remainder because of interconnecting fractures, joints, and solution openings formed during pre-glacial erosion.[612]

The site is in an upland area where down-gradient groundwater is utilized as a source of drinking water. Groundwater flow is southerly, and there are approximately 30 residences located within one mile down-gradient. The Site borders on the west with Sauk Creek, which is designated an Area of Special Natural Resource Interest.[613]

Impact:[614] According to EPA (2007), a copy of the original Water Well Journal article cited by the commenters was obtained from the National Ground Water Association (NGWA). The article presented instances in which boron and selenium concentrations exceeded standards in a well located down-gradient of the CCR disposal site. A representative of the Wisconsin Department of Natural Resources (DNR) Waste Management Program reported that the site affects a residential, private water well supply. In lieu of providing up-gradient well monitoring data, the DNR representative stated that in his best professional judgment the boron levels reported for the well are not naturally occurring, and that the contaminants must come from the quarry because of the proximity to the monitoring well.

Chicago, Milwaukee and St. Paul railway: http://dnr.wi.gov/botw/GetActivityDetail.do?detailSeqNo=33727&crumb=0 and http://dnrmaps.wi.gov/SL/Viewer.html?Viewer=RR+Sites&runWorkflow=ZoomToBRRTS&brrtsid=35228.

[608] Syverson et al., (2011a).

[609] See, for instance, Mickelson and Syverson (1997), Young and Batten (1980, Fig. 7), and USGS (2007).

[610] Steidman et al., (1924, pages 72 and 189, analysis #183) provide an averaged composition of a high-purity dolomite from the Independent Lime and Stone Company's Druecker Quarry: 95.4 percent dolomite and 3.49 percent limestone. The Druecker Quarry provided dolomite to local lime kilns since the mid-19th Century, with lime shipped to markets by boat via Lake Michigan (Bertrand, 1944). According to the Ozaukee County Management Plan (2011, Table 2.7 and Map 2.9), the Druecker Lime Kiln was designated as a site of regional geologic importance.

[611] Young and Batten, ibid.

[612] Young and Batten, ibid.

[613] EPRI (ibid).

[614] According to EPA (2007) and the references cited below, originally, the commenters on the March 1999 Report to Congress on Wastes from the Combustion of Fossil Fuels identified this Wisconsin site in a table that alleged fly ash contaminated several drinking water wells with boron and selenium. Following a preliminary evaluation by the EPA, this site was initially classified as indeterminate because (i) the commenters did not identify the source of the information, and (ii) No quantitative data or further information about this site was available. *Memorandum from SAIC to Dennis Ruddy: Rationale and Conclusions Regarding Commenter-Identified Fossil Fuel Combustion Waste Damage Cases, April 20, 2000;* and *Memorandum from SAIC to Dennis Ruddy regarding Final Revised Report on Resolution of 18 Previously Indeterminate Candidate Damage Cases, March 5, 2003.*

According to EPA's inquiry with the DNR, selenium in the contaminated well exceeded the Preventative Action Limit (PAL), not MCL or enforceable standard (ES).[615, 616] Boron exceeds current Wisconsin ES although there was no standard at that time.[617] According to EPRI (2010), onsite exceedances of sulfate were also recorded.

Sediment samples were collected in 1994 at three sites in Sauk Creek to obtain baseline sediment quality data for Sauk Creek and to assess the potential sediment quality impacts from the fly ash landfill adjacent Sauk Creek near Druecker's Quarry. Whereas selenium, boron, and cadmium were higher in Sauk Creek near the former fly ash landfill, the levels were relatively low and not perceived to be at levels of concern. Consequently, Sauk Creek adjacent the Druecker's Quarry does not require specific management activities.[618]

Resolution: Wisconsin has not pursued any administrative action against WEPCO.[619] The DNR was first notified about the contamination in January 1980, then again in November 1990. After notifying the primary responsible parties, DNR received the Site Investigation Report in February 1994 and a Remedial Design Report in May 2007.[620] The impacted private well that had boron and sulfate exceedances was replaced with a deeper well, the property with the quarry were purchased by WEPCO, and the well was purchased and retired.[621] Remediation includes an engineered cap (installed in 2007-2008), and approximately 40,000 cubic yards of ash were pulled back from the bank of Sauk Creek on the western boundary of the ash fill site, creating over one acre of wetland. The wetland and adjacent swales were vegetated using a native seed mix to complement the adjacent natural areas. Remediation has been performed and the site is inactive.[622]

WEPCO monitors nine private water supply wells that represent potential down-gradient receptors at a frequency of one sampling event every two years. No exceedances have been detected in any of these wells.[623]

Previous Basis for Consideration: This case was categorized as a proven damage case because of the off-site exceedance of a health-based standard.[624]

ICF (2010) Rationale**:** "Not a damage case: No exceedances of MCL or comparable health based standard".

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615 EPA (2007) and reference therein. According to a laboratory report from the State Laboratory of Hygiene, samples collected at the John & Dolly Keating Port Washington Sample Tap Pit, an off-site drinking water well, showed very high concentrations of boron and elevated selenium concentrations.
616 Today's selenium MCL standard is 50 μg/L. According to Zilmer and Fauble (2004), Wisconsin's enforcement standards (ESs) are roughly equivalent to the federal maximum contaminant levels (MCLs). The preventive action limit (PAL) is generally 10 percent of the ES for all substances that have carcinogenic, mutagenic, teratogenic properties, selenium included.
617 According to Zilmer and Fauble (2004), enforcement standards and preventive action limits for boron became effective on January 1, 1999. The Wisconsin groundwater standard for boron is 0.960 mg/L.
618 Galarneau and Masterson (2001).
619 EPRI (2010).
620 http://dnr.wi.gov/botw/GetActivityDetail.do?detailSeqNo=35228&crumb=0
621 EPRI (ibid) also claims that "Contrary to the narrative in the 2007 USEPA Damage Case Assessment, the well where boron concentrations were high was on the same property as the ash fill, rather than off-site." This reference is, apparently, to the impacted well that has been acquired by WEPCO.
622 According to EPRI (ibid), the engineered cap consists of a 2.5-foot topsoil/rooting-zone layer, geocomposite drainage layer, and 40-mil PVC geomembrane over a fly ash bedding layer.
623 EPRI (ibid).
624 EPA (2007).

Postscript: EPRI claims[625] that "The analytical data for this site indicate that the basis for categorizing this site as a proven damage case is questionable. This site was categorized by USEPA as a proven damage case on the basis that selenium concentrations in an off-site drinking water well exceeded a health based standard. However, the 2007 USEPA Damage Case Assessment narrative is contradictory on selenium concentrations, because the history section notes that selenium concentrations in this well were lower than the MCL. Furthermore, the power company database shows that the highest selenium concentration monitored in any well for this facility (14 μg/L) was a factor of three lower than the MCL and state standard of 50 μg/L, and all other selenium concentrations are very low (2 μg/L or less)."

Considering that selenium has not exceeded the MCL, and that boron and sulfate have exceeded the corresponding secondary MCLs in a drinking water well that was originally offsite (prior to its purchase by WEPCO), this case qualifies as a potential damage case.

Reference

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PTa40. Wisconsin Power Service Corporation (WEPSCO)[626] Pulliam Power Station's Ash Disposal Site, Green Bay, Brown County, Wisconsin[627]

Type: Landfill.

Background and Description: An unlined, 80-acre coal ash landfill commissioned in 1971, located in a diked area built on a former shallow wetland close to the mouth of the Fox River's discharge to Green Bay. Considering that the landfill's site borders on a significant water body to the north and on drainage ditches on the other three sides, ash may have been placed below the water table and/or surface water elevation. Thick, dense clay till (with low hydraulic conductivity) underlies the landfill.[628] Portions of the landfill have been covered with about 4" of dredged material from Green Bay for diversion of run-off and percolation. Groundwater flow is radial outward due to mounding. Older monitoring wells (designated "DNR") were at least partially screened within the ash fill (hence, they represented actually leachate compositions); they were abandoned in 1995, and replaced by "MW" piezometers that were screened below the ash fill.

EPRI (2010) claims that, considering that Green Bay is immediately down-gradient and the site is located in an urban area that receives municipal water obtained from Lake Michigan, there are no potential human receptors.

All of Brown County was subject to glaciation during Wisconsin and probably older stages of the Pleistocene epoch, and it is largely covered with unconsolidated glacial drift and lake deposits ranging in thickness from a thin veneer to more than 160 feet.[629] Lake deposits of sorted sand are present along the Fox River from De Pere (about 10 miles from the Fox River's discharge point to the Green Bay) northward and along the shores of Green Bay. The Pleistocene deposits overlie Ordovician-age dolomites and sandstones, which, in turn are underlain by a sequence of Cambrian-age sandstones. The most important water-bearing formations underneath the Green Bay area are the sandstones of Cambrian age, and the Prairie du Chien group dolomite and the St. Peter sandstone of Ordovician age. The three units can be considered to form one aquifer (hence, the *sandstone aquifer* or the *deep aquifer*) which supplies large quantities of ground water to municipalities and industries.[630] The water of this deep confined aquifer is subject to artesian conditions and is derived from rain and melting snow at or near the outcrop area about 5 to 20 miles to the west and northwest.[631] In the Green Bay area, the thickness of the *deep aquifer* ranges in from 550 to 640 feet, and 400 feet at the City of Green Bay. Groundwater in Brown County is typically a very hard, calcium magnesium bicarbonate type. Naturally occurring radium,[632] arsenic,[633] and strontium in the *deep aquifer* have been recently reported.[634]

Sands in glacial lake deposits furnish small quantities of water to domestic wells along the shores of Green Bay. The water is from local precipitation. The bottoms of the Fox River and Green Bay are effectively sealed by silt, and very little, if any, recharge occurs directly from the river or bay to the aquifers.

Impact: According to EPA (2007), monitoring data at this site showed down-gradient levels of sulfate and manganese that would exceed WDNR's Enforceable Standard (ES) levels (equivalent to secondary MCLs for these constituents) and levels of iron that exceed WDNR's Preventative Action Level (PAL). According to information provided, however, the site had no down-gradient ES points of standards application (i.e., all wells are within the Design Management Zone of the landfill). Thus, the State would consider the sulfate and manganese exceedances to be PAL, not ES, exceedances. Further review by WDNR found an inadequate monitoring network at the facility.

According to Cherry et al., (2000), this site has nine constituents in down-gradient monitoring wells and ash wells (the older monitoring wells that were at least partially screened within the ash fill, and

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[626] WEPSC is a subsidiary of subsidiary of Integrys Energy Group.

[627] In 2007, WEPSCO was purchased by Integrys Energy Group. According to Sourcewatch (2012), the Plant's nameplate capacity was originally 410 MW, comprising eight generation units. Four have been retired and are no longer operating: Units 1 and 2 (10 MW each, came online in 1927 and retired in 1980); and Units 3 (30 MW, came online in 1943) and 4 (30 MW, came online in 1947), retired in 2007. The four operating units are fueled using low sulfur, Powder River Basin (PRB) coal from Wyoming, which contains about 5 percent ash: Unit 5: 50 MW (online since 1949), Unit 6: 62 MW (1951), Unit 7: 75 MW (1958), and Unit 8: 125 MW (1964). Together, the units are capable of producing 312.5 MW of electricity. The Pulliam Plant burns 1.5 million tons of coal annually, which produce 60,000-70,000 tons of fly ash and 10,000 tons of bottom ash annually. In 2009 and 2010, Pulliam installed equipment to reduce nitrogen oxide (NOx) on Units 5,6,7,8, and in 2009, Pulliam installed activated carbon system on Unit 8 to capture mercury. (http://www.wisconsinpublicservice.com/company/pulliam.aspx). There is also a natural gas fueled combustion turbine (82.6 MW) commissioned in 2003, which runs during peak energy demand. For beneficial use applications such as road embankments, see http://www.wisconsinpublicservice.com/environment/coal.aspx.

[628] EPRI (2010). For Brown County groundwater susceptibility, depth to water table, bedrock type, depth to bedrock, and soil deposits maps, see USGS (2007).

[629] The unconsolidated materials, consisting mostly of fine grained silts and clays, were deposited by glacial Lake Oshkosh that existed in front of the Green Bay Lobe of the Laurentide Ice Sheet during the last glaciations (Mass, 2010).

[630] This statement reflects the realities of the late 1940s. Subsequent large increases in water withdrawal have resulted in an unsustainable drawdown and a large cone of depression, which was centered around the Green Bay metropolitan area. Consequently, in 1957 the City of Green Bay switched to the use of Michigan Lake water as a drinking water source (e.g., Mass, 2010, Figs. 1-2 and 1-5). The current, limited level of pumping from the *sandstone aquifer* is also the result of the natural radium contents of this aquifer, which occasionally exceed EPA's standard of 5 pCi/L.

[631] Drescher (1953), Mass (2010), and Batten and Bradbury (1996, Figs. 7, 8, and 9). According to Drescher (ibid), in the Green Bay city area, the sandstone aquifer has a transmissivity of 10,600gpd/ft, and a coefficient of storage of 0.0002. Knowles (1964) cites a transmissivity of 13,200gpd/ft and a coefficient of storage of 0.0004 for the 590 feet deep Well BN 76, on the west side of Fox River on WEPSC's property. According to Drescher (ibid), at the location of Well BN 76, the top of the aquifer is at a depth of 150 feet below ground level. Interpolating from Figs. 10, 12, and 13 in Drescher (ibid) yield the following approximate concentration levels for chloride, sulfate, and TDS in the *sandstone aquifer* in the Pulliam Plant's area: 15ppm, 50ppm, and 350ppm, respectively. Based on Drescher (ibid, Table 9) and Batten and Bradbury (1996, Table 6), the dissolved iron content of the sandstone aquifer waters ranges between 0.2 and 2.8ppm, and the pH values are slightly alkaline (between 7.3 and 7.7).

[632] For the probable causes, see http://il.water.usgs.gov/proj/gwstudies/radium/, http://pbadupws.nrc.gov/docs/ML0931/ML093160829.pdf, and http://www.ncbi.nlm.nih.gov/pubmed/16857029.

[633] http://info.ngwa.org/GWOL/pdf/pdf/001467082.pdf and http://link.springer.com/article/10.1007%2FPL00021535#

According to Mass (ibid) and references therein, the top of the St. Peter Sandstone in the *deep aquifer* typically contains a zone of abundant arsenic-bearing sulfide minerals (known as the secondary sulfide cement horizon, SCH). These sulfides tend to oxidize when exposed to air or to oxygenated water. Another possible natural source of dissolved arsenic in the *deep aquifer*'s groundwater is the reduction of arsenic-bearing iron (hydr)oxides where the aquifer is under confined conditions and the groundwater is reducing (http://wisconsingeologicalsurvey.org/pdfs/staffpdf/Gotkowitzetal2004.pdf). To the extent that sulfide oxidation is the major cause for mobilizing arsenic into the *deep aquifer*, potentiometric records of Well BN 76 from 1950 to 2009 indicate that only around 1957, when the Green Bay's area depression cone hit its lowest point ever of 340 feet msl, was the SCH at this well site exposed above the saturated zone. See Figs. 2-1 and 3-6 to 3-13 in Mass (ibid); Figure 7 and Plates 3-6 in Knowles (ibid), and Drescher (ibid).

[634] Mass (ibid) and references therein.

monitored from 1975-1995) that exceeded federal standards: sulfate, TDS, boron, manganese, iron, chloride, aluminum, zinc, and pH.[635]

Resolution: The landfill was closed and capped in 1986. In 1994, WDNR required investigation of groundwater contamination and upgrade of monitoring network to reflect concentrations outside the screened ash zone intervals (deep piezometers in three separate locations), and a groundwater monitoring program is in effect. Ongoing monitoring at the site includes indicator parameters plus boron, selenium, manganese, and iron.

Basis for Consideration as a Potential Damage Case: "The exceedances found at this site, sulfate, manganese and iron, are within the design management zone of the landfill and are for constituents without health-based standards. Therefore, this case is a potential damage case."[636]

References

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http://pubs.usgs.gov/wsp/1190/report.pdf

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[635] Sulfate was barely above the MCL (one time) in shallow down-gradient, groundwater wells but excessive in nearby ash wells at 7,260 mg/L. TDS levels reached 1,750 mg/L in the groundwater and 7,917 mg/L in the ash well. Boron was high at 28 mg/L; manganese was measured at 0.469 mg/L in groundwater and 6.240 mg/L in an ash well; iron from an ash well reached 142 mg/L; chloride levels reached 1,491 mg/L; aluminum and zinc were elevated in an ash well at 7,960 and 1,030 mg/L, respectively; and the highest pH in an ash well was 9.56.
[636] EPA (2007).

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PTa41. Alliant (Formerly, Wisconsin Power and Light Company) Rock River Ash Disposal Facility, Beloit, Rock County, Wisconsin

Type: Surface Impoundments (Ash Disposal Area and four Settling Basins).

Background and Description: The Rock River Generating peak load Station is located north of Beloit, Wisconsin at 827 (West Beloit Rock) W. B. R. Townline Road on the west bank of the Rock River.[637, 638] Coal has not been burned at the site since 2000 because the facility closed the landfill it had used for fly ash.[639, 640]

Some confusion arises as a result from the waste site being classified as a 'landfill' under a RCRA permit (RCRA License #0728). However, by token of receipt of sluice water, it was actually a group of surface impoundments.[641] The unlined coal ash impoundment(s) near the banks of Rock River were active

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[637] The Rock River is a tributary of the Mississippi River.
[638] The facility opened in the early 1950s and consists of two 284 MW boilers each with one steam turbine. Originally designed to burn Illinois Basin bituminous coal supplied by rail car or barge, the site switched to natural gas or lower sulfur Powder River Basin coal. Additionally, a 30 MW combustion turbine was added in 1967 and two 50 MW combustion turbines were added between 1972 and 1977. As of 2000, the boilers were capable of operating on a variety of fuel sources, including natural gas, Powder River Basin coal, #2 fuel oil and tire-derived fuel. Electricity is generated via steam turbines and process water is taken from the Rock River.
[639] http://en.wikipedia.org/wiki/Rock_River_Generating_Station
[640] http://www.jsonline.com/blogs/business/46127242.html
[641] According to Alliant Energy (2009) and GZA GeoEnvironmenta (2013), there are actually four impoundments that are subject to a WPDES permit, all commissioned in 1978 and decommissioned in 2000. These ponds have the following surface area and storage capacity, respectively: WPDES Pond 1 (1.7 acre, 18 acre-feet), WPDES Pond 2 (1.35 acre, 19 acre-feet), Slag Pond (2.94 acre, 166 acre-feet), and Final Ash Pond (3.68 acre, 24 acre-feet). All four received fly ash, slag and 'other' waste. While operating, solids were allowed to settle and water was discharged from the WPDES Pond 1 and WPDES Pond 2 into the Slag Pond. In addition to historically receiving water and unsettled solids from WPDES Pond 1, WPDES Pond 2 and the facility, the Slag Pond has and continues to receive

between the 1950s and 2000, when the power plant switched to natural gas as its fuel source.[642] Ash may have been placed below the water table and/or surface water elevation.[643] While groundwater flow direction is toward the Rock River, no dwellings were observed between the site and the river.[644]

The Rock River Disposal Facility is located in the floodplain of the Rock River, overlying the ancestral Rock River valley which has eroded more than 300 feet into the underlying bedrock - sandstones of Cambrian age, and subsequently filled with Quaternary outwash and other fluvial deposits.[645] These outwash deposits consist of sorted and stratified medium to very coarse sand and gravel. The high permeability and transmissivity of these deposits renders them a plentiful aquifer. According to Zaporozec (1982, Figure 7), the main groundwater users within a radius of one mile from the Rock River Disposal Facility in 1979 were two industrial wells (one of which is apparently serves the power plant) and one irrigation well west of the Rock River, as well as seven small public water wells (less than 10,000 gallons/day) and twelve irrigation wells on the east side of Rock River.[646]

Impact: According to EPA (2007), monitoring data at this site show down-gradient levels of arsenic and mercury that would exceed the Wisconsin Department of Natural Resources (WDNR) drinking water Enforcement Standard (ES) levels (equivalent to primary MCLs). The data also show down-gradient levels of sulfate and iron that would exceed their ES levels (equivalent to secondary MCLs for these constituents). According to information provided by WDNR, however, the site has no down-gradient ES points of standards application due to its proximity to the Rock River (i.e., all wells are within the *design management zone* of the landfill). Thus, the State considers the Preventive Action Limit (PAL) exceedances, not ES exceedances. The preventive action limit represents a lesser concentration of the substance than the enforcement standard.[647]

EPRI claims that the tabulation of exceedances in groundwater before/after remediation in its 2010 report is based on time-series plots in a power company report to the WDNR covering the period 1977 to 2007,

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water from the Coal Pile Runoff Pond and stormwater runoff from the closed Landfill. Water and unsettled solids discharged from the Slag Pond into the Final WPDES Pond and then into the Rock River.
At least three of these inactive ponds can be still recognized in a recent Google Map image (accessed February 20, 2013) as their embankments have not yet been breached. See also Figure 25 in Zaporozec (1982): map showing location of solid waste disposal sites and surface impoundments in Rock County, and Table 12, ibid.

642 According to GZA GeoEnvironmenta (2013), the impoundments were commissioned for the purpose of settling CCW from the process streams of the facility and clarification of water prior to discharge.

643 For Rock County groundwater susceptibility, depth to water table, bedrock type, depth to bedrock, and soil deposits maps, see USGS (2007).

644 According to EPRI (2010).

645 Zaporozec (1982). These outwash deposits are a southward extension of the Late-Wisconsin age Johnstown Moraine.

646 According to Zaporozec (1982), pumping tests performed on Janesville and Beloit municipal wells yielded specific capacity of 280 to 1,250 gallons per minute (gpm) per foot of drawdown. Large yields of more than 500 gpm can be obtained in much of the sand and gravel deposits (See Figure 9 in Zaporozec 1982, for a map showing probable yields of wells in the sand and gravel aquifer of Rock County, Wisconsin). All high-capacity industrial wells in the Beloit area and most irrigation wells are constructed in these aquifers. Groundwater of the three bedrock aquifers and the Quaternary aquifer in Rock County is a very hard, calcium-magnesium-bicarbonate type. The quality of the Quaternary aquifer's water is good, with TDS in the Rock River's Facility area being about 400 mg/L (Figure 20). Among the constituents that were determined in chemical analyses of groundwater in Rock County (including the three bedrock aquifers) are arsenic, barium, cadmium, chromium, cobalt, copper, cyanide, lead, lithium, mercury, nickel, selenium, silver, strontium, and zinc. All of them are below the recommended limits.

647 The PAL either is 10 percent, 20 percent, or 50 percent of the enforcement standard as specified by statute based on the health-related characteristics of the particular substance. Ten percent is used for cancer-causing substances, 20% for substances with other health effects, and 50 percent for substances having aesthetic or other public-welfare concerns.

except for arsenic and mercury, which are based on data from the WDNR GEMS database. According to industry, onsite exceedances associated with CCRs involve arsenic (>MCL), boron (above health advisory level), sulfate (up to x2 the SMCL), and TDS (x3 SMCL); and onsite exceedances (source uncertain) involve iron (up to x26 the SMCL).[648] According to WDNR's comment to the docket,[649] arsenic ranged between 7-11 µg/L, selenium: 1-5 µg/L, boron: 1.3-3.7 mg/L, and sulfate, between 53-900ppm (mean: 322ppm).[650]

The Utility claims (EPRI 2010) that according to the WDNR's GEMS database, mercury was only sampled three times, during 1976 and 1977. The first samples in 1976 yielded mercury values that were about x 1000 higher than the two subsequent samples, for which results were lower than the MCL of 2µg/L. Therefore, industry considers the first set of mercury sample results to be outliers.[651] EPRI (2010) claims also that according to records in the WDNR GEMS database, arsenic was sampled twice, with both samples taken in 1977. One down-gradient well had arsenic concentrations higher than the current MCL in both samples.

Resolution: According to EPA (2007), in 1996, as a result of the PAL exceedances for sulfate and iron, WDNR required the company to begin submitting biennial ground water reports evaluating causes and trends relating to the continued PAL exceedances. Monitoring record comprises two surface water locations in the River, three piezometers, and 12 water-table wells, spanning the period between September 1976 and October 1998. Ongoing monitoring at the site includes indicator parameters and iron.

According to EPRI (2010), the impoundment was capped in 2007, included 2 feet of soil with 6" topsoil cover, and remediation has been performed. According to GeoEnvironmenta (2013), in June 2011, WP&L was in the process of establishing closure requirements in cooperation with the WDNR. WP&L indicated they anticipate obtaining permanent closure status for the impoundments by 2014.

Basis for Consideration as a Potential Damage Case: "Whereas the levels of arsenic and mercury in down-gradient wells exceed health-based enforcement standards, these exceedances are within the design management zone of the landfill and there is no evidence available of off-site migration of contaminants. Therefore, this case was determined to be a potential damage case."[652]

References

EPA (2007): 2007 Coal Combustion Waste Damage Case Assessments, Case #42 and a reference therein (Memorandum from SAIC to Dennis Ruddy regarding Rationale and Conclusions Regarding Commenter-Identified Fossil Fuel Combustion Waste Damage Cases, April 20, 2000). http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2006-0796-0015

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648 Note that according to Zaporozec (1982, Figure 19: Range of major constituents of ground water by aquifer), the range of dissolved iron in sampled drinking water wells of the Quaternary aquifer is between 0.03 to 1.9 ppm/L, with a median of 0.04 mg/L. Hence, non-impacted wells contain dissolved iron up to only about six times the SMCL.
649 EPA-HQ-RCRA-2009-0640-6416.
650 For a map of groundwater quality exceedances as of October 2009, see Figure 4 in Appendix F of GZA GeoEnvironmental (2013, virtual page 125), taken from RMT's March 2010 Biennial groundwater monitoring report.
651 EPRI (2010): "A total of ten monitoring wells were sampled in 1976 and all ten had anomalously high mercury results. Five of these wells were sampled in 1977, and the other five were not sampled again. Mercury was analyzed in two samples taken in 1977, before mercury analysis was discontinued at this site, and all ten mercury results (two sample events for five wells) were lower than the MCL."
652 EPA (2007).

EPRI (2010): Evaluation of Coal Combustion Product Damage Cases, Volume 2: Site Information. EPRI 1020554, Final Report, September 2010. Accessed Online July 2012.
http://www.epri.com/search/Pages/results.aspx?sq=1&k=Evaluation%20of%20Coal%20Combustion%20Product%20Damage%20Cases

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http://www.epa.gov/waste/nonhaz/industrial/special/fossil/surveys/alliant-rock.pdf

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http://wi.water.usgs.gov/gwcomp/find/rock/susceptibility.html

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GZA GeoEnvironmenta (2013): WPDES Pond 1, WPDES Pond 2, Slag Pond, and Final WPDES Pond, Wisconsin Power and Light Company, Rock River Generating Station, Beloit, Wisconsin, GZA *Engineers and* GeoEnvironmental, Inc., January 31, 2013. Accessed Online April 2013.
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/alliant_rockriver_final.pdf

A brief summary, site map, GW contour map, and selected monitoring records of B-9A (down-gradient) vs. W-1 (up-gradient) are found in D. Rudy's 'legacy' files.

PTa42. PacifiCorp Energy's Dave Johnston Power Plant,[653] Glenrock, Converse County, Wyoming

Type: Landfills, and a 2009 Spill into the North Platte River.

Background and Description: The Dave Johnston power plant is located approximately 5 miles east of Glenrock, Converse County, Wyoming, along Interstate 25, on the north (left) bank of the North Platte River. In addition to three landfills (one active and two inactive), the Site comprises also eight ponds (not-implicated): two active CCR settling ponds, one active clear pond, one conveyance canal (referred to as the Blowdown Canal), two former CCR settling ponds, and two former clear ponds (currently used as supplemental water storage and clear ponds).[654] The CCR impoundments are located generally west and

[653] Commissioned in 1958, the plant comprises four generation units – for a total of 817 MW nameplate capacity (net capacity: 762 MW). Units and In-Service Dates: 114 MW (1959), 114 MW (1961), 230 MW (1964), 360 MW (1972). Dave Johnston burns as much as 4 million tons of sub-bituminous coal per year. Until the mine's closure in 2000, that coal came from neighboring Dave Johnston Mine; currently it is supplied via rail from other Wyoming mines.
http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/EnergyGeneration_FactSheets/RMP_GFS_Dave_Johnston.pdf
[654] GEI (2011). For summary information on impoundment dimensions, storage capacity, and performance history see Table 2-1 in GEI (2011).

north of the power plant. The primary uses of the CCR impoundments are the holding and recovery of bottom ash received from the power plant and storage of water for later re-use at the plant.[655]

According to EPRI (2010), three (dry) ash management areas, all unlined, are located east of the power plant. Two are closed and received only fly ash, while an active site (as of 1988) received fly ash and small amounts of plant trash. The three sites cumulatively covered an area of about 50 acres, and there was no information on the age of these facilities. There were several other closed ash management areas on-site, estimated to be 10 to 20 years old, and the power company reports that there are no water quality exceedances associated with these areas.

The Dave Johnston Plant is located in the southern, steep flank of the Powder River Basin, close to the foothills of the Laramie Mountains.[656] According to GEI (2011), the plant and related structures are presumed to be constructed on Quaternary alluvial (sand, silt, and clay) deposits of the North Platte River. The overburden thickness is not known and large areas of the plant site have been disturbed by cut and fill activities over the last 60 years. According to the Geologic Map of Wyoming (1985) bedrock in the area consists of the Late-Cretaceous age Lance Formation,[657] which underlies the Paleocene age Fort Union Formation. The Lance Formation is characterized by thickly-bedded gray sandstone with thin inter-bedded shale and conglomerate layers. Its maximum thickness in Converse County is 2,900 feet.[658]

According to EPRI (2010), groundwater flow is to the south toward, but not necessarily discharging to, the North Platte River. There are no homes within one mile down-radius.

Impact:[659] *Groundwater:* According to EPA (2007), exceedances of the primary MCL for cadmium and the secondary MCLs for manganese and sulfate were observed in ground water up-gradient and down-gradient of the site. Interpretations of sampling results were difficult to make because other potential sources of contamination exist, such as other waste disposal areas at the site; contaminants naturally occurring in the soil which is highly mineralized around the Johnston site;[660] and uncertainties with regard to what degree leachate from the two landfills had reached the down-gradient wells.[661] In addition, elevated boron levels were detected in groundwater beneath the site.[662]

EPRI (2010) claims that exceedances of cadmium, sulfate, and manganese are not associated with CCR. Cadmium, manganese, and sulfate concentrations also exceeded the MCL in up-gradient wells suggesting their source was uncertain. The power company reports that a follow-up investigation found that the cadmium and manganese were naturally occurring, while the source of sulfate was uncertain.[663]

Surface Water: On January 8, 2009, the Blowdown Canal [664] released, over a 24-hour period, 14,400 gallons of coal ash processing water into the recirculation canal, which feeds NPDES Outfall 007.[665] In response to a low pH at Outfall 007, fresh water flow was increased to the No.4 Clear Pond and Blowdown Canal to keep the discharge waters in compliance. The flow into the pond eventually exceeded the Blowdown Canal discharge capability so the water level bridged the berm and flowed into 1B ash pond, bypassing the normal designed flow configuration. The water ultimately discharges into the North Platte River.

Resolution: According to EPRI (2010), there is no information on remedial action or on the existence of a monitoring well network associated with the landfill area.

In response to the January 2009 spill, plant personnel opened a water control valve at the discharge end of the Blowdown Canal to stop it from overflowing. Samples were taken of the process water in the Blowdown Canal, the recirculation canal water, and the water of the North Platte River upstream of where the recirculation canal discharges into the river.[666] A contractor was to build up the Blowdown Canal berm with fill material to remediate the discharge.

In response to stakeholder's concerns raised in the 2010 Denver Public Hearing, WDEQ responded to EPA Region 8 followup inquiry[667] that corrective action has been taken by the state to address the spill. EPA Region 8 was to close the investigation pending a confirmation letter from the state water program.

Basis for Consideration as a Potential Damage Case: "Whereas exceedances of the primary MCL (cadmium) and the secondary MCLs (manganese and sulfate) were observed in ground water down-gradient of the site, the natural occurrence of mineralization products in the local soils and possible and other potential sources of contamination Therefore, this case is a potential damage case."[668]

References

EPA (2007): Coal Combustion Waste Damage Case Assessments, Case #65 and a reference therein (Compendium of nineteen alleged coal combustion wastes damage cases, May 3, 2007.) http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2006-0796-0015

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[655] According to GEI (2011), ash ponds 1A/1B and 4A/4B are lined with a flexible membrane installed after ponds' commissioning, and Ponds 4A and 4B are also lined with 3 feet of compacted clay that was installed during pond construction. All the other ponds (The 1A/1B Ponds, Blowdown Canal, and the 4 Clear Pond) are unlined.
[656] Lane et al., (1972).
[657] For additional information on the Lance Formation, see: http://tin.er.usgs.gov/geology/state/sgmc-unit.php?unit=WYKl%3B0
[658] Lane et al., (1972).
[659] For citizens' complaints about fugitive dust impacts, see Docket comment EPA-HQ-RCRA-2009-0640-10019. Citizen concerns expressed in the CCR proposed rule's Louisville, KY Public Hearing (September 28, 2010) about fugitive dust, are substantiated by dust wipes from residents' properties and indoors, with arsenic at 2.72 mg/wipe and lead at 1.34mg/wipe.
[660] ADL (1985) states that: "Widespread measurement at the site of what might elsewhere be considered elevated chemical constituent level (e.g., sulfate, about 1,000ppm) is not due to the waste landfill…..Most of the 'elevated' measurements reflect pervasively high background levels characteristic of highly mineralized groundwater in many western settings. However, lower measured values (e.g., sulfate about 100ppm) at one background and one peripheral well indicate that even in highly mineralized arid areas there may be areas of good water quality." Rapp and Durum (1963) describe the general properties of groundwater in both the upper, unconsolidated aquifer along the North Platte River as characterized by a wide range in-the chemical constituents; high TDS contents (occasionally with more than 1,500 ppm of dissolved solids and a hardness of more than 400 ppm). Sodium and sulfate are the principal mineral substances in solution.
[661] ADL (1985) states that "Travel time from the 20-year old inactive landfill to a much closer (to the landfill) down-gradient well is estimated to be in excess of 20-years, accounting for both unsaturated and saturated zone travel."
[662] ADL (1985), cited in the RTP (1988), page 5-32.
[663] Tabulation of exceedances in groundwater based on results presented in the RTC (1988).
[664] Constructed in 1972, with one-acre foot capacity.
[665] PacifiCorp Energy (2009); and Exhibit 5B-1 of the proposed CCR rule's June 2010 RIA and Table L.1 of that RIA's Appendix K11. According to GEI (2011, page 13), "The cut slope to the south of the Blowdown Canal failed during a rainstorm in 2008 and resulted in the release of approximately 300 gallons to the recirculation canal. The plant subsequently re-configured the blowdown canal to reduce the potential for future releases." This is apparently a reference to the same event cited above, but we are unsure about the reason for the difference in cited dates and spilled volume.
[666] The incident (#090109-1535) was documented (January 16, 2009) in a letter of release from the power plant to WDEQ.
[667]Relayed in an October 21, 2011 email from K. Morrison to A. Livnat, EPA/OSWER.
[668] EPA (2007).

EPRI (2010): Evaluation of Coal Combustion Product Damage Cases, Volume 2: Site Information. EPRI 1020554, Final Report, September 2010. Accessed Online August 2012. http://www.epri.com/search/Pages/results.aspx?sq=1&k=Evaluation%20of%20Coal%20Combustion%20Product%20Damage%20Cases

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ATTACHMENT 2

EPA/OSWER/ORCR

Damage Cases: Fugitive Dust Impact

Technical Support Document, Docket # EPA-HQ-RCRA-2009-0640

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Evidence of fugitive dust impact throughout the life cycle management of coal combustion residuals (CCR) has been available even prior to the publication of the proposed CCR rule in June 2010. Since the proposed rule was issued, a great deal of additional evidence has surfaced. This evidence, combined with the results of air quality risk screening conducted by EPA that demonstrated human health risk associated with CCR fugitive dust was instrumental in EPA's decision to regulate air quality issues associated with CCR management. This technical support paper documents all CCR fugitive dust impact cases known to EPA at the time the final CCR management rule was about to be signed.

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EPA Region 2

Vitale Fly Ash Pit, Beverly, Massachusetts

Implicated Activity: Disposal, landfill (sand and gravel pit).

Description: An abandoned sand and gravel pit used as an unpermitted landfill between the 1950s and the mid-1970s. The Vitale Brothers, the site owners until 1980, accepted and disposed saltwater-quenched fly ash from New England Power Company along with other wastes.

Status: The site submitted a site-closure report February 1, 2007, and a preliminary screening of the site closure report was underway in July 2007, and is no longer active.

Impact Summary: In addition to groundwater and surface water impacts, there were complaints of fugitive dust from the site from neighbors located 500 feet away.

Study: Air sampling on one occasion in 1988 revealed arsenic concentrations of 2 ppb.

Regulatory and Legal Response: Unknown.

References:

Coal Combustion Waste Damage Case Assessments, July 2007, EPA (Case #2).

AES Coal Combustion Plant, Guayama, Salinas Area, Puerto Rico

Implicated Activity: Beneficial use (structural fill).

Description: In the absence of CCR disposal facilities, AES sells all its CCR (300K ton/year) at $0.15/ton, with free customer delivery, once recipient commits to limit the type of testing he can perform. CCR (mixed fly- and bottom ash, with added water, drying and cutting) are used as fill material in residential, commercial and road construction sites. The coal plant frequently stockpiles tens of thousands of tons of CCR in proximity to the Jobos Bay; particles of CCRs are mobilized by the Caribbean breeze into the Ocean.

Status: Active.

Impact Summary: Photographs of residential construction sites where CCRs were used in Salinas, PR, reflect virtual clouds of CCRs (particularly in the dry, December to May season) in spite of the fact that the Commonwealth government theoretically requires fugitive dust controls at construction sites.

Study: "A recent sample from the power plant indicates alpha particles of 9.9 pCi/g (nearly twice EPA's ARARs), in addition to 5.7 pCi/g beta particles and high levels of Arsenic (23 mg/kg) and other metals." The recommendations of a March 2006 University of Puerto Rico study: *Possible Applications for Circulating Fluidized Bed Combustion By-Products from the Guayama AES Power Plant* – for a great number of detailed CCR evaluations to better determine suitability of CCP for different applications have not been performed prior to its extensive use as a fill material.

Regulatory and Legal Response: Puerto Rico has weak regulatory system: When the Salinas Municipal landfill contaminated nearby wells, the government authorized relocation of the wells rather than requiring corrective action. New PR permitting regulations curtail public participation in siting processes and other activities requiring permits (Law 161, December 1, 2009). Puerto Rico's Environmental Quality Board (*Junta de Calidad Ambiental*) has no regulations in place regarding CCRs generation, disposal or secondary use. In 1996, the Board issued a resolution (Resolution 96-39-1; ratified by Resolution R-00-14-2, April 25, 2000) providing that EAS was not required to comply with the provisions applicable to installations that produce solid wastes. There are no permit or notification requirements for beneficial use projects, nor a requirement for independent characterization of CCR prior to its secondary use. The Guayama region, with one of the highest percentages of people of African descent in PR, including high poverty rates, unemployment and school dropout rates, qualifies as an environmental justice community.

Public Justice announced on September 26, 2012 an Intent to Sue AES due to its liberal use of CCR in construction projects that cause, among others, excessive fugitive dust.[1]

References:

Arlington, VA, Public Hearing, August 30, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

[1] http://publicjustice.net/sites/default/files/downloads/Final-AES-Notice-Letter-with-Appendicies-26Sep2012.pdf.

May 4, 2011 meeting between Ruth Santiago, a community activist, and EPA, Arlington, Virginia.

EPA Region 3

BBSS S&G Quarries, Constellation Energy, Gambrills, Anne Arundel County, Maryland

Implicated Activity: Disposal, structural fill (sand and gravel pits).

Description: Fugitive dust associated with reclamation work of two mining pits.

Status: Inactive. Site ceased receiving CCR as a result of contamination by heavy metals of adjacent drinking water wells.

Impact Summary: Complaints by neighboring residents.

Study: In December, 2007, Environmental Maryland documented the impacts of resuspended CCRs on a Maryland residential community adjacent to the Gambrills mine reclamation site in a study that showed that CCR fugitive dust (fly ash and/or coal ash), emanating from the disposal site, were present in all the samples collected throughout the community. Coal particulate represented between trace amounts (<1%) to 5% of the total particulate in these samples, with four of these samples containing more than trace amounts of post-combustion coal particulate. Fly ash was present at 12 of the 12 sampled sites; coal ash was present at eight sites; oil soot was present at six sites; and wood char was present at six sites. These grab-samples give an immediate picture of the particulate at that moment in time: depending on time, weather, and wind conditions, percentages could increase or decrease.

Regulatory and Legal Response: None specific to fugitive dust.

References:

Brad Heavner, Environment Maryland, comment to the docket: EPA-HQ-RCRA-2009-0640-4041.

Joshua Stewart, Airborne fly ash concerns residents, *Annapolis Capital,* September 26, 2007. Reprinted in http://www.croftonfirst.org/docs/Airborne_fly_ash_concerns_residents.pdf

Coal Ash Found In Dust at Homes Near Gambrills Dump, news release, Environmental America, January 3, 2008: http://www.environmentamerica.org/news-releases/clean-air/clean-air2/coal-ash-found-in-dust-at-homesnear-gambrills-dump (inaccessible, 3/16/2012)

Brandywine Coal Ash Landfill, Mirant MD Ash Management, LLC/Mirant Mid-Atlantic, LLC, Brandywine, Prince George's County, Maryland

Implicated Activity: Disposal (landfill).

Description: None available.

Status: Active.

Impact Summary: Windblown ash from the Brandywine coal ash landfill produces dense clouds of fugitive dust from large piles of uncovered ash. A children's playground is located 250 yards from the uncovered landfill, and there is a little league baseball field and kid's soccer field within several hundred yards of the coal ash site. About a dozen homes lie within a half-mile of the landfill.

Study: No air monitoring or soil/dust sampling has been completed as of May 2011.

Regulatory and Legal Response: None specific to fugitive dust. In April 2010, MDE filed suit in federal court maintaining that the disposal site was leaching pollutants in violation of the CWA and state law. A $1.9 million settlement was reached in January 2013.

References:

May 10, 2011 email, with an attachment and photos, from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Prince George's Cable TV News (CTV) documented the problem in a news segment: http://www.youtube.com/watch?v=xiT5aK0CV88.

Dominion Virginia Power's Battlefield Golf Course, Chesapeake, Virginia

Implicated Activity: Beneficial use (structural fill). (Also, a potential damage case site on account of groundwater contamination.)

Description: Between 2002 and 2007, Dominion Virginia Power built a 217-acre, 18-hole golf course with 1.5 million tons of coal ash. The coal ash was amended with 1.7 to 2.3 percent cement kiln dust. During construction of the golf course, neighbors and workers reported clouds of black dust migrating from the construction site to the adjacent residential neighborhoods.

Status: Inactive.

Impact Summary: Homeowners abutting the golf course reported that their homes, yards, cars, picnic tables and play equipment were covered with ash. They were reassured by Dominion Virginia Power it was harmless.

Study: None.

Regulatory and Legal Response: In March 2009, a lawsuit was filed by 400 residents from neighborhoods surrounding Battlefield Golf Club against Dominion Virginia Power, Combustion Products Management, VFL Technology, Battlefield Golf Club at Centerville owners MJM Golf LLC, and several related companies. The plaintiffs asked more than $1 billion in damages. The attorneys dropped that lawsuit in 2011, after the court dismissed substantial portions of the case. Whereas the judge ruled that the residents had not provided enough evidence that they had suffered damages from well water contamination,[2] one of the parts of the lawsuit allowed to move forward allege that airborne contaminants from the golf course pose a health risk.

In August 2009, another lawsuit was filed against Dominion Virginia Power against the same group of defendants. The suit maintained that the material has begun to leach into the groundwater feeding two neighborhoods in Chesapeake's Fentress section. It sought $1.25 billion to remove the fly ash, clean and restore the site, and bring public water and sewer to the neighborhoods. It also sought millions more to pay for homes, properties, medical bills and the nuisance created by the development. [3]

[2] Dominion Virginia Power funded an alternative, piped water supply system to the affected neighborhood.
[3] According to a former construction manager of the golf course, Dominion Virginia Power directed the building of the course with fly ash to disguise the project's true purpose—a coal ash dump. In a sworn statement, Derrick

In February 2012, a contractor who helped build the course filed a $10 million lawsuit in Chesapeake Circuit Court against Dominion and the company that transported the fly ash, alleging that the material used in shaping the course caused his kidney cancer. According to that suit, the plaintiff, Neil Wallace, inhaled fly ash particles while working at the site regularly over a five-year period and developed a cancerous kidney that was removed in 2010.[4]

In February 2012, lawyers representing nearly 400 people living near the Battlefield Golf Club at Centerville refiled a lawsuit, asking for damages related to toxic fly ash on which the course was built.[5] The lawsuit asks for $2 billion in damages. As of May 2013, a half-dozen lawsuits were still pending in Circuit Court.[6]

References:

Hazardous and Solid Waste Management System: Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities. EPA Proposed rule, June 21, 2010. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2009-0640-0352

The Virginian Pilot (2013): *Chesapeake fly ash fight yields little resolution*, The Virginian Pilot, May 5, 2013. Accessed Online January 2013.
http://hamptonroads.com/2013/05/chesapeake-fly-ash-fight-yields-little-resolution

Ash in Lungs: How Breathing Coal Ash is Hazardous to Your Health. Alan H. Lockwood and Lisa Evans, Physicians for Social Responsibility and EarthJustice. August 1, 2014:
http://www.psr.org/news-events/homepage-story-archive.html?page=2

Indian River Power Plant – NRG Energy (Formerly: Delmarva Power), Burton Island, Millsboro, Delaware

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Howell, a former employee of the builder of the golf course, said, "It was clear that a golf course wasn't being built," stated Howell. "It was a coal ash dump. All Dominion ever cared about was tonnage and how much more they could dump."
Louis Hansen, The Virginian-Pilot, *Lawsuit claims Dominion saw golf course as 'coal ash dump*, August 27, 2009: http://hamptonroads.com/2009/08/lawsuit-claims-dominion-saw-golf-coursecoal-ash-dump

[4] *Chesapeake fly ash suit against Dominion refiled*. PilotOnline, February 22, 2012: http://hamptonroads.com/2012/02/chesapeake-fly-ash-suit-against-dominion-refiled
(Originally: Marjon Rostami, TheVirginian-Pilot, *Chesapeake fly ash suit against Dominion refilled*, February 22, 2012: http://hamptonroads.com/2012/02/chesapeake-fly-ash-suit-against-dominion-refiled).

[5] The suit was filed against Dominion Virginia Power, MJM Golf LLC - the golf club's owners - and two other parties involved in building the golf course.

[6] The Virginian Pilot (2013): Chesapeake fly ash fight yields little resolution, The Virginian Pilot, May 5, 2013. Accessed Online January 2013.
http://hamptonroads.com/2013/05/chesapeake-fly-ash-fight-yields-little-resolution

Implicated Activity: Disposal (landfill).

Status: Active. (A potential damage case on account of groundwater contamination).

Description: The Phase I Landfill mound loses 1.51 tons/year from wind erosion.[7]

Impact Summary: The population in the six zip codes around the facility is a lung cancer cluster with an incidence of 104.7 per 100,000 compared to Delaware's 76.9 rate; 16% of Indian River District-school children have special education needs compared to 9.7% upwind; and heart disease, stroke, and heart attack rates are all elevated.[8]

Study: In response to community requests, the Delaware Division of Public Health (DPH) and Delaware Department of Natural Resources and Environmental Control (DENRC) launched a series of studies. In July 2007, DPH issued a report concerning a cancer cluster investigation in the Indian River area of Sussex County. The DPH study confirmed the existence of a statistical cancer cluster, but did not identify any increased rate of unusual cancers or cancer incidence among young people. DPH stated that, without further information, it was not possible to assign a cause to the cancer cluster.[9]

In May 2008, the Air Surveillance Branch issued a report on a short-term study using portable battery-operated monitors to determine PM2.5 concentrations in the Indian River area.[10] The final report concluded that although the study period was too brief to fully investigate the relationship of concentrations to wind directions, Hysplit[11] was used to examine the track of the air parcels on the five highest $PM_{2.5}$ concentration days. The results were consistent with strong regional source influence, and didn't support a strong local source. A follow up, November 2009 study concluded that when considered as a whole, findings from the study do not rule out tobacco use and occupational exposure as contributing factors to the elevated lung cancer rate in the Indian River area.[12]

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[7] Citizens for Clean Power (CCP), comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-0358.
[8] CCP, ibid.
[9] *Cancer Cluster Investigation, Indian River Area*, Delaware Health and Social Services Division of Public Health, 7/17/2007: http://dhss.delaware.gov/dph/dpc/files/irrpt071707.pdf.
[10] Between 12/2/2007 and 3/7/2008, with 26 scheduled sampling days.
[11] Hybrid Single Particle Lagrangian Integrated Trajectory Model.
[12] < Regardless of lung cancer status, Indian River participants were significantly more likely than non-Indian River participants to be heavy smokers and to have worked in a high-risk industry. Thus, baseline prevalence rates suggest that the Indian River community may have a unique lung cancer risk factor profile. When considered as a whole, findings from the IRCLS do not rule out tobacco use and occupational exposure as contributing factors to the elevated lung cancer rate in the Indian River area. Given the magnitude of odds ratios, tobacco use is the major factor that explains the original finding of the elevated lung cancer rate in the Indian River area of Sussex County, Delaware.>

On May 28, 2013, the State of Delaware issued a final report: The fall 2011 and fall 2012 sample collection periods included 32 participants recruited from the vicinity of the NRG Energy power plant in Sussex County, Delaware. The participants allowed personal, indoor residential and outdoor residential particulate matter samples to be collected over 3 consecutive days.[13] Data demonstrated that ambient background PM2.5 concentrations in southern Delaware are driven by long-range airborne transport from neighboring upwind states and metropolitan areas. These findings were criticized as the result of a faulty study, which used too small of a sample and by design, didn't capture the impact of long-term exposure to pollution.[14]

Regulatory and Legal Response: According to citizen Advocacy groups, Current permits and state regulations are ineffective other than to record reported dusting complaints. The State does not monitor PM downwind of the facility, as for its size only one sampler is needed for Sussex County (in Seaford, Delaware, 19 miles to the WNW).

A citizen suit brought by CCP for 6,304 documented violations of the CAA and the facility's own Title V state operating permit between 2004 and 2008. Before CCP's suit made it to court, DNREC filed a complaint against NRG Energy and the two settled out of court (NRG Energy paid $5,000 for its violations and had to purchase a $60,000 air quality monitor for the Department.) CCP charged DNERC was trying to preempt its lawsuit and alleged DNERC was not pursuing meaningful penalties or enforcing the law. The court held the state acted within its authority and "its DENRC and not the citizens, who is principally responsible for enforcing the law."

References:

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010. Case #1. http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

Citizens for Clean Power (CCP), comment to the docket: EPA-HQ-RCRA-2009-0640-0358.

Cancer Cluster Investigation, Indian River Area, Delaware Health and Social Services Division of Public Health, 7/17/2007: http://dhss.delaware.gov/dph/dpc/files/irrpt071707.pdf.

Delaware Air Quality Management $PM_{2.5}$ Indian River MiniVol Study, Final Report. Betsy Frey, Air Surveillance Branch, Air Quality Management Section, Division of Air and Waste

[13] During the fall 2011 season, the NRG Energy power plant was not operating while engineering upgrades designed to reduce pollutant emissions were installed. The fall 2012 sampling period was conducted while the power plant was operational, though not at 100% capacity.

[14] Critic chides cancer study: Indian River plant results called lame. Delawareonline, May 28, 2013: http://www.delawareonline.com/article/20130528/NEWS/305280081/

Management, Delaware Department of Natural Resources and Environmental Control, May 21, 2008.
Delaware Air Quality Management PM2.5 Indian River MiniVol Study

Lung Cancer in Sussex County, Delaware: Findings from the Indian River Community-Level Survey (IRCLS). Delaware Health and Social Services, Division of Public Health, November 2009.
http://dhss.delaware.gov/dph/dpc/files/ircls_finalreport.pdf

Millsboro Inhalation Exposure and Biomonitoring Study. Delaware Department of Natural Resources and Environmental Control, Prepared by RTI International for State of Delaware Department of Natural Resources and Environmental Control, Department of Health and Social Services, Dover, DE, May 28, 2013.
http://www.dnrec.delaware.gov/Admin/Documents/Millsboro_Inhalation_Exposure_and_Biomonitoring_Study_Final_Repor_05282013.pdf

Millsboro Inhalation and Biomonitoring Report finds air pollution coming into Delaware problematic; "Personal air," indoor sources contributed most to toxic exposure. Delaware.gov, May 29th, 2013.
http://news.delaware.gov/2013/05/29/millsboro-inhalation-and-biomonitoring-report-finds-air-pollution-coming-into-delaware-problematic-%E2%80%9Cpersonal-air%E2%80%9D-indoor-sources-contributed-most-to-toxic-exposure/

First Energy's Bruce Mansfield Power Plant, Little Blue Run Impoundment, Shippingport, Greene Township, Pennsylvania

Implicated Activity: Disposal, Little Blue Run Surface Impoundment (a proven damage case on account of groundwater contamination).

Description: A history of recurring particulate emission incidents and fugitive dust violations.

Status: Active (Impoundment slated to become inactive and start closure on January 1, 2017.)

Impact Summary: Records provided by FirstEnergy showed that the Bruce Mansfield plant released harmful and illegal air pollution at least 257 times between November 22, 2002 and March 29, 2007. A stakeholder who lives within one mile of First Energy's Little Blue Run Fly Ash Impoundment testified:

> 'We had a dry spell in 1993. First Energy employees knocked on our door and told us to make sure we washed the vegetables from our garden and to stay indoors as much as possible. It seemed that because of the dry, cold weather and low water level in the impoundment, the fly ash, normally in a wet slurry form, had dried to a fine powder and blown through the air covering Hookstown and Georgetown in a layer of dust.'[15]
>
> "In (March) 2009, dry conditions on the surface of the Impoundment covered nearby residents' homes in a layer of coal ash fugitive dust, prompting a NOV."

Study: Analyses of the exposed CCR collected on February 2, 1993 from the surface of the Impoundment, yielded, among others 18 ppm arsenic, 33 ppm chromium, 3.2 ppm lead, 18 ppm nickel, and 1.5 ppm selenium.

Regulatory and Legal Response: PADEP issued several NOVs for groundwater contamination and fugitive dust; the earliest NOV on hand is a March 8, 1993 PA Air Quality Control/DENR letter to the Bruce Mansfield Power Company indicating violations of Sections 6.1 (a), 6.1(b) and 8 of the Air Pollution Control Act, and violations of 25 Pa Code $$123.1(a) and 123.2, that have occurred in the Impoundment, between January 30 and February 4, 1993. Subfreezing temperatures combined with strong winds lifted up CCR (gypsum, lime, limestone, and possibly, calcium sulfite) from an elevated bar in the Impoundment, generating heavy dust clouds that settled on adjacent properties, barns and range areas. It lead state and local officials to issue an air advisory for Greene Township and Hookstown. The advisory recommended that people stay indoors, especially those with respiratory problems, and those that have to be outdoors, protect themselves with a mask to avoid breathing in the dust. FirstEnergy responded by raising the water levels in the impoundment and by spraying a dust-inhibiting chemical on the sludge. The Company also said it is willing to provide lodging or other assistance for affected residents.

On March 12, 2009, Waste Management SW Region/DENR issued another NOV alleging violation, on March 4, 2009, of §§ 289.271(a)(7); and the Solid Waste Management Act, July 7, 1980, P.L. 380, as amended, 35 P.S. §§ 6018.101-6018.1003, for a repeat of the 1993 dust dispersion event under similar circumstances (subfreezing temperatures combined with high winds, resulting in settling of significant amounts of CCRs on the ground, houses, lawns, decks, and automobiles). First Energy applied wetting of the Impoundment and latex soil cementing agent for mitigation/control. PADEP required First Energy to modify its permitted nuisance control plan and submit regular documentation on inspections and corrective actions to reduce dusting potential, and a $24,500 penalty was imposed. In addition, PADEP required a

[15] David Sulkowski's testimonial: CCR proposed rule Pittsburgh Public Hearing, September 21, 2010, Pp. 81-83. http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/transcripts/transcript-pittsburgh-pa.pdf

modification of the permit requiring more frequent inspections by FirstEnergy to reduce dusting potential. FirstEnergy responded to the NOV and corrected the situation.[16]
The Consent Decree issued by PADEP against FirstEnergy on July 26, 2012 required, among others, that FirstEnergy conduct monitoring sufficient to ensure that operation of the Impoundment will not cause or contribute to an exceedance of Ambient Air Quality Standards, in accordance with Section 131.1 of PADEP's regulations, 25 Pa. Code § 131.3.[17]

References:

Arlington, VA, Public Hearing, August 30, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Pittsburgh, PA, Public Hearing, September 21, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

In Harm's Way: Lack of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-Nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project, Earthjustice and Sierra Club, August 26, 2010.
http://www.environmentalintegrity.org/news_reports/08_26_10.php

Lisa Evans, EarthJustice, May 18, 2011 email to A. Livnat, EPA/OSWER.

PADEP's comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0201.

[16] PADEP's comment to the 2011 NODA docket, EPA-HQ-RCRA-2011-0392-0201: Commonwealth of Pennsylvania Department of Environmental Protection Southwest Region: Review of the Environmental Integrity Project, Earthjustice and Sierra Club Report: In Harm's Way: Lack of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-nine New Damage Cases of Contamination, From Improperly Disposed Coal Combustion Waste August 26, 2010; Page 26.

[17] http://www.environmentalintegrity.org/news_reports/documents/FirstEnergyConsentDecreeFinal1.pdf, section (k). 'No later than ninety (90) days following entry of this Consent Decree, FirstEnergy shall submit for approval by the Department a plan for the establishment of a fugitive particulate monitoring system for the Impoundment. The plan shall propose monitoring site locations of sufficient number and spatial distribution to accurately determine the rates at which particulate emissions from the Impoundment are deposited in peripheral areas, and that monitors shall be constructed in conformance with the standards of ASTM D 1739-98. The location of the monitoring sites shall be initially based on a wind rose of the area derived from climatological data recorded at the nearest National Weather Service weather station. The plan shall further propose specifications for, and a location for the installation of, a meteorological monitoring station near the Impoundment that conforms to the provisions of "Meteorological Monitoring Guidance for Regulatory Modeling Applications", EPA-454/R-99-005, US Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC, February 2000. FirstEnergy shall prepare and submit to the Department a quarterly report of all particulate monitoring results, no later than the last day of April, July, October and January of each year. Upon completion of one calendar year of meteorological monitoring data collection, FirstEnergy shall submit to the Department a re-evaluation of the fugitive particulate monitoring system based on the site-specific data.'

Mitchell Power Station, Allegheny Energy, Courtney, Pennsylvania

Implicated Activity: Disposal (landfill).

Description: None available.

Status: Active (issue addressed?)(A potential damage case on account of groundwater contamination).

Impact Summary: Unknown.

Study: None.

Regulatory and Legal Response: In 2001, PADEP issued a NOV for failure to minimize fugitive dust emissions from a Landfill NW of the power plant. Once the power plant improved its dust suppression methods, monitoring requirements for fugitive dust emissions were discontinued in 2004. There are no current administrative rulings or court decisions associated with the site.

References:

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

La Belle, Luzerne Township, Fayette County, Pennsylvania

Implicated Activity: Haulage and off-site disposal in a minefill and impoundment in a coal refuse and CCR disposal area, abandoned coal strip mine. (In addition, exceedance of the applicable groundwater and surface water standards.)

Description: Three foci of fugitive dust issues: (1) barge haul and downloading at the La Belle dock; (2) trucking from the dock to the reclaimed mine disposal site; and (3) airborne dust from the reclamation site.

Rejected coal and coarse and fine refuse was deposited at this site for an unknown number of years until the coal preparation plant ceased operation in 1994. It is estimated that approximately 40 million tons of coal waste material has been dumped on a 300-acre site in depths of up to 150 feet.[18] "The fine coal refuse was deposited in two large impoundments that are contained by massive embankments of coarse coal refuse. When operations ceased, the site was left in an abandoned, partially reclaimed condition with stability problems concerning one of the fine coal refuse impoundments.[19] In 1996, Matt Canastrale Contracting, Inc. (MCC) purchased the bankrupted LaBelle coal refuse landfill. The final sale was contingent upon site reclamation. It was decided to utilize coal ash in order to stabilized the impoundment and address the issues of water pollution.

The disposal site[20] accepts material from Allegheny Energy's Hatfield's Ferry coal-fired power plant in Greene County and from other power plants: Mitchell (FGD sulfite), Hatfield, and Elrama power plants, as well as from the Fayette and Greensburg thermal plants. In addition, First Energy, the operator of a power plant 75 miles north, plans to deposit more than 3 million tons of additional coal ash here every year starting in 2017, when its 1,300-acre Little Blue Run coal ash impoundment in Beaver County closes.

Status: Active.

Impact Summary: Both the General Permit WMGR052 and the Coal Refuse Mining Permit #26970702 strictly prohibit fugitive dust emissions from leaving the site:"[a]ll trucks which transport coal ash shall be covered with a suitable covering to minimize dust emissions during transit from each generating station to the disposal site." However, residents have not seen any trucks covered since the start of the coal ash dumping at the LaBelle site in 1998. And recently the LaBelle site excavator, Richard Lawson, admitted at a community meeting that he chose not to tarp any of the trucks believing that the tarps created more dust.[21]

[18] According to a BNA (March 2013) article, the site contains two vast piles of coal processing waste, known as "gob piles,'' with 40 million tons of refuse.
[19] The impoundment of concern has a footprint of approximately 24 acres and a contributing drainage area of approximately 87 acres. Comparison of pre-landfill mapping, post-1994 aerial photography, and drilling at various dates results in an impoundment depth range from 60 to 100 feet, averaging 74 feet. Several feet of standing water, contributed by precipitation falling on the surface of the drainage area, are present at all times in the impoundment and this water is loading the fine coal refuse and the laterally-confining coarse refuse. As early as 1984, the eastern slope of the coarse refuse embankment began to show signs of movement and various engineering plans were designed and implemented to some degree before the site was abandoned in 1994.
[20] The site comprises 361.5 - acres as coal refuse disposal area and 145.2 - acres as support area – coal ash and FGD disposal/reprocessing.
[21] Community Meeting at the Luzerne Township Volunteer Fire Hall, October 28, 2010.

Large loads of fly ash arrive in open, uncovered barges,[22] are unloaded onto trucks, with the crane sometimes dropping the ash onto the shoreline of the Monongahela River. Loaded trucks motor near a La Belle neighborhood in Luzerne Township without anything covering the fly ash as it's taken to a hilltop where it is dumped and left uncovered.

Instead of decreasing the fugitive dust emissions as the operator and his experts predicted, the emissions from the disposal site have actually increased as the low permeability cementitious (LPC) coal ash has been dumped. Hundreds of acres of coal ash are allowed to dry, over time, especially during hot, summer months. The dried ash becomes airborne and blankets the local communities in clouds of grey coal ash.[23] Winters winds carry the coal ash off the hilltop onto residents' properties.

Up the hill from the barge-unloading facility, LaBelle residents complain often about dust that settles on their properties and hangs in the air. Downwind from the dump site in Sauerkraut Hill residents say there are nine cases of cancer in the 18 houses, and in LaBelle there is a prevalence of pulmonary sicknesses. In La Belle, ash-like powder accumulates on window sills of houses, on appliances inside garages, and on apples trees in the yards. In summer months, swimming-pool filter cartridges have to be changed daily, instead of every two weeks, as recommended, because the previous day's filters are stained black.

Study: A sample of fly ash taken from the La Belle disposal site and tested by a local company, R.J. Lee Group, shows presence of arsenic and several heavy metals, most significantly lead. These represent levels in the actual ash, and not amounts found in the air or on neighboring properties. While there's no scientific proof that fly ash or other forms of pollution are causing health problems, Luzerne Township has elevated mortality levels for diseases that have been linked to pollution exposure, according to the Post-Gazette ecological study on mortality rates. Luzerne had 170 heart-disease deaths from 2000 through 2008, or 26 percent higher than the national average, which would project 135 deaths.

Regulatory and Legal Response: Uncovered trucks are a clear violation of the existing permits, and yet there have been no violations or fines issued by the PADEP. A petitions signed by 93 La Belle-area residents was sent to PADEP to seek an investigation and force the owner to clean up the process. PADEP officials investigated and ordered the company to dampen roads to reduce dust. Local residents believe, however, that PADEP's actions, to date, have been insufficient to correct the problems and protect the public. In October 2010, PADEP and concerned citizens toured the fly ash depot.

[22] In May 2006, a barge, presumably with a coal ash shipment from the Mitchell power plant sunk at the docking site, releasing tons of fly ash into the Monongahela River (EPA-HQ-RCRA-2006-0796 -0443 and EPA-HQ-RCRA-2009-0640-8243, page 17.)
[23] EPA-HQ-RCRA-2009-0640-8243, pp. 14-17.

A Notice of Violations and Notice of Intent to Sue was issued on March 13, 2013 by EIP for Citizens Coal Council against MCC for Violations of the Clean Streams Law, Air Pollution Control Act, the Resource Conservation and Recovery Act, the Clean Air Act, and Pennsylvania's Law Implementing the Requirements of the Surface Mining and Reclamation Act at the LaBelle, PA Coal Waste Mine Dump in Luzerne Township, PA. The lawsuit would be filed in the U.S. District Court for the Western District of Pennsylvania and would ask the court to require MCC to abate the alleged violations. In addition, Citizens Coal Council would ask the court to bar future violations and to impose civil penalties and award attorneys' fees.[24] On June 26, 2013, Public Justice and Environmental Integrity Project (EIP), representing Citizens Coal Council, filed a citizens' suit against (MCC).[25] In September 30, 2014, the U.S. District Court, W.D. Pennsylvania rejected the Motion to Dismiss filed by Defendant, Matt Canestrale Contracting, Inc. ("MCC"), pursuant to Rule 12(b)(1) for lack of subject matter jurisdiction.[26]

References:

'Large loads in La Belle', December 16, 2010, Pittsburgh Post-Gazette: http://www.post-gazette.com/pg/10350/1109211-114.stm#ixzz18IksbbGA;

G. Kuklish, comment EPA-HQ-RCRA-2009-0640-8243; 'Large loads in La Belle', March 29, 2012, Pittsburgh Post-Gazette: http://www.post-gazette.com/stories/news/health/large-loads-in-la-belle-277904/

Notice of Violation and Notice of Intent to Sue Matt Canestralle Contracting, Inc., March 23, 2013:
http://www.environmentalintegrity.org/news_reports/documents/LabelleNoticeLetter20130313.pdf

[24] *PA Contractor Faces Possible Lawsuit for Violations of Federal & State Pollution Laws at Coal Mine Dump*, EIP News and Reports, March 13, 2013: http://environmentalintegrity.org/archives/6130

[25] *Citizens Coal Council v. Matt Canestrale Contracting, Inc.* Public Justice. Complaint filed June 26, 2013: http://publicjustice.net/content/citizens-coal-council-v-matt-canestrale-contracting-inc and http://www.environmentalintegrity.org/news_reports/documents/2013_06_26_FINAL_CCC%20Canestrale%20Complaint.pdf

[26] *Citizens Coal Council, Plaintiff, V. Matt Canestrale Contracting, Inc., Defendant.* LEAGLE: http://leagle.com/decision/In%20FDCO%2020141006940/CITIZENS%20COAL%20COUNCIL%20v.%20MATT%20CANESTRALE%20CONTRACTING,%20INC. Plaintiff, Citizens Coal Council ("CCC"), brought this action under the citizen suit provision of the Resource Conservation and Recovery Act, 42 U.S.C. §6972(a)(1)(B) ("RCRA"), to abate an imminent and substantial endangerment to health or the environment allegedly caused by solid waste located on the LaBelle Coal Refuse Disposal Area, currently owned and operated by MCC. Plaintiff also asserts violations of various Pennsylvania statutes by MCC. For the reasons that follow, the Court will deny Defendant's motion to dismiss. The Court found that the Amended Complaint alleges sufficient facts to show that Plaintiff has asserted a plausible claim under ISE citizen suit provision of the RCRA, 42 U.S.C. §6972(a)(1)(B), to withstand MCC's motion to dismiss under Rule 12(b)(6). An appropriate order will follow.

http://news.bna.com/deln/DELNWB/split_display.adp?fedfid=29991193&vname=dennotallissues&jd=a0d6x4x2x1&split=0

Rostosky Ridge Road Collapse of CCR Pile, Forward Township, Allegheny County, Pennsylvania

Implicated Activity: Piling for beneficial use.

Description: Fly ash and "bottom ash" were removed from Allegheny Energy's Mitchell Power Plant and dispose of at River Hill Road in Forward Township to be used by the PA DOT for the maintenance of River Hill Road, and specifically as structural material for construction of the roadway, its embankment, and adjacent slope. A collapse of the ash pile was triggered by a break in the water main under River Hill Road. On January 25, 2005, thousands of tons of fly ash slid down a hillside and flowed into a creek and through a neighborhood located on Rostosky Ridge Road.[27] Approximately nine homes, a business (restaurant), and a mile of the creek were directly impacted by the landslide, which deposited large piles of fly ash in residential yards, flower beds, culverts, play areas, around garages and along the creek banks. Cleanup immediately following the slide in 2005 included removal and disposal of 1,500 tons of ash from the public parking lot at Gallatin Sunnyside Park, the commercial and affected residential properties on Rostosky Ridge Road, as well as from roadways, culverts, and creek banks. During the first week after the landslide, residents used township equipment to remove some of the fly ash from driveways, walkways, parking lots, and roadways, generally w/o the use of any protective gear. An uncovered dump truck transported the fly ash to a nearby ball field. The local fire department helped with wetting the streets to keep down dust levels.

Following this initial removal effort, PADEP contracted to remove the fly ash from the affected neighborhood yards, roadways, creek banks, and ball field. From January 2006 through August 2006, the DEP removed 40,000 tons of ash from the embankment, eliminating any risk of another release of fly ash from the slide area. When feasible, the PADEP contractor removed the fly ash with a vacuum truck and small equipment such as skid-loaders, mini-excavators, and backhoes. Hand tools such as rakes, shovels, and hoes were also used to remove the fly ash. The affected areas near the creek banks and culverts were flushed with water, allowing the fly

[27] The slide occurred when the old coal ash embankment adjacent to River Hill Road collapsed and temporarily dammed the stream at the embankment's base. When the ash dam failed, the ground broke loose and water, slurry and tree branches rushed down the hill onto Rostosky Ridge Road, just off Route 136. Some water and debris from the slide spilled onto Route 136 near Rapp's Restaurant.

ash deposits to enter the creek water. Nearly five years after the coal ash slide incident, work was expected to begin to remove the final remains of that slide.[28]

Status: Inactive (a one-time incident.)

Impact Summary: Following the landslide, residents stated that they were ill with a variety of flu-like symptoms, including sore throat, cough, fever, nausea, fatigue, diarrhea, and headaches.

Study: Based on a petition for a public health evaluation of the fly ash landslide, in March 2005, ATSDR conducted a preliminary review of available data, on the basis of which ATSDR classified the landslide site as a potential health hazard and made several recommendations, among which were removal of the remaining fly ash from the affected neighborhood and post-removal confirmatory sampling. ATSDR also agreed to complete a formal written health consultation evaluating all available data following the post-removal confirmatory sampling.[29]

Eleven samples were measured for PM10 in outdoor air. Because samples were not necessarily collected during fly ash removal activities, results may not represent peak exposure levels. The maximum PM10 24-hour average air concentration was 36.4 $\mu g/m^3$, which is below EPA's PM10 24-hour average NAAQS of 150 $\mu g/m^3$. It is not known what levels of PM2.5 were associated with measured PM10 levels. However, even assuming all of the particulate matter was <2.5 microns, the measured levels are also below EPA's PM2.5 24-hour average NAAQS of 65 $\mu g/m^3$. The limited air data suggests exposures to PM10 levels are not likely to be harmful to human health.

However, past exposures to fine particulate matter immediately following the landslide and during removal activities may have been at levels of health concern. Many epidemiologic studies have found consistent associations between exposure and harmful health effects for short-term, or acute, exposures (usually measured in days) to fine particulate matter. Acute exposures to fine particulate matter may also aggravate pre-existing respiratory conditions in sensitive individuals. Although measured PM10 levels from the one residential yard were below NAAQS values, the air measurements were not necessarily collected during peak exposure periods when residents were shoveling and removing fly ash from their yards. ATSDR considers it plausible that fine particles in the fly ash may have acted as a respiratory irritant in exposed adults and children during that time.

Following the landslide, fly ash could have been brought into vehicles and homes on the feet of family members and pets. In fact, during a February 2005 site visit, ATSDR staff

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[28] Final fly ash clean-up begins - Pittsburgh Tribune-Review, January 18, 2010. http://www.pittsburghlive.com/x/valleyindependent/news/s_662812.html#ixzz1mDyrFKOx
[29] ATSDR Health Consultation: *Coal Fly Ash Landslide, Forward Township, Allegheny County, Pennsylvania*, June 1, 2006: http://www.atsdr.cdc.gov/HAC/pha/CoalFlyAshLandslide/CoalFlyAshLandslideHC060106.pdf

witnessed fly ash dust and indoor tracking of dirt into homes and cars in the affected neighborhood. Suspended fly ash particles in outdoor air could have entered a home through indoor-outdoor air exchange. A young child playing on a home's floor will have the maximum opportunity for ingestion, inhalation, and dermal exposure to dust. An environmental services company engaged by legal counsel representing the affected residents conducted an interior home sampling investigation. In February, March, and April 2005, interior dust wipe samples from the surface of carpets, countertops, tables, windowsills, fans, furnace filters, and vacuum cleaner bags were collected by residents and sent for arsenic analysis. Arsenic was detected in some of the samples. Follow-up sampling in July 2005 also detected arsenic in dust wipe samples. Detections of arsenic in dust wipe samples are an indication that arsenic was, at some point, distributed throughout the home and was accessible to the occupants.

Results of the analysis of the urinary arsenic levels measured indicate that the participants were not exposed to high levels of arsenic two to three days prior to their urine collection. However, the urinary sampling time does not represent the time of peak exposure levels. None of the arsenic concentrations in toenails or fingernails exceeded the published reference ranges. However, because of the length of time required for nail growth, the results from the nail samples did not reflect peak exposure times at the site.

In July 2005, the Allegheny County Health Department issued a study, based on information and samples collected in March-April of that year.[30] The study tested for arsenic in urine, hair, and nail samples collected from potentially affected residents between February 5 and early April, 2005.

Overall, the biological testing of both studies was conducted to address community concerns about arsenic exposures following the landslide event. However, the timing of the biological testing does not allow these community concerns to be addressed.

Regulatory and Legal Response: In October 2006, residents along Rostosky Ridge Road and a portion of Rainbow Run Road filed a lawsuit in Allegheny County Court in an effort to force PADEP to clean the site. The suit claimed the PADEP violated the Clean Streams Act, the Air Pollution and Control Act and the Hazardous Sites Cleanup Act and created a private and public nuisance.[31]

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[30] *Results of the Health Investigation Following Fly Ash Contamination in Forward Township, Allegheny County, Pennsylvania:* http://academics.rmu.edu/faculty/short/research/arsenic/ACHD-Arsenic-2005.pdf.

[31] The suit also named as defendants: Allegheny Energy, owner of the fly ash that had been generated at the company's Mitchell Power Station; the state Department of Transportation, for using fly ash to stabilize River Hill Road and maintaining the hazardous substance within its right-of-way and/or embankment supporting the road; the Municipal Authority of Westmoreland County (MAWC), because its water main ruptured, bringing the fly ash hillside down into the neighborhood; and Weavertown Environmental Group, because of alleged "negligent remediation at the site, which caused further harm."

The state maintained that tests previously conducted by the Allegheny County Department of Health found low levels of arsenic - consistent with an area where coal is burned to produce electricity. The agreement[32] called for more than $3 million in claims and damages to be paid to the commonwealth and to 25 residents on or near Rostosky Ridge Road. The commonwealth received approximately $1.8 million for cleanup costs and monitoring, with the rest going to the residents for compensation and damages.

References:

Barbara J. Diess comment to the 2007 NODA docket: EPA-HQ-RCRA-2006-0796-0424.

Health Consultation: Coal Fly Ash Landslide, Forward Township, Allegheny County, Pennsylvania: ATSDR, June 1, 2006.

East End Landfill (aka East End Resource Recovery), 1820 Darbytown Road, Henrico County, Virginia

Implicated Activity: Landfill disposal and structural fill.

Description: A landfill permitted only for C&D debris has been stockpiling and disposing of coal ash for nearly two years without a permit from the county. The landfill, operating since 1987 and located about 200 m from the closest residential area, accepts C&D debris from within a 150-mile radius of Richmond.

As of July 2009, the company ("TEEL"), however, had approval from the Virginia DEQ to use the materials as embankment, daily cover and firebreak material, as well as a structural fill to stabilize the 108 acres former, old Richmond City landfill while it is being excavated as part of a remediation process; after the company's petition for a 180-day trial to use the material, in March 2010 DEQ approved the landfill's request for permanent use[33]. Under previous violations, the company was fined more than $100,000 by the DEQ "in the previous year".

[32] September 15, 2009: http://www.newspapers.com/newspage/36312281/

[33] DEQ also approved incinerator fly ash, bottom ash, nonhazardous contaminated soil and petroleum-contaminated soil as acceptable cover materials and shredded tires as a drainage material. The use of CCBs is exempt from Virginia's Solid Waste management regulations when used in combination with a cementitious binder.

In December 2010, the Henrico County Board of Zoning Appeals denied a permit to deposit coal ash at the landfill.[34] After that decision, however, the company continued to bring more ash to the site.

Status: Active.

Impact Summary: Residents near the landfill have raised many concerns about coal ash being dumped near their homes, which has caused unsafe levels of dust and potential groundwater contamination. From 2008 to 2011, neighbors complained about a persistent rotten-egg smell, potential health hazards from coal ash stored at the landfill being blown into neighborhoods, and mud being tracked by trucks onto nearby roads.

Paragraph (19) of the County's late April 2011 filing of a complaint against TEEL at the Circuit Court of the County of Henrico states: "There is clearly observable harm from TEEL's continued receipt, storage and use of these materials (CCBs) at the property. See, e.g., Exhibit 8 (April 4,2011 video shot by County inspector showing massive quantities of fly ash blowing from the site)."

Study: None.

Regulatory and Legal Response: In 2009, the Virginia Department of Environmental Quality penalized the landfill's operator more than $100,000 for numerous site violations.[35]

In February 2011, the East End Landfill was issued a zoning violation. In April 2011, the Henrico County Board of Zoning upheld the zoning board NOV that orders the removal of piles of coal ash by June 30, 2011. Henrico County officials also filed a complaint against the landfill, initiating a process to obtain a temporary injunction to get the company to stop taking more coal ash at the site and to find a way to keep the ash from being spread by wind.[36]

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[34] http://www2.timesdispatch.com/news/2010/dec/16/henrico-panel-denies-landfill-permit-coal-ash-ar-720607/ and http://www2.timesdispatch.com/news/2010/dec/17/TDMAIN01-henrico-panel-denies-landfill-permit-for--ar-721709/

[35] Henrico landfill looks to expand. Timesdispatch.com, June 27, 2013: http://www.timesdispatch.com/news/local/henrico/henrico-landfill-looks-to-expand/article_6c2a2505-d94a-54cc-86f6-668befe023ff.html

[36] Complaint attached to original email message from Lisa Evans, EarthJustice. See also http://www2.timesdispatch.com/news/2011/apr/28/1/henrico-board-denies-landfills-petition-to-take-co-ar-1002839/

In June 2013, the county's Board of Zoning Appeals voted to grant an expansion of the site's waste disposal area despite sizable opposition from neighbors, claiming a turnaround in the quality of the site's management since it has changed hands in 2011.[37]

References:

May 19, 2011 email from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Fort Martin Power Plant, Fort Martin, West Virginia

Implicated Activity: Disposal and haulage.

Description: Clouds of coal dust and fly ash blowing in the wind and dispersed by 50 coal ash trucks per hour on the highway from disposal and haulage. All four nearby streams are polluted by CCRs.

Status: Active.

Impact Summary: No information.

Study: None.

Regulatory and Legal Response: "WVDEP did not respond to any complaint letters nor have they taken any action." WVDEP responded that they are aware of the issues that are in the complaint. WVDEP stated that they have followed up on all the complaints that they have received for this area. WVDEP has not observed an impact from coal combustion residuals at this time. There are berms on the highway in the area, which do not contain coal combustion residuals that have been observed to create dust clouds when trucks run into them. This information has been passed to the Department of Highway.[38]

References:

[37] Henrico zoning board OKs expansion for landfill. Times Dispatch.com, June 29, 2013. http://www.timesdispatch.com/news/local/henrico/henrico-zoning-board-oks-expansion-for-landfill/article_431f8880-40b3-5ea4-973f-6337665bf5b8.html

[38] August 29, 2011 email from Rick Rogers, EPA R3 to A. Livnat, EPA/OSWER.

Pittsburgh, PA, September 21, 2010 Public Hearing:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

August 29, 2011 email from Rick Rogers, EPA R3 to A. Livnat, EPA/OSWER.

EPA Region 4

Arrowhead Landfill, Uniontown, Perry County, Alabama

Implicated Activity: Disposal (landfill) and beneficial use; haulage.

Description: The Arrowhead landfill has been taking TVA Kingston's 2008 ash spill waste, and using it as a landfill cover. Concerns were raised over fugitive dust and drinking water wells from waste disposal; it is also an environmental justice issue, as there is no air monitoring in the poor, black-American community, whereas respirators are used by workers at the CCR source location (in Kingston, TN). According to Earthjustice "…the ash was dumped in mounds as high as 60' without nothing covering them." Whereas shipments of TVA ash waste to the Perry County Landfill ended in late 2010, the residents are experiencing health problems that they believe are due to the improper disposal of the ash. "Levels of arsenic at more than 80 times the safe drinking water standards have been found in runoff near the LF."[39] Similar evidence was recorded by the Institute for Southern Studies.[40]

Status: Active.

Impact Summary: According to the May 2013 complaint, the impacts resulting from the activities authorized by Permit No. 53-03 include odors; increased populations of flies in and around the homes of many of the Complainants that are bothersome and that may be carriers of dozens of infectious viruses, bacteria, and parasites; increased populations of birds around the homes of many of the Complainants that deposit droppings and that may be carriers of dozens of infectious viruses, bacteria, and parasites; increased noise from operation of heavy machinery; decreased property values of many of the Complainants; and the frequent emission of fugitive dust from the landfill that causes particulate deposition on personal and real property of many of the Complainants, including homes, porches, vehicles, laundry, and

[39] February 10, 2012 blog post: http://earthjustice.org/blog/2012-february/tr-ash-talk-dumping-a-civil-rights-issue
[40] *Complaint cites health threats at Alabama dump taking TVA's spilled coal ash.* Facing South, February 17, 2010: http://www.southernstudies.org/2010/02/complaint-cites-health-threats-at-alabama-dump-taking-tvas-spilled-coal-ash.html

plantings. Dust and odors from the landfill caused residents of Uniontown to experience health problems, including respiratory illness, headaches, dizziness, nausea and vomiting.[41]

Study: None.

Regulatory and Legal Response: On January 3, 2012, 54 individuals from Perry County filed a Title VI Complaint,[42] concerned that environmental injustice incurred through permitting the disposal of 15,000 ton/day (municipal, non-hazardous commercial, and industrial) from 35 states; specifically, CCRs from Kingston, TN, a white majority, middle-class County, for disposal in a poor, high-minority population county in Alabama. This operation results, among others, in bad odors, noise, and frequent emissions of fugitive dust that causes particulate deposition on personal and real property of many Complainants, including homes, porches, vehicles, laundry, and plantings, all resulting in lowering of property values.[43] The complaint asks EPA to revoke funds that it gave to ADEM for its discriminatory actions, though the overall removal plan was authorized by EPA under Superfund.

On May 30, 2013, a complaint was filed by the law firm David A. Ludder, representing 34 complainants, pursuant to Title VI of the Civil Rights Act of 1964, 42 U.S.C. §§ 2000d to 2000d-7, and 40 C.F.R. Part 7, alleging that the Alabama Department of Environmental Management (ADEM) violated Title VI and EPA's implementing regulations by reissuing and modifying, on September 27, 2011 and February 3, 2012 respectively, Solid Waste Disposal Facility Permit No. 53-03 authorizing Perry County Associates, LLC to construct and operate the Arrowhead Landfill, a municipal solid waste landfill in Perry County, Alabama which has the effect of adversely and disparately impacting African-American residents in the adjacent community.[44] If a violation is found and ADEM is unable to demonstrate a substantial, legitimate justification for its action and to voluntarily implement a less discriminatory alternative that is practicable, Complainants petition EPA to initiate proceedings to deny, annul, suspend, or terminate EPA financial assistance to ADEM. [45]

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[41] *Ash in Lungs: How Breathing Coal Ash is Hazardous to Your Health*. Alan H. Lockwood and Lisa Evans, Physicians for Social Responsibility and EarthJustice. August 1, 2014: http://www.psr.org/news-events/homepage-story-archive.html?page=2

[42] *Alabama faces civil rights complaint over landfill taking waste from TVA coal ash disaster*. Facing South, January 5, 2012: http://www.southernstudies.org/2012/01/alabama-faces-civil-rights-complaint-over-landfill-taking-waste-from-tva-coal-ash-disaster.h. Title VI prohibits recipients of federal funds from engaging in discriminatory activity. *Alabama Department of Environmental Management Permitting of Arrowhead Landfill in Arrowhead County*, submitted to EPA's Office of Civil Rights on 1/12/2012: http://insideepa.com/iwpfile.html?file=feb2012%2Fepa2012_0293a.pdf.

[43] Exhibit F: Dust video, at http://www.enviro-lawyer.com/News-LandOfficeNews.html

[44] While the Harriman, Tennessee, community where the Kingston spill occurred is almost entirely white (91 percent) and middle class (median income $36,031), Uniontown is 90 percent African American, and 45.2 percent of its citizens live below the poverty line (median income $17,473). *Ash in Lungs,* ibid.

[45] http://insideepa.com/iwpfile.html?file=jul2013%2Fepa2013_1199b.pdf

According to the complaint, the first alleged discriminatory act is the reissuance (renewal) of Solid Waste Disposal Facility Permit No. 53-03 by ADEM to Perry County Associates, LLC on September 27, 2011. The second alleged discriminatory act is the modification of Permit No. 53-03 by ADEM on February 3, 2012. The permit modification authorizes Perry County Associates, LLC to expand the disposal area at the Arrowhead Landfill by 169.179 acres (66%). In 2010, certain residents of Perry County filed a civil action in the U.S. District Court for the Southern District of Alabama, Northern Division, against Phill-Con Services, LLC, the operator of the Arrowhead Landfill, to enforce an emission standard or limitation under the Clean Air Act, 42 U.S.C. 7401–7671q, and to enforce a standard, regulation, requirement, or prohibition under the Solid Waste Disposal Act, 42 U.S.C. 6901-6992k.

On September 26, 2012, EPA dismissed the September 27, 2011 and February 3, 2012 complaints without prejudice to refiling "within 60 days following termination or conclusion of" the aforesaid litigation. The foregoing litigation was terminated on April 16, 2013. EPA determined that ADEM has ample authority to regulate and control *fugitive dust emissions* from landfills. Although ADEM's fugitive dust rule was declared to be unconstitutional by the Alabama Supreme Court in *Ross Neely Express, Inc. v. Alabama Department of Environmental Management*, 437 So.2d 82 (Ala. 1983), Alabama has neither repealed the rule nor sought or obtained EPA approval of a revision of the State Implementation Plan. Accordingly, the rule continues to be included in the "applicable implementation plan" under the Clean Air Act.

In the complaints filed on January 6, 2012 and February 21, 2012, Complainants also alleged "the frequent tracking of dirt and other solids from the landfill onto County Road 1 where through traffic causes the dirt and other solids to become airborne particulates resulting in particulate deposition on personal and real property of many of the Complainants, including homes, porches, vehicles, laundry, and plantings." Subsequently, the Arrowhead Landfill relocated its entrance to Tayloe Road off U.S. Highway 82. This relocation has eliminated tracking of dirt on County Road 1.

References:

Arlington, VA, Public Hearing, August 30, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Duke Energy's Riverbend Steam Plant, Mt. Holly, Mecklenburg CO., North Carolina

Implicated Activity: Piling for beneficial use.

Description: Pond-dredged ash piles on side of road are a source of fugitive dust. Ash also used for structural fill and various road uses.

Status: Active.

Impact Summary: *Complaint:* "Three years ago Duke dredged out the ponds, generating much fugitive dust that impacted the Stonewater development. The ash was heaped in a large, unmonitored mound beside the Horseshoe Bend Beach Road, the only access to the peninsula. It is a source of fugitive dust (ash accumulating on cars, houses), and presumably – of leaching to groundwater, which potentially risks many of the peninsula residents' drinking water wells." *Response:* "DWQ was not aware of the concern. DWQ is currently looking into the concern to see if any action is needed." [46]

Study: None.

Regulatory and Legal Response: No information.

References:

Charlotte, NC, Public Hearing, September 14, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Progress Energy, Asheville (Arden), North Carolina

Implicated Activity: Beneficial use. (A potential damage case on account of groundwater contamination.)

Description: According to Progress Energy's response letter (February 9, 2009) to the January 22, 2009 NOV, the source area is an NPDES permitted surface impoundment rather than a stockpile area, hence no permit conditions are violated. The fugitive dust comprises cenospheres that in spite of the application of dust suppressing measures (mulch with dust suppressant, straw and wetting) become airborne during extended periods of winter subfreezing temperatures, when their harvesting from the top of the frozen pond is halted. In response to the NOV, Progress Energy stated that they are evaluating the establishment of an

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[46] EPA-HQ-RCRA-2011-0392-0267, North Carolina Department of Environment and Natural Resources (NCDENR):

alternate harvesting area that has more wind buffer, as well as wind break options at the existing harvesting area.

Status: Active.

Impact Summary: Coal ash from waste disposal blowing and covering houses, garages and cars in the Lake Julian Trails housing development. One of the residents stated that after one bad incident Progress Energy washed everyone's house and had someone specially vacuum people's homes. He also stated that there was little or no enforcement, until the community started pushing someone to do something about it. The residents finally were able to get their state aquifer protection branch to issue an NOV. The power plant is supposed to be putting up an air monitoring system and come up with a plan to reduce dust. The power plant already came up with one plan to spray more and planted trees and shrubs for additional buffering.

Study: An analysis of a sample scraped off a resident's window sill in the Julian Lake Trails housing development (October 5, 2010) yielded the following, selected results (all in mg/Kg): arsenic: 37.7; chromium: 18.2; lead: 8.2; nickel: 8.2; selenium: 2.8; mercury: 0.047.

Regulatory and Legal Response: NC's Division of Water Quality issued (January 22, 2009) a NOV of Permit WQ0000020 for failing to take adequate provisions to prevent wind erosion and surface runoff from conveying ash from stockpile/storage areas onto adjacent property or into any surface waters. This resulted in the deposition of ash on property adjacent to Progress Energy's ash storage pond: ash from the ash pond had blown and accumulated on several properties (homes, cars and lawns) in the Lake Julian Trails housing development.

References:

Charlotte, NC, Public Hearing, September 14, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

May 19, 2011 and May 21, 2011 emails from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Swift Creek Structural Fill Site, ReUse Technology, Inc./Full Circle Solutions, Inc., Rocky Mount, North Carolina

Implicated Activity: Beneficial use (structural fill). (A proven damage case on account of groundwater contamination.)

Description: A 25-acre beneficial use structural fill received CCRs from six North Carolina and Virginia power plants, operated from 1991 through at least 2001. The site did not require a permit from NC DENR. CCR was placed only one foot above the water table and into a wetland, contaminating off-site groundwater and causing off-site coal ash dust impacts to adjacent property.

Status: Inactive.

Impact Summary: None available.

Study: None.

Regulatory and Legal Response: In its comment to the docket[47], NCDEQ conceded that *Out of Control's* damage assessment for the Swift Creek site "appears essentially accurate." A NOV and a Compliance Order were issued, but for violations unrelated to fugitive dust.

References:

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #14. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

Harlan County, Kentucky

Implicated Activity: Unauthorized (?) disposal ('structural fills'?).

Description: A large number of open, illegal coal ash dumps throughout the state. Residents of Harlan County, Kentucky report open dumps of CCR that are compacted with bulldozers and covered with dirt. The illegal CCR dumps he is referring to are located within a couple of

[47] North Carolina DENR: EPA-HQ-RCRA-2009-0640-9282.2, p 11.

hundred feet of the Poore Fork of the Cumberland River and adjacent to US 119, the main road that links the city of Harlan and the Tri-Cities communities of Cumberland, Benham and Lynch.[48]

Status: Active.

Impact Summary: One observer said, "The workers who dump it and compact it do not use any protective equipment. Dust from it is flying around all the time."

Study: None.

Regulatory and Legal Response: None

References:

K.A. Owens, Kentuckians for the Commonwealth (KFTC) comment to the docket: EPA-HQ-RCRA-2009-0640-3934.

Louisville Gas & Electric Cane Run Power Plant, 5252 Cane Run Rd., Louisville, Kentucky 40216

Implicated Activity: Disposal (surface impoundments, landfill), on-site processing (ash treatment basin, sludge processing plant), storage (ash silo and stacks), haulage (trucks and roads.)

Description: During the over 50 years the Cane Run plant has been in operation, LG&E has constructed an unlined wet coal ash containment that is less than 100 yards from a residential neighborhood. Residents' homes are covered continually with a layer of dust from fly ash.[49] The current "Ash Mountain" is projected to reach capacity in 3-years. LG&E has applied for a new, 60-acres/160'-high landfill, to be located 800' from the closest residences. Currently residents are holding community meetings on a regular basis, and the Kentucky State Legislature is planning to hold hearings in the community to hear residents' concerns. Some

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[48] According to SourceWatch: http://www.sourcewatch.org/index.php?title=Existing_U.S._Coal_Plants, the closest coal-fired power plants (<50 miles of US 119/Harlan-Tri City route) are: Eastman's Kingsport PP (Eastman Chemical Co.), Kingsport, TN; John Sevier Fossil Plant, TN; and Cooper Power Station, KY. This is not to suggest that any of these plants are implicated in the cited activity.

[49] Neighbors of Cane Run plant worry about health impact of coal ash Courier-Journal, April 19, 2011: http://www.courier-journal.com/article/20110419/GREEN/304190120/Neighbors-Cane-Run-plant-worry-about-health-impact-coal-ash?odyssey=tab%7Ctopnews%7Cimg%7CHome

residents said they believe LG&E officials know their plant causes ash and soot problems because the company has sometimes provided them with vouchers to pay for car washes. LG&E's representative acknowledged the company has paid for car washing, but only rarely, after an unusual incident at the plant. Under its permit, the company is allowed to emit fly ash from its smokestack, but if ash is leaving the landfill the company can be told to fix the problem.[50] The plant is scheduled to close by 2016: LG&E is planning to build a cleaner natural gas powered plant on its Cane Run property.

Status: Active.

Impact Summary: The residents experience fugitive dust from coal ash on a daily basis. Health problems and respiratory illnesses abound, and there are high rates of cancer.

Study: In February 2011, a Louisville Metro Air Pollution Control District inspector swabbed the outside sills on the front of the Little's house, about 150' from the eastern wall of the ash pond, and just down the block from the black face of the ash dump. A laboratory analysis confirmed fly ash in three samples. Air district spokesman Matt Stull confirmed that investigation.

On the other hand, a preliminary round of testing in March by the state at five locations in Claremont Acres, east of the plant, and Riverside Gardens to the north, "did not show significant levels of fly ash" on homes, Hubbard (Assistant Director of the Kentucky Division of Waste Management, which regulates the dump) said, adding that inspectors would like to return "when conditions are drier."

A study to evaluate surface dust samples deposited unto adjacent properties, ordered by LG&E from the RJ LEE Group, used adhesive lift samplers to collect six samples from three houses near the PP (4/18/2011). The SEM characterization identified significant, but variable amounts of fly ash and bottom ash in each of the samples, including untreated Hopper Ash and Pozotec (the former predominated by silicon-aluminum, and the latter - also with elevated calcium-sulfur). Based on backscattered electron images and X-ray maps, the PP concluded that they found 'nothing harmful in the results.'[51]

In a follow up study,[52] a multi-day sampling approach was employed to monitor particle deposition over time and to gain knowledge on the amount of time necessary to achieve an

[50] According to WFPL News, July 13, 2011: http://www.wfpl.org/2011/07/13/lge-report-finds-coal-ash-on-area-homes/

[51] Ash on residences study (July 8, 2011): TLH104154-Nuisance-dust-report-7-8-11-FINAL.pdf at http://archives.wfpl.org/wp-content/uploads/2011/07/. Note that the analytical techniques used are too insensitive for the detection of trace metal amounts.

[52] TLH104154-Passive-Sampling-Report_FINAL_July-13.pdf at http://archives.wfpl.org/wp-content/uploads/2011/07/

appropriate particle loading for detailed individual particle analysis. The UNC passive aerosol sampler was deployed. The UNC passive sampler is unique in its ability to estimate ambient concentrations (µg/m^3).

The CC (computer-controlled) SEM individual particle data were processed via the Wagner-Leith model to estimate ambient concentrations. Based on this process, the PM10 concentrations ranged from 9.4 to 14.7 µg/m^3 (average over sampling period).[53] In summary, the number of fly ash/bottom ash on the passive deposition samples and the UNC passive aerosol samples appeared to correlate well with the passive deposition samplers in that fly ash/bottom ash was a small component of the particulate matter collected on the initial set of samples. However, the results from the passive monitoring program did not correlate with the surface dust sample results. Given this discrepancy, it was recommended that sampling continue on an ongoing basis with the passive deposition samplers and the UNC passive samplers.

Regulatory and Legal Response: On July 20, 2011, the Air Pollution Control District (APCD), Louisville, Kentucky, issued a NOV accompanied by a $4,000 fine to LG&E for allowing particulates to move outside the plant's property and settle on adjacent residential properties, first in December 2010, then in February and April 2011. The NOV requires LG&E to submit, by August 26, 2011, a compliance plan for control of ash emissions from the plant and for remediation of particulate fallout on neighboring properties.[54]

On April 18, 2012, LG&E reached a settlement with the Louisville Metro APCD regarding several air emissions and fugitive dust violations in 2011 that resulted in two NOV. The Settlement stipulates, among others, that the Company shall submit to the District by April 30, 2012 a proposed plan for the application of dust suppressant to inactive open areas of the landfill. After notification from the District of its approval of the plan, Company shall comply with the plan.[55]

Equipment malfunction kept occurring at the Cane Run plant that release clouds of coal ash. A malfunction of the sludge processing plant (SPP, July 30-31, 2011) at the LG&E Cane Run power plant has sent a billowing cloud of ash into the air. On September 13, 2012, the SPP malfunctioned again. The SPP mixes the coal ash with other materials to turn it into Poz-O-Tec, a cementitious substance, so it can be put into the landfill. A video[56] shot by a resident who

[53] The UNC passive sampler has recently been used by the US Environmental Protection Agency to monitor coarse particles (PM10-2.5) in the Cleveland, Ohio area. Note, however, that in this study PM2.5 was not measured.
[54] According to an August 1st, 2011 posting of the Courier: *Air Pollution Control District, Louisville, Kentucky: Notice of Violation Letter 02246*: http://blogs.courier-journal.com/watchdogearth/files/2011/08/LGECaneRunNOV7-2011.pdf
[55] A list of LG&E's violations and resulting penalties between August 2011 and August 2013 can be accessed at: *LG&E Fined $65,000 for Odor Problems at Cane Run Power Plant*. The News for Louisville, August 5, 2013: http://wfpl.org/post/lge-fined-65000-odor-problems-cane-run-power-plant
[56] Multiple release are documented in a series of videos: http://www.youtube.com/user/kaeterina1; *Cane Run Sludge Plant Malfunction September 13, 2012*. Youtube, September 16, 2012:

lives across the street shows clouds of ash rising above the plant - and over the dust screen the company installed in April. A Plant representative said the ash was actively being released for seven minutes, before the plant was shut down. [57]

On September 6, 2013, *Hagens Bergman* submitted, on behalf of Greg Walker and Kathy Little, individually and on behalf of all others similarly situated, intend to file a citizen suit against Louisville Gas & Electric Company (LG&E) and its owners (collectively, the Cane Run Defendants), pursuant to: (1). 42 U.S.C. § 6972(a)(l)(A), for past and continuing RCRA violations; (2). 42 U.S.C. § 6972(a)(l)(B), for past and continuing violations of RCRA by having contributed and/or contributing to the handling, storage, hauling or disposal of solid and hazardous wastes at the Cane Run site in a manner that may present an imminent and substantial endangerment to health or the environment; and (3). 42 U.S.C. § 7604(a)(l), for past and continuing violations of the federal Clean Air Act (CAA).

The Intent to Sue claims that since at least 2008, the Cane Run Defendants have generated, handled, stored, treated, transported, and disposed of solid and hazardous wastes at the Cane Run site. These wastes are stored outdoors on the Cane Run site, including in a massive landfill, an Ash Treatment Basin, and as many as four ash ponds, which are at least partially dry and, thus, contain dry solid and hazardous wastes. The Cane Run plant has three active stacks, dedicated to three steam generators used in the production of electric power; a Sludge Processing Plant (SPP), which is used to process fly ash before storing it in the Landfill; and an Ash Silo, which is used to store fly ash for processing by the SPP.

None of these sources of fly ash, bottom ash, toxic metals, and other coal combustion particulates located on the Cane Run site (the Landfill, the Ash Treatment Basin, the Ponds, the SPP, the Ash Silo, trucks operated by the Cane Run Defendants, roads on the Cane Run site, and the Stacks) have adequate controls for insuring that these solid and hazardous wastes are not emitted into the atmosphere and deposited on the residential areas surrounding the site. As a result, the Cane Run Defendants have regularly and frequently released significant amounts of fly ash, bottom ash, toxic metals, and other coal combustion particulates, often in the form of dust clouds and storm water runoff, into the atmosphere and over ground. These releases have traveled for miles off of the site and, because of the Cane Run site's lack of controls, these releases are continuing. The solid and hazardous wastes released from the site have settled on the exteriors of surrounding homes and buildings, as well as on playgrounds, parks, lawns, pools, ponds, recreational items, and vehicles. These solid and hazardous wastes have also

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http://www.youtube.com/watch?v=BPgQCYsErGY; Ash blowing from cane run plant 8 16 12. Youtube, August 18, 2012: https://www.youtube.com/watch?v=ze0LNF7MNyI&index=4&list=UUwIapnG8JXDG0rCle0_HAFQ

[57] *Cane Run residents report more blowing ash.* Courier-journal, September 14, 2012: http://blogs.courier-journal.com/watchdogearth/2012/09/14/cane-run-residents-report-more-blowing-ash/; http://blogs.courier-journal.com/watchdogearth/2012/10/12/epa-reviews-cane-run-ash-problem/ and http://wfpl.org/post/coal-ash-problems-continue-cane-run.

migrated inside surrounding homes and buildings, where they settle in interior living and working spaces.

The Cane Run site is adjacent to residential neighborhoods containing thousands of homes. It is also in close proximity to parks, schools, roads, restaurants, and shopping areas. Residents of the areas surrounding the Cane Run site have complained to county, state, and federal officials regarding health problems stemming from exposure to particulates released from the Cane Run site, including respiratory ailments, severe eye irritation, sensitivity to strong sulfur odors, and elevated cancer rates.

The APCD is the Jefferson County agency charged with enforcing the District's environmental regulations, which are promulgated pursuant to Kentucky Revised Statutes, Chapter 77. Many of the APCD environmental regulations have been adopted by the USEPA, pursuant to Kentucky's State Implementation Plan (SIP) under the CAA. Violations of the APCD regulations adopted as part of Kentucky's SIP are therefore violations of the CAA. The APCD has repeatedly cited LG&E for violations of the District's environmental regulations relating to the Cane Run site's release of fly ash and other particulates into the surrounding community, as well as failing to control the strong sulfur odors produced by the Cane Run site's generation and storage of coal combustion by-products.

The Cane Run Defendants' activities have violated and are continuing to violate the Cane Run site's Operating Permit, issued pursuant to Title V of the CAA, and regulations which are part of Kentucky's SIP under the CAA. Between July 2011 and August 2013, five NOVs were issued for violations by Cane Run Defendant LG&E of scores of APCD regulations. Examples include "Visible Fugitive Emissions beyond the Property line settling onto surrounding neighborhood properties (December 2010, and February and April, 2011);" "On June 21, July 29, and August 4, 11, 12, and 22, 2011, source emitted clouds of dust into the atmosphere from its sludge processing plant that caused nuisance and annoyance to the residents of the neighborhood that surround it;" "The source allowed visible fugitive dust emissions to travel from the ash landfill, an in-plant road, and the SPP and to cross the plant's property line onto the neighboring residential area."

Substantially similar violations to those that are the subject of the APCD NOV's are continuing on at least a weekly basis at the Cane Run site because the Cane Run Defendants have failed to implement measures to control the emission of fly ash and its constituent toxic metals, bottom ash, and other particulates produced by the coal combustion process from the Landfill, the Ash Treatment Basin, the Ponds, the SPP, the Ash Silo, roads on the Cane Run site, and the Stacks at the Cane Run site, as well from trucks operated by the Cane Run Defendants.

The Cane Run site's Operating Permit does not allow particulate emissions from the Cane Run site's Landfill, Ash Treatment Basin, Ponds, roads on the Cane Run site, or from trucks operated by the Cane Run Defendants. As a result, particulate emissions from these sources are also violations of the CAA and are continuing on at least a weekly basis.

In November 2013, LG&E agreed to pay $113,250 penalty and comply with a pollution control and maintenance plan adopted in April — on top of $33,000 in other ash-related fines since 2011.

In July 2014, a federal court ruled that a class of residents alleging that Kentucky' Cane Run power plant covered their properties with coal ash may proceed with state tort law claims. The federal court ruled, on July 17, that the claims aren't preempted by the Clean Air Act (*Little v. Louisville Gas & Electric Co.,* 2014 BL 198330, W.D. Ky., No. 13-1214, 7/17/14). Residents alleged dust and coal ash emitted from the plant coat their homes and properties in violation of the CAA and RCRA. They also brought state law claims of nuisance, trespass and negligence. The defendants, Louisville Gas & Electric Co. and PPL Corp., moved to dismiss the state law claims as preempted by the Clean Air Act. The court found the plaintiffs' arguments persuasive: the court dismissed from the lawsuit the plaintiffs' claims under RCRA, and all but one of their claims under the CAA, saying that only the state law claims and one CAA claim for alleged operation of the Cane Run plant without a valid permit remain.

Recently, LG&E settled a lawsuit for fugitive dust, negligence, and nuisance in *Monika Burkhead, et al v. Louisville Gas and Electric Company*, U.S. District Court, Western District of Kentucky at Louisville**,** which involved over a hundred residents in the community of Riverside Gardens. Terms of the settlement are confidential.

References:

May 18, 2011 and July 14, 2011 emails with attachments from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Cane Run residents report more blowing ash/September 14, 2012: courier-Journal.com

EPA reviews Cane Run ash problem/October 12, 2012: courier-Journal.com

A letter of Intent to Sue LG&E Cane Run, September 16, 2013, an attachment in a November 4, 2013 email from Pete Raack, EPA/OECA to A. Livnat, EPA/OSWER.

Louisville faces concerns on coal ash: LG&E has agreed to pay fines for problems at Cane Run power plant, Courierjournal.com, Dec. 21, 2013.[58]

Coal Ash Claims Not Preempted by Air Act, Court Rules in Tort Suit against Power Plant.[59]

[58] http://www.courier-journal.com/article/20131221/GREEN/312210038/Louisville-faces-concerns-coal-ash?gcheck=1&nclick_check=1

[59] Bloomberg BNA Daily Environment Report, July 21, 2014: http://news.bna.com/deln/DELNWB/split_display.adp?fedfid=50244297&vname=dennotallissues&jd=a0f3p2v8j1

EPA Region 5

Duke Energy's Gibson Generating Station, Somerville & Mount Carmel Area, Indiana

Implicated Activity: Disposal (surface impoundment). (Also, a proven damage case on account of groundwater impact.)

Description: Residences of the ten trailers in East Mt. Carmel are blanketed regularly with coal ash dust blowing from the near full ash ponds in the summer; fugitive dust from waste disposal causes medical issues and covering cars with coal ash dust. Impact extends also to communities across the Wabash River in Illinois.
Status: Active.

Impact Summary: No information.

Study: None.

Regulatory and Legal Response: None.

References:

Knoxville, TN, Public Hearing, October 27, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Louisville, KY, Public Hearing, September 28, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

&split=0; *The U.S. District Court for the Western District of Kentucky's opinion in Little v. Louisville Gas & Electric Co.:*
http://www.bloomberglaw.com/public/document/Little_v_Louisville_Gas__Electric_Co_CIVIL_ACTION_NO_313CV01214JH

EarthJustice, comment to the docket: EPA-HQ-RCRA-2009-0640-6315.

Hoosier Energy Merom Station, Merom, West Old 54, Sullivan County, Indiana

Implicated Activity: Disposal (landfill). (Also, a potential damage case on account of groundwater impact.)

Description: Hoosier Energy disposes of its CCRs in landfills on-site. According to Hoosier Energy, the volume of waste disposed is approximately 2,050 cubic yards per day. The largest volume waste stream is fixated scrubber sludge (a mixture of fly ash, scrubber sludge and lime). The area surrounding the Merom generating facility includes residences (the closest: about 800' away from the active landfill cell)[60] and farm land. Dust blowing off the landfill has been a chronic problem, and has become worse over the last several years as the height of the current landfill, which is reaching capacity, has increased.

A permit for a new third landfill on-site has been recently issued by the Indiana Department of Environmental Management. The new landfill will be the larger in both footprint (112 acres) and height than the previous two landfills and is much closer to surrounding homes. It has an estimated life of 19 years. Although the new permit includes more dust control requirements than previous landfill permits, continued dust problems are anticipated because of the nature of the material and the disposal method.

Status: Active.

Impact Summary: The nearby residents' lives have been seriously impacted by the fugitive dust. The coal ash dust coats their homes, cars, outdoor furniture, toys, equipment and vegetable gardens. They must clean the outsides of their homes and windows frequently. They are forced to keep their windows and doors closed at all times. Nevertheless, coal ash dust gets into their homes and settles on the furniture and floors. Several nearby residents have infants, toddlers and young children or grandchildren and they worry about exposure to the dust both indoors and outdoors. They restrict outdoor play and must clean indoor surfaces frequently to try to minimize exposure.

Another neighbor, Mike Eslinger, testified that there are days that he cannot take his children outside to play because of the fugitive dust and the blue plume from the smoke stack is so bad. His house is covered with dust from the plant.[61] There have been problems reported with

[60] EPA measurement, Google Maps.
[61] In the Louisville Public Hearing, September 28, 2010. A July 26, 2010, consent decree between Hoosier Energy

unexplained illessnesses/deaths of livestock in the area and residents are concerned these problems may be associated with the coal ash dust, which settles on pastures where the livestock feed.

Study: Wipe dust samples from two of the neighbors kids toys showed lead at 1340 µg/wipe and arsenic at 2720 µg/wipe; lead on one of the resident's dressers in a bedroom was 886 µg/wipe. The same family (Miller) have had their daughter tested for lead and the results confirm lead exposure.

Regulatory and Legal Response: Mike Blann, a Hoosier Energy employee and neighbor, testified at the same hearing: "Personally over the years I have seen how the State of Indiana has regulated the power plant landfill in our backyards and can honestly say it is without doubt NOT working!"

The attorney representing the nearby, fugitive dust impacted residents (Rosemary G. Spalding, Spalding & Hilmes), reported that since July 2010, they have been engaged in making comments on behalf of their client group on a variety of Hoosier Energy-Merom (HE) environmental permits. These include a request for IDEM to enforce the permit for the current landfill, FP77-03, and public comments on HE's permit application for a new landfill, FP77-04. As a result of their endeavors, the IDEM revoked the variance for daily cover in FP77-03 (state operational rules requiring daily cover on the working face of the landfill (329 Indiana Administrative Code 10-28-11 and 12) and the variance request was denied in the FP77-04 application.

References:

Knoxville, TN, Public Hearing, October 27, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Louisville, KY, Public Hearing, September 28, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Coal Combustion Waste Damage Case Assessments, July 2007:
http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2006-0796-0015

May 24, 2011 email, with attached documents and photos, from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

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and EPA requires Hoosier Energy to address, among others, a 'blue plume' composed of sulfuric acid mist that has been emitted from the plant for several years and documented extensively by its neighbors.

Spalding & Hilmes, PC, Law Firm. Commenter: Rosemary G. Spalding and Kathryn A. Watson, on behalf of Springer family et al., comment to the docket: EPA-HQ-RCRA-2009-0640-10019.

Ameren Coffeen Power Station and US Minerals, Coffeen, Illinois

Implicated Activity: Beneficial use.

Description: Complaints about fly ash from disposal on cars, homes, yards. According to IEPA,[62] its air program is not aware of any permitting issues/complaints concerning Coffeen Power Plant. Apparently, there is a company called *US Minerals* in Coffeen that processes boiler slag from the Coffeen Power Plant. IEPA had many complaints back in 2004 from citizens in Coffeen about blowing coal ash dust. The company installed fabric filters on the process and the complaints stopped.

U.S. Minerals, Montgomery County - *U.S. Minerals* is located on the south side of Coffeen and receives boiler slag from the Coffeen Power Plant, grinds and sizes the granules and ships them to facilities that make asphalt roofing shingles and blasting media. IEPA received dust complaints from Coffeen citizens in 2004, 2005, 2006 and a violation notification letter (VNL) was sent in 2006. The company installed bag houses on the process and the facility currently has a Bureau of Air (BOA) state operating permit. IEPA has not received recently any complaints about operations at this location.[63] *U.S. Minerals* uses the bottom ash from Coffeen Power Station for making construction materials. Coal ash is stored in large piles at the industrial site, a half mile north of Coffeen Power Station. The piles of coal ash do not have liners, covers, windbreaks, or silt fences to prevent erosion and release of pollutants to air and water.

Status: Active.

Impact Summary: Residents living next to *U.S. Minerals* have complained to Prairie Rivers Network personnel about lung and eye irritation, breathing problems and constant coating of their homes and vehicles with coal ash dust. The coal ash piles are still sitting on the ground without any air or water pollution controls in place."

Study: None.

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[62] IEPA's response, 8/16/2011.

[63] IEPA, Other Coal Ash Sites, Case #6, September 2011: http://www.epa.state.il.us/water/ash-impoundment/documents/other-coal-ash-sites.pdf

Regulatory and Legal Response: OSHA fined *U.S. Minerals* nearly $400,000 on December 7, 2010 for more than two dozen safety violations endangering workers with dangerously high levels of hazardous ash dust without proper breathing equipment and training.[64]

References:

Chicago, IL, Public Hearing, September 16, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Coal Combustion Waste Damage Case Assessments, July 2007.
http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2006-0796-0015

Email correspondence between Julie Gevrenov, EPA R5 and A. Livnat, EPA/OSWER: September 27, 2011 email to A. Livnat; September 29, 2011 and November 8, 2011 emails to J. Gevrenov.

Rocky Acres Coal Combustion By-Product Disposal Site – Bunge Corp., Oakwood, Vermilion County, Illinois[65]

Implicated Activity: Beneficial use (structural fill). (Also, groundwater contamination.)

Description: 380,000 tons of CCR from FBC coal-fired boilers at the Bunge N. America Co., which operates a dry corn mill in Dansville, Ill deposited on a 25-ac. site over a 10-year period in a ravine adjacent to the Grays Siding neighborhood. The subdivision is a rural community of 30 homes that all draw their drinking water from groundwater. The CCR fill site has been encroaching on residential property, and the residential community is adversely affected by uncontrolled fugitive dust from the site.

Status: Inactive.

Impact Summary: Fugitive dust reported as uncontrolled from 'waste disposal.' Several residents registered "citizen pollutant complaints" with IEPA due to the dust (February 26, 2002).

Study: None.

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[64] Illinois at Risk, page 9, August 2011: http://prairierivers.org/wp-content/uploads/2011/08/Illinois-at-Risk.pdf; Specific information on OSHA's citations and penalty: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=NEWS_RELEASES&p_id=18918

[65] Site known also as Gray Sidings.

Regulatory and Legal Response: IEPA notified O/O that site was illegal open dump in 2006. Site owner declared bankruptcy; Bunge refuses liability. Bunge installed IEPA-requested GW monitoring wells, submitted GW Investigation Work Plan in 2007. Bunge is undertaking voluntary GW investigation. The site is now inactive.

Bills were proposed to tighten requirements for structural fill projects, requiring, among others, covering fly-ash by a 12" soil cover within 30 days of its placement or end of project.[66]

References:

Chicago, IL, Public Hearing, September 16, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

May 22, 2011 email, with attached documents and photos, from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Electric Energy, Inc., Met-South Coal Combustion Waste Disposal Facility, Joppa, Illinois

Implicated Activity: Disposal or beneficial use; haulage.

Description: Coal Ash placed on roads, resulting in being stirred up by each passing vehicle.
Status: Active (?)

Impact Summary: Fugitive dust from waste disposal causes chronic and acute respiratory problems. Coal Ash spreading to nearby houses and yards, causing serious health problems.

[66] On February 15, 2008, SB2567 (2007-08) was proposed , in the 95th General Assembly by Mike Frerichs, D-Champaign, and House Bill 4172 was proposed by Bill Black, R-Danville:
http://www.ilga.gov/legislation/fulltext.asp?GAID=9&SessionID=51&GA=95&DocTypeID=SB&DocNum=2567&LegID=&SpecSess=&Session=

Study: IEPA's response to EPA R5 (August 16, 2011): IEPA is not aware of any citizen complaints of damage cases concerning Electric Energy, Inc., nor is their air program aware of any permitting issues.

From Scott Arnold, IEPA (August 17, 2011): "I checked this same complaint out about three years ago. It is a bogus complaint. EEI does NOT stack any ash at all. They haven't in since the 70's. The ash handling system stores the ash in silos and it is pneumatically moved to retention ponds.

The road in question, Liberty Ridge Road was black topped in the mid 80's. Any coal ash that was ever applied to that road has been encapsulated for roughly 30 years now. There is no potential for air pollution at either site. And BOL decided over three years ago, they weren't going to do anything about Liberty Road. There is no "clean up" on going. I was down in Joppa yesterday and confirmed all of the above."

Regulatory and Legal Response: None.

References:

Louisville, KY, Public Hearing, September 28, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Chicago, IL, Public Hearing, September 16, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

EPA Region 6

Clean Hydro Reclamation (formerly: Making Money Having Fun, LLC) Landfill, Bokoshe, Le Flore County, Oklahoma

Implicated Activity: Reclamation of an open coal pit mine/landfilling; haulage. (Also, surface water contamination.)

Description: Making Money, Having Fun (renamed: Clean Hydro Reclamation), a coal ash company, has been dumping coal ash in Bokoshe from the coal-fired AES Shady Point power plant in nearby Panama, Oklahoma (7 miles east). Oklahoma law prohibits locating a coal ash dump any closer than 3 miles from an incorporated city: when *Making Money Having Fun*

(MMHF) applied to the Oklahoma Corporation Commission for a permit to dispose 'commercial waste', they left the 100-year old, incorporated town of Bokoshe off their maps. MMHF is building a coal ash wall at least 50' high and growing, dumping the ash first and only adding oil/gas wastewater later to reclaim the abandoned strip mine.[67] MMHF, in denial that there is a town (incorporated since 1899) of less than 20,000 within a 1.2 mile from the fill area, have been operating since 2001 without any intervention by a regulatory authority.

"Significant amounts of fugitive ash were seen every time a load of ash was dumped into the recirculating water stream. The fugitive ash lingered in the air and did not disperse quickly. Oklahoma's requirements (Title 45 § 11.913.14) are that dust control measures shall be taken where dust significantly reduces visibility of equipment operators. Haulage roads shall be wet down as necessary unless dust is controlled adequately by other methods. Dust control measures are also specifically mentioned in the permit. ODEQ has jurisdiction over fugitive dust and issues Air Quality Permits in that regard."[68]

Status: Active.

Impact Summary: The coal ash flies out of 80, 25-ton trucks/day as fugitive dust on their daily trips to Bokoshe. A video shows dust billowing hundreds of feet up in the air. Sometimes school busses drive through it. The coal ash then leaks mercury, arsenic and other metals into the groundwater that supplies drinking water and then runs down the 50 foot hill onto the neighbors' property. Over half of the school kids have asthma. The calves are stillborn. Fourteen of the 20 families living at the vicinity of the disposal site have/had at least one cancer case per family, including a toddler with leukemia, an 8th grade boy with breast cancer, and a 35-year-old teacher who has had cancer twice. Several of her same-age exercise buddies are dead from cancer.[69]

Study: None.

Regulatory and Legal Response: Following an April 15, 2009 meeting of concerned residents with the Air Quality Advisory Council/OKDEQ, they found that MMHF has been

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[67] Two Clean Water Act Administrative orders were issued by EPA R6: (i) on Dec. 10, 2009 (Docket CWA#06-2010-1748), for discharging pollutants (900 to 4200 ppm TDS) to a tributary of the Buck creek; and (ii) on Feb. 22, 2010, another cease-and-Desist order. Due to lack of compliance (including requirements to eliminate the discharge of the pollutant water, and within 30 days, document and describe the corrective actions taken to eliminate the unauthorized discharge and provide a plan explaining how future waste stream will be managed). Late in 2010, the case was forwarded to DOJ. Because of surface water contamination problems, the Oklahoma Corporation Commission prohibited MMHF in 2010 from accepting water from oil and gas wells that was mixed with the fly ash.
[68] The earliest reference to a fugitive dust issue, in MMHF's Reclamation Pit #2. Cited from *U.S. EPA Site Visit Report Coal Combustion Waste Minefill Management Practices - Oklahoma - Draft Final Report,* September 9, 2002: http://www.epa.gov/waste/nonhaz/industrial/special/fossil/sites/ok-visit.pdf
[69] ABC News: *Oklahoma Town Fears Cancer, Asthma May Be Linked to Dump Site* (March 29, 2011): http://abcnews.go.com/US/oklahoma-town-fears-cancer-asthma-linked-dump-site/story?id=13240312

committing 5 separate violations of the CAA for seven years. However, in the subsequent Consent Order between OKDEQ and MMHF, there were no fines, penalties, or findings of violation.

On October 6, 2011, residents of Bokoshe[70] filed, in LeFlore County District Court, a lawsuit against AES Shady Point PP, MMHF LLC and its fly-ash operators individually, Thumbs Up Ranch, GCI Mining, Mountain Minerals and several trucking companies (overall, 24 defendants), "for their creation of a noxious and harmful nuisance, pollution and contamination, trespass, diminution of property values and business interest, and personal injury." According to the plaintiffs, people living in more than half of the homes near the fly-ash pit have had cancer, and they believe that the high number of respiratory illnesses – including asthma in children – among area residents is caused by dust blowing from the fly-ash pit. The lawsuit asks the court to force the defendants to stop the dumping, clean up the site, and pay for current and future fly-ash-related illnesses and property damage. The plaintiffs are asking more than $75,000 each in compensatory and punitive damages.[71]

In October 2012, the six Bokoshe plaintiffs in a class-action lawsuit that was filed in October 2011 against AES Corp. and the businesses serving its nearby AES Shady Point plant filed an amended petition,[72] adding 48 defendants that use the same disposal pit site. Summons were issued to the new defendants on October 10, 2012. A jury trial had been set for November 29, 2012.

References:

Dallas, TX, Public Hearing, September 8, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

[70] Bokoshe residents William and Diane Reese, Herman Tolbert, Tim Tanksley, Susan Holmes and Charles Tackett: http://swtimes.com/sections/news/dozens-defendants-added-class-action-coal-dust-lawsuit.html
[71] http://www.tulsaworld.com/news/article.aspx?articleid=20111102_12_A11_CUTLIN672607&subjectid=11
[72] *Dozens Of Defendants Added To Class-Action Coal Dust Lawsuit*: Times Record, Oct. 19, 2012: http://swtimes.com/sections/news/dozens-defendants-added-class-action-coal-dust-lawsuit.html**.** Among others, the amended petition adds oil and gas producers who also use the MMHF, aka Making Money Having Fun, Clean Hydro Reclamation and Clean Hydro Evacuation disposal pit site to dispose of their produced fluids, including saltwater and other contaminants, from oil and gas well drill sites and production sites. The *amended petition* alleges the transport of the produced fluids to the disposal pit has resulted in the release of hundreds of millions of gallons of contaminants into creeks, streams, rivers and other surface water drainages and impoundments, and specifically onto and under the homes, businesses and properties of the plaintiffs and their fellow class members. The lawsuit contends that more than 450 residents in and around Bokoshe have been affected by the businesses' actions.

Denver, CO, Public Hearing, September 2, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Comment to the docket submitted by Jody Harlan, Chapter Vice Chair, Sierra Club Oklahoma: EPA-HQ-RCRA-2009-0640-2401

May 4, 2011 meeting between Susan Holmes, B.E.Cause and Lisa Evans, EarthJustice, with EPA/OSWER.

Tulsa World, 11/2/2011

Coal Ash chronicles, 2014: http://www.coalashchronicles.com/in-your-backyard/oklahoma

Arizona Public Service San Juan Generating Station and Four Corners Power Plant, New Mexico

Implicated Activity: Disposal (surface impoundments) and beneficial use (minefilling) (Also, groundwater and surface water contamination caused by minefilling.)

Description: In addition to the contamination of groundwater and surface water from the surface impoundments, APS does not control fugitive dust resulting from its disposal activities. The arid climate and often windy conditions on the Navajo Reservation make airborne ash from the uncovered and not reclaimed impoundments a serious problem. APS's decades-long failure to contain windblown ash has resulted in contamination of soil in areas surrounding the impoundments.

APS claims that active measures (dust suppressants, wetting, and compaction) are undertaken to control fugitive dust, and that Four Corners has been approached by the Navajo Nation to ask for application of CCPs on soils of the NAPI (irrigated agriculture) Project.[73]

Status: Active.

Impact Summary: Apparently associated with higher-than-normal rates of cancer (leukemia) and respiratory ailments attacking otherwise healthy, young Navajo residents in the Shiprock downwind area

[73] USWAG's comment to the 2007 NODA docket: EPA-HQ-RCRA-2006-0796-0446.

Study: None.

Regulatory and Legal Response: New Mexico does not require daily cover at disposal sites.

References:

Denver, CO, Public Hearing, September 2, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste. Environmental Integrity Project and EarthJustice. February 24, 2010.
http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

Comment to the docket submitted by Marty Rustan on behalf of Lisa Evans, EarthJustice: EPA-HQ-RCRA-2006-0796-0446.

An October 24, 2006 complaint by a Navajo Reservation resident to Susan Bodine, the AA for OSWER, in a meeting at EPA HQs in Washington, DC.

EPA Region 8

Valmont Coal Plant, Boulder, Colorado

Implicated Activity: Haulage for disposal (conveyer belt).

Description: Fugitive dust blowing off plant (conveyer belt) as a result of high winds.

Status: Active.

Impact Summary: No information.

Study: None.

Regulatory and Legal Response: None.

References:

Denver, CO, Public Hearing, September 2, 2010:
http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm

EPA Region 9

Nevada Energy, Reid Gardner Generating Station, Moapa, Nevada

Implicated Activity: Disposal, Class III industrial landfill, surface impoundments and ash haulage. (Also, a proven damage case on account of groundwater and surface water contamination.)

Description: The waste disposal site, directly adjacent to the power plant, is a 91-acre unlined landfill, less than one mile from the Moapa Band of Paiutes Tribal community on the Moapa River Indian Reservation in Southern Nevada. There are two major types of CCR management that seem to generate most of the fugitive dust that blows to the community of the Moapa Band of Paiutes: (i) Fly ash from the surface impoundments that is scooped out periodically and heaped for haulage to the coal ash landfill. There are also pond- solids, forming on the sides of the impoundments as liquid evaporates, entrained in droplets as liquid evaporates, or made air-borne by blowing wind, all being carried from the wastewater ponds; (ii) Some twenty uncovered trucks of coal ash per day are trucked from the ash ponds to the landfill over unpaved haul roads. The landfill is also higher in elevation and southeasterly of the tribal community. CCR dust is generated when the landfill surface is dry, disturbed by landfill activities, driven upon by haul trucks, or when ash escapes or is blown from the haul trucks. Winds in the vicinity of the power plant are frequently southern or southeasterly, so that ash mobilized by the winds frequently blows in the Moapa community. During high wind events, residents of the Reservation have observed dust from the vicinity of the landfill sweeping towards them.[74]

Status: Active.

Impact Summary: None available.

[74] Between 2008 and 2012, this occurred on September 19, 2008; April 14, 2009; April 23, 2009; April 20, 2010; December 13, 2010; June 30, 2010; April 7, 2011; and February 13, 2012

Study: Early in 2012, EPA R9 launched a fugitive dust study: "Region 9 is in the process of evaluating the dust/odor issues associated with the Reid Gardner (RG) facility. We are in the process of information gathering: Environmental permits and EIS documents and associated public comments; Meteorological data; Historic and current RG dust and odor complaint data; Effective engineering and process controls to minimize dust/odors from the management of CCRs; Damage case related information related to the management of CCR waste; RG analytical data for both slurried and landfilled CCR wastes; and on and off-site soil data, if available; to determine if the area has been adversely impacted from CCR related heavy metals."[75] Based on a recent feedback from EPA R9, it seems that Nevada Energy has put in place work practices in the recent two years to address both the odor and fugitive dust issues associated with the Plant's operations.[76]

Regulatory and Legal Response: Tribal community has complained for years about blowing dust from landfill area, aggravating respiratory ailments, and smells emanating from wastewater ponds. When NV Energy applied for the landfill expansion in 2006,[77] more than fifty comments from tribal members were generated against the expansion, which were all dismissed by BLM. More recently complaints have been documented in photos (April 2010, July 2010, April 2011, and May 2011). Complaints have been registered with the Nevada Department of Environmental Protection (NDEP), NV Energy, Southern Nevada Health District, and the Clark County Department of Air Quality. To this date (mid-2011), no written record or report on complaints has been provided to the Tribal community or Sierra Club.

Tribal members have commented on cultural life-ways being abrogated by the landfill's operation, such as the harvesting and hunting of local plants and small game, as well as the ability to conduct ceremonies and traditional religious observances outdoors. There is also no record of response to these complaints. During a dust storm 4-5 years ago, Tribal Member Calvin Meyers was told he "did not have the authority" to call in a complaint.

According to a June 24, 2010 Notice of Decision on a public comment period on the pending NDEP's issuance of groundwater permit number NEV91022, Nevada Energy, Inc., Reid Gardner Station (RGS), one of the letters submitted by the Paiutes addressed air emissions. The letter recommended conducting a health feasibility study to look at health consequences of living near RGS, to be paid for by NV Energy; and a tribal lifestyle study to identify exposure and risk. A public hearing was conducted on June 3, 2010, where "much of the comments dealt with issues outside the scope of the permit or regulations and authority of the Bureau of Water Pollution Control." The groundwater permit was granted and became effective June 25, 2010.

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[75] A January 31, 2012 email from J. Schofield, EPA R9, to A. Livnat, EPA/OSWER.
[76] November 12, 2013 email from J. Schofield, EPA R9, to A. Livnat, EPA/OSWER.
[77] NV Energy received a tentative approval for a single-lined, 24-acre expansion of their coal ash landfill on BLM land.

The Solid Waste Authority for Southern Nevada is the Southern Nevada Health District. 347 letters were submitted to the Southern Nevada Health District opposing the landfill. Of these letters, seven include complaints of blowing dust, asthma, and falsified reports. To this date (mid-2011), there is no record of compliance violations or enforcement actions on the dry coal ash landfill at Reid Gardner.

On December 16, 2010, The Moapa Band of Paiutes et al sued U.S. BLM for violating NEPA when allowing the LF expansion on public land.[78] On October 6, 2011, in the case of the Moapa Band of Paiutes et al v. U.S. BLM et al and Nevada Power Co., the US District Court of Nevada denied the plaintiffs' request for Summary Judgment concerning BLM's failure to prepare an EIS, following FONSI in its Environmental Assessment regarding Nevada Energy's request for relocating its CCR evaporation ponds and expanding the landfill. Among others, the court stated (P. 11): "The BLM properly determined that the standards for fugitive dust and hydrogen sulfide fell within the range of National and State Ambient Quality Standards" (AR at 100-101), and that "BLM complied with its obligations under NEPA in determining that the Expansion would have no significant impact on air quality."

The September 9, 2011, South Nevada District Board of Health issued CCR landfill operation permit contains two sections on controlling fugitive dust (8g and 8h), and indicates that the installation of PM10 continuous monitoring was completed prior to March 1, 2011. While a significant step forward, the permit does not include any reporting requirement to the permitting authority, which obviates the enforcement aspect of this measure.

The April 8, 2011 Nevada Energy draft dust suppression plan for high-wind (>15 miles/hour) event days, developed by Nevada Energy as part of the permit requirements, does not spell out what additional measures, other than ceasing the disturbance of the coal and coal ash piles during high wind event days, would be undertaken to control excessive fugitive dust emissions

On October 10, 2011, the Moapa Band of Paiutes and the Sierra Club submitted a law suit against the S. Nevada Health Board, who had granted Nevada Energy a permit to expand the CCR LF. "When the wind blows from the south, the ash blows into the homes and the hair and food of my clients…State law is clear: The Board of Health is not entitled to license a public nuisance."[79]

On February 8, 2013, a Notice of Violation and Intention to Sue Pursuant to U.S.C.§ 6972 and 33 U.S.C. § 1365; the Moapa Band of Paiute Indians and the Sierra Club, was submitted by the Law

[78] High Country News, Case No. 2:10-CV-02021-KJD-LRL: http://www.hcn.org/greenjustice/blog/sierra-club-and-a-small-tribe-sue-the-blm-to-stop-the-expansion-of-a-coal-ash-landfill

[79] *Lawsuit aims to block expansion of NV Energy landfill;* Las Vegas Review-Journal, October 10, 2011: http://www.lvrj.com/news/lawsuit-aims-to-block-expansion-of-nv-energy-landfill-131491113.html

Offices of Charles M. Tebbutt, P.C., Eugene, Oregon, to NV Energy and the California Department of Water Resources.[80]

These and similar complaints were included in Appendix A of the August 8, 2013 Sierra Club and the Moapa Band of Paiute Indians citizen suit in federal court against Nevada Energy and the California Department of Water Resources, seeking cleanup of contaminated lands and waters surrounding the Reid Gardner plant.[81] Considering fugitive dust from Reid Gardner's facility, <Plaintiffs' members in the community center of the Tribal reservation live within a mile or two of the Reid Gardner facility, including its landfill, wastewater ponds, the generating station itself, its adjacent coal piles, and the facility's other sources of pollutants and contaminants. *Plaintiffs' members are reasonably concerned about harm to their health from breathing air contaminated with particulates from the coal ash landfill, solids from the wastewater evaporation ponds, coal dust, and other contaminants blown into the reservation from the Reid Gardner facility*. Plaintiffs' members are also concerned about the threat to their health caused by needing to shutter themselves indoors, including during hot weather, so as to avoid exposure to southerly winds that entrain contaminants from the facility.>

<Plaintiffs' members utilize the land and river in the area near the Reid Gardner facility for religious purposes and spiritual practice. CCW dust and associated fumes and gases from the Reid Gardner facility, including from the coal ash landfill and CCW ponds, impair Plaintiffs' ability to pursue these practices and undermines the quality of the experience. Plaintiffs also attempt to grow vegetables in their home gardens, and plaintiffs are reasonably concerned that toxic dust from the Reid Gardner facility deposited on their soil and vegetables renders their produce unsafe or otherwise impairs its quality.>

<Plaintiffs' members, volunteers and staff have seen and smelled the coal ash landfill and wastewater ponds, including the dust clouds they generate during periods of high wind and the odors that may be especially intense during hot periods.>

References:

[80] EPA Correspondence Management Control Number AX-13-000-2093; File Code 401_127_a General Correspondence Files Record copy (An April 29, 2013 email attachment from P. Raack, EPA/OECA to A. Livnat, EPA/OSWER).

[81] BNA Daily Environmental Report, August 13, 2013. *Moapa Band of Paiute Indians v. Nevada Power Co.,* D. Nev., No. 2:13-cv-01417, 8/8/13. The suit said that NV Energy reported "over 7,000 exceedances of state action levels for contaminants of concern" to the Nevada Division of Environmental Protection since 2008, covering several pollutants including chloride, sulfate, total dissolved solids, arsenic, boron, chromium, manganese, magnesium, molybdenum, selenium, and sodium. "Groundwater monitoring data also indicates that, in the period 2008-2012, there were additional exceedances of federal standards for toxic contaminants beyond those identified as exceedances of the less restrictive state action levels."
http://content.sierraclub.org/coal/sites/content.sierraclub.org.coal/files/docs/Doc%2301%20Complaint%208-8-13_0.pdf

May 12, 2011 email, with attachments of petitions and photos, from Lisa Evans, EarthJustice, to A. Livnat, EPA/OSWER.

Email exchanges between J. Schofield, EPA R9, with A. Livnat, EPA/OSWER (August 25, 2011; November 2, 2011; and November 13, 2013.)

October 10 press article on Paiute/Sierra Club suit to block Landfill expansion, 10/10/2011

April 29, 2013 email, with attachment, from P. Raack, EPA/OECA to A. Livnat, EPA/OSWER.

EPA Region 10

College Peat and Landscaping and Alaska Industrial Support, Inc., Fairbanks, Alaska

Implicated Activity: Storage and haulage for disposal and beneficial use.

Description: In Fairbanks, Alaska, two coal-fired power plants have no designated CCR landfill in the area. Power plants operated by Aurora Energy, LLC and the University of Alaska Fairbanks (UAF) use a contractor to dispose of their coal ash. The UAF produces 1 to 2 dump truck loads of coal ash daily. Until just a few years ago, this waste was used exclusively on campus as filler material for numerous construction projects such as roads, buildings, parking lots, and sports fields, and even for winter traction on icy roads and sidewalks. Today, coal ash is stockpiled at a local landscaping company until it is used as fill in local areas such as public spaces, roads, and residential neighborhoods. The landscaping company was recently notified of a violation of air pollution regulations in reference to coal ash disposal.

Status: Active.

Impact Summary: In June 2010, Local Fairbanks resident and Farmer’s Market vendor Mary Zalar commented: ‘Last spring, while selling our handcrafted wood bowls at our local Farmer's Market, a strong north wind blew coal ash into the market from where it is stored on adjacent property (College Peat & Landscaping stockpile next to the Farmer’s Market). Our product was coated with a very obnoxious, persistent and pervasive black ash that was difficult to remove. My concern increased when I discovered there is no regular testing or regulation of the disposal of coal ash in our community.’

Study: At the request of local residents, a sampling project was conducted in June 2010 in the Fairbanks area to determine the toxicity in local sources of coal ash. Samples of coal ash from local power plants, waste disposal sites and reuse sites were found to contain a range of toxic heavy metals. In almost every case, the levels of toxic chemicals were found to be much higher than background soil samples from Fairbanks. In the coal ash samples, levels of arsenic and vanadium were found at concentrations that may harm human health. Two samples from the UAF coal fired power plant show arsenic concentrations more than 100 times higher than the standard for residential soils set by the EPA. Lastly, mercury was found at levels 70 times higher than background soils, and at levels high enough to be a concern if inhaled in the form of windblown dust.

Regulatory and Legal Response: In June 2010, the Alaska Department of Environmental Conservation (ADEC) sent a compliance letter to College Peat & Landscaping, citing concerns about fugitive dust emissions from its property onto the neighboring Farmer's Market. ADEC's inspection showed "excessive dust coming from a coal ash pile that was uncovered and was spreading dust & ash all over the tables at the Farmer's Market" in violation of *18 AAC 50.045(d) and 18 AAC 50.110: Air Pollution Prohibited*, creating a health concern for the vendors and customers. The cited entity was requested to take appropriate precautionary steps to prevent fugitive dust from coal ash storage piles and coal ash handling activities.

In August and September 2010, ADEC issued a letter alleging Possible Violation of Solid Waste Transport Regulation and a Confirmed Violation of Solid Waste Transport Regulation, respectively, alleging citizen complaints, then actual observation of Alaska Industrial Support, Inc. (AIS) trucks hauling uncovered loads of coal ash from the UAF power plant to the College Peat site, in violation of 18 AAC 60.015. The second letter forewarned that was another truck to be seen uncovered, ADEC would begin a formal enforcement action against AIS.

On May 16, 2011, a citizen (Teresa de Lima) submitted a CERCLA petition to EPA R10 to conduct a preliminary assessment of the suspected release of CCW at the owners parents' residential property and neighboring properties in Fairbank, AK, due to 8-10 daily trips of CCR hauling trucks from Aurora Energy's PP to a landfill, with inadequately covered load. The wetted load releases CCR-laden sooty water, leaving a CCRs trail in the streets and sidewalks. All her prior efforts to contact local and state authorities remained inadequately- or not addressed.[82]

Teresa de Lima (Affected Citizens in Fairbanks, Alaska HR2273) cites EPA's response to her May 2011 filing of a citizen's petition to EPA R10, accompanied by four photos documenting the fallout on her ailing parents' house:[83] In September 2011, EPA conducted soil testing on homes

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[82] Petition referenced in *Aurora Energy Coal Power Plant preliminary Assessment, Fairbanks, AK*, TD: 11-06-0004, prepared by Ecology and Environment, Inc., for USEPA, Seattle, Washington, January 2012: http://groundtruthtrekking.org/static/uploads/files/EPA-PA-Fairbanks-Coal.pdfGOqKVt/EPA-PA-Fairbanks-Coal.pdf

[83] Her mother has very severe Rheumatoid Arthritis, Alzheimer, Cardiac and Gastroesophageal reflux disease (GERD). Her father, Parkinson; she cites scientists and doctors of the Physicians for Social Responsibility that these ailments can be directly linked to exposure. She also cites exposure of the residents on Van Horn Road, College

in the immediate area of the dirty polluter on First Avenue (the Aurora Energy power plant, which is owned by the Usibelli Coal Mine).[84] In an enclosed email April 18, 2012 message, she prods Erik Elram, the environmental liaison of Alaska's representative Don Young, to oppose the passage of HR2273 because of the adverse side effects of using CCW as road fill.

References:

Two emails (May 10, 2011 and May 11, 2011), with attached documents and photos, from Lisa Evans, Earthjustice, to A. Livnat, EPA/OSWER.

April 18, 2012 letters from Teresa de Lima, Affected Citizens in Fairbanks, Alaska to Lisa P. Jackson, EPA's Administrator, and to Erik Elam, the environmental liaison of Representative Don Young, U.S. Congress.

Estates to fugitive dust, including' significant health problems that have striken four individuals after having lived in close proximity to the coal (combustion) piles – i.e., respiratory ailments and Saircoidosis (a disease in which inflammation occurs in the lymph nodes, lungs, liver, eyes, skin, or other tissues).

[84] Remembering Don and Rose de Lima; Northern Line, Summer 2013, page 11: http://northern.org/media-library/document-archive/northern-line/2013/summer-2013-high-resolution-file-6-mb/at_download/file

Fugitive Dust Cases: Summary Table[85]

Case	State, Region	LF	SI	Minefill	Structural Fill	Road Application	Haulage	Captive Waste	Plant Operation	Active	Resolved	Inactive	Partially Active	Dust Only	Dust & Other Media	Air Dispersion Study	Particle Study	Health Study	State/Gov Action	Public Hearing	Damage Case[86]	Comment to Dockt	Court case, Intent to Sue, Settlement
AES Guayama, PR	PR R2				✓					✓					✓							✓	✓
Vitale Fly Ash Pit, Beverly	MA R2	✓										✓			✓						✓		
Gambrills	MD R3	✓										✓			✓		✓					✓	
Mirant Brandywine LF	MD R3	✓								✓					✓						✓		
Indian River, Millsboro	DE R3	✓							✓	✓					✓	✓		✓	✓			✓	✓
Case	**State, Region**	**LF**	**SI**	**Minefill**	**Structural Fill**	**Road Application**	**Haulage**	**Captive Waste**	**Plant Operation**	**Active**	**Resolved**	**Inactive**	**Partially Active**	**Dust Only**	**Dust & Other Media**	**Air Dispersion Study**	**Particle Study**	**Health Study**	**State/Gov Action**	**Public Hearing**	**Damage Case[87]**	**Comment to Dockt**	**Court case, Intent to Sue, Settlement**
Bruce Mansfield	PA R3		✓						✓	✓					✓			✓	✓	✓	✓		

[85] Entry marked only when parameter is relevant specifically to fugitive dust.
[86] Recognized or alleged damage case based on groundwater and/or surface water impact.
[87] Recognized or alleged damage case based on groundwater and/or surface water impact.

Case	State, Region	LF	SI	Minefill	Structural Fill	Road Application	Haulage	Captive Waste	Plant Operation	Active	Resolved	Inactive	Partially Active	Dust Only	Dust & Other Media	Air Dispersion Study	Particle Study	Health Study	State/Gov Action	Public Hearing	Damage Case[89]	Comment to Docket	Court case, Intent to Sue,
Shippingport																							
Mitchell PP, Courtney	PA R3	✓								✓	✓				?				✓		✓		
La Belle, Luzerne Township	PA R3			✓			✓			✓					✓							✓	✓
Rostosky Ridge Rd.	PA R3					✓						✓		✓				✓				✓	✓
East End LF, Henrico Co.	VA R3				✓														✓ [88]				
Battlefield Golf Course	VA R3				✓		✓					✓			✓					✓	✓		✓
Fort Martin PP, F. Martin	WV R3	?					✓			✓				?						✓			
Arrowhead LF, Uniontown	AL R4	✓					✓			✓					✓					✓			✓

88 State endorsed site activities, but County issued a NOV for permit violation.
89 Recognized or alleged damage case based on groundwater and/or surface water impact.

Case	State, Region	LF	SI	Minefill	Structural Fill	Road Application	Haulage	Captive Waste	Plant Operation	Active	Resolved	Inactive	Partially Active	Dust Only	Dust & Other Media	Air Dispersion Study	Particle Study	Health Study	State/Gov Action	Public Hearing	Damage Case[90]	Comment to Dockt	Court case, Intent to Sue, Settlement
Riverbend Steam P., Mt. Holly	NC R4		✓		✓	✓				✓					✓					✓			
PE Asheville	NC R4	✓								✓					✓		✓		✓	✓	✓		
Swift Creek Rocky Mount	NC R4				✓										✓				✓		✓		
Harlan Co., Off US 119	KY R4	?			?					✓				✓								✓	
Louisville G&E Cane Run	KY R4	✓	✓				✓		✓	✓				✓			✓		✓				✓ **91**
Duke Energy's Gibson, Somerville /Mt. Carmel	IN R5	?	✓							✓					✓					✓	✓		
Hoosier Energy Merom	IN R5	✓							✓	✓					✓		✓		✓	✓	✓	✓ **92**	✓ **93**

[90] Recognized or alleged damage case based on groundwater and/or surface water impact.

[91] (i) Settlement between LG &E and over 100 residents of the community of Riverside Gardens for fugitive dust, negligence and nuisance; (ii) Intent to Sue (9/6/2013).

[92] Proposed Rule Docket: EPA-HQ-RCRA-2009-0640-10019.

[93] NOV (8/2009); CO (7/2010) between Hoosier Energy and IEPA, $95K penalty and upgrade of pollution control technology.

Case	State, Region	LF	SI	Minefill	Structural Fill	Road Application	Haulage	Captive Waste	Plant Operation	Active	Resolved	Inactive	Partially Active	Dust Only	Dust & Other Media	Air Dispersion Study	Particle Study	Health Study	State/Gov Action	Public Hearing	Damage Case[95]	Comment to Dockt	Court case, Intent to Sue, Settlement
Ameren Coffeen/ US Minerals	IL R5								✓	✓					✓				✓ 94	✓	✓		
Rocky Acres CCBP Disposal site, Bunge Corp., Oakwood	IL R5				✓			✓				✓			✓				✓	✓	✓		
Met-South CCW Disposal Facility, Joppa	IL R5	?	?			✓				✓				✓						✓			
MMHF LF, Bokoshe	OK R6	✓	✓	✓			✓			✓					✓				✓	✓		✓	✓ 97
San Juan G. Station/ 4 Corners	NM R6			✓						✓					✓					✓	✓		

[94] OSHA fined *US Minerals* $400 K in Dec. 2012 for endangering their workers on multiple occasions with hazardous ash dust.
[95] Recognized or alleged damage case based on groundwater and/or surface water impact

[97] A class action Lawsuit against AES Shady point and additional 23 defendants, Oct. 2011, amended Oct. 2012.

Case	State, Region	LF	SI	Minefill	Structural Fill	Road Application	Haulage	Captive Waste	Plant Operation	Active	Resolved	Inactive	Partially Active	Dust Only	Dust & Other Media	Air Dispersion Study	Particle Study	Health Study	State/Gov Action	Public Hearing	Damage Case[98]	Comment to Dockt	Court case, Intent to Sue, Settlement
Valmont Coal Plant, Boulder	CO R8								✓	✓					✓					✓			
Nevada Energy Reid Gardner, Moapa	NV R9	✓	✓							✓					✓	✓ [99]			✓ [100]		✓		✓ [101]
College Peat & Landscaping, AIS, Fairbanks	AK R10				✓		✓			✓				✓			✓		✓				✓ [102]

98 Recognized or alleged damage case based on groundwater and/or surface water impact.

99 In 2012, EPA R9 launched a study to evaluate the dust/odor issues associated with the power plant.

100 EPA R9 conducted a fact-finding visit to Reid Gardner and the Paiute Indians (Sep. 26, 2012), based on which findings' it has not pursued any enforcement action.

101 (i) Against the Bureau of Land Management (Dec. 2010) for failing to prepare an EIS as a condition for authorizing a CCR LF expansion on public land; plaintiff's request denied (Oct. 2011); (ii) Lawsuit, Moapa Band of Paiutes and the Sierra Club against the S. Nevada Health Board (permitting agency), Oct. 2011; (iii) Intent to Sue, Moapa Band of Paiutes and the Sierra Club against Nevada Energy and the California Department of Water Resources (Feb., 2013).

102 A City resident submitted (5/2011) a CERCLA petition to EPA R10 for assessment of fugitive dust releases on her parents' property next to the trucks' CCR hauling route. EPA R10 responded it would conduct soil testing at the impacted property.

ATTACHMENT 3

EPA/OSWER/RCRA

Damage Case Compendium

Technical Support Document, Volume IIb, Part One: Potential Damage Cases

Alexander Livnat, Ph.D.

12/18/2014

This is the third out of five volumes describing EPA's current state of knowledge of CCR damage cases. This volume comprises 32 damage case-specific modules. Each module contains background information on the host power plant, type and design of the CCR management unit(s), their hydrogeologic setting and status of groundwater monitoring system, evidence for impact, regulatory actions pursued by the state and remedial measures taken, litigation, and rationale for the site's current designation as a potential damage case in reference to pre-existing screenings. Ample footnotes and a list of references provide links to sources of information.

IIb. Coal Combustion Residuals Potential Damage Cases

PART I (Cases PTb01 to PTb32)

(Submitted and Assessed between 2010 – January 2011)

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PTb01. Flint Creek Power Plant, American Electric Power - Southwestern Electric Power Company (SWEPCO), Gentry, Benton County, Arkansas

Type: Landfill and Surface Impoundments.

Background and Description: The 528 MW Flint Creek Power Plant site[1] contains a 40-acre landfill which has been in operation since 1978 but was only permitted in 1994.[2] The current landfill permit allows for disposal of dried fly ash and dredged bottom ash. The landfill has had a liner (a 6" compacted clay) only since 1994, and as of April 2010, also a leachate collection system.[3] The site also contains a 42.8-acre primary ash pond and a 3.7-acre secondary ash pond located south of the plant operations area, both commissioned in 1978.[4] Both ponds are unlined.[5] The ponds receive primarily bottom ash, but also fly ash and coal pile and landfill runoff; the primary pond receives also boiler slag.[6] The SWEPCO ponds at Flint Creek are dredged for re-use of the solids and/or their disposal elsewhere. The ponds and their dredged materials are exempt from regulation under the "use of recovered materials" provision in ADEQ

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[1] Name plate capacity is 558 MW. The plant occupies 1,500 acres. The dry bottom pulverized coal boiler furnace uses 5,000 tons/day of low-sulfur, subbituminous Powder River Basin coal from Wyoming, shipped via Kansas City Southern Railway; the ratio between fly ash and bottom ash plus boiler slag is approximately 70:30: EPRI (2002) and https://www.swepco.com/info/projects/FlintCreekPlant/. According to https://swepco.com/info/news/ViewRelease.aspx?releaseID=1187, it is the only baseload power plant in Northwest Arkansas. To comply with new EPA regulations, the Plant must install additional environmental controls to continue operation beyond 2015; on February 8, 2012, American Electric Power subsidiary SWEPCO asked the Arkansas Public Service Commission to review the company's plans to install such environmental controls on the Flint Creek Power Plant.

[2] Approximately 700 acres of SWEPCO's Flint Creek Power Plant's 1,600 acres are designated as wildlife habitat. In early 2007, Audubon Arkansas designated the Flint Creek property as an "Important Bird Area" (IBA). SWEPCO Lake, the year-round warm water power plant's 500-acre reservoir, attracts wintering American Bald Eagles and many other avian species. The plant has been home to the Eagle Watch Nature Trail since 1999: See https://www.swepco.com/info/news/ViewRelease.aspx?releaseID=457, https://www.swepco.com/environment/EagleWatch.aspx, and https://www.swepco.com/global/utilities/lib/docs/environment/AEP-SWEPCO%20Eagle%20Watch%20Wildlife%20Checklist.pdf

[3] According to ADEQ's comment to the October 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0249), from 1978 to 1994, in situ clay was used as a liner and now underlies the eastern two-thirds of the landfill.

[4] Their corresponding capacities are 484.1 acre-ft and 24.3 acre-ft , respectively; and the actual CCR volume stored in 2009 was 80,700 cubic yards in the primary pond and 'minimal' in the secondary pond (from which ash is routinely removed for beneficial use). According to EIP (2010a), the primary pond is a treatment unit that is permitted to receive, other than CCR and associated waste, also 0.03 million gallons a day (MGD) of treated domestic wastewater from the town of Gentry's wastewater treatment plant. The primary pond was the subject of EPRI's (2002) detailed study. The ponds provide treatment through settling and neutralization. The estimated combined flow through the ash ponds that discharges to SWEPCO Lake is 7.29 MGD, but the flow can be up to 9.83 MGD. For the Plant's layout, see Figs. 2-1 and 2-9 in EPRI (2002).

[5] However, according to ETTL Engineers & Consultants August 2010 *Flint Creek Power Station Existing Ash Storage Ponds Embankment Investigation* report [in Dewberry & Davis LLC (2011), Appendix A, Document 13], the permeability of the foundation soils ranges from 2.4×10^{-8} cm/sec to 9.4×10^{-9} cm/sec. The permeability of the weathered rock layers was not tested but due to the possibility of interconnected voids, the permeability of the rock mass could vary widely and is estimated to range from1×10^{-3} cm/sec to 1×10^{-8} cm/sec.

[6] Southwestern Electric Company (2009). According to Dewberry & Davis LLC (2011), the primary and secondary bottom ash ponds are adjacent to the plant and the plant's cooling pond. These ponds are divided into two impoundments in series. The cross valley embankments of both are constructed of native clayey fill that impounds bottom ash and ash pond water. The primary dam is an 820-foot long cross-valley dam. The secondary dam is a 750-foot long cross-valley dam. The construction of these ponds took place between 1974 and 1978.

Regulation 22.[7] The Flint Creek Power Plant is located next to the Little Flint Creek, a tributary of Flint Creek and the Illinois River. SWEPCO Lake, a 500-acre cooling reservoir for the power plant, is part of the watershed.[8] The Plant's three Outfalls are subject to a National Pollutant Discharge Elimination System (NPDES) permit.[9]

The first groundwater monitoring at the site was undertaken in 1994. The Arkansas Department of Environmental Quality (ADEQ) required the facility to start assessment monitoring in 2005 due to statistically significant increases in selenium, sulfate, pH, and total dissolved solids (TDS); however, no offsite groundwater data is available. The site is underlain by the cherty limestone of the Early Mississippian Boone Formation. Solution waters create some caves and voids throughout the Boone and it is not uncommon to penetrate a void while drilling this formation. The Boone Formation is approximately 300 to 350 feet thick and is fractured by faults and joints, and karst features are common. In the area of Little Flint Creek the thickness of Boone could reach 350 feet.[10] The Boone Formation is underlain and confined by the Chattanooga Shale, which is typically 25 to 30 feet thick. The Chattanooga is underlain by a thick sequence of Paleozoic sedimentary rocks of Devonian-, Silurian-, and Ordovician-age. Depth to bedrock ranged from approximately 10 to 55 feet below ground surface.

The shallow aquifer at the Flint Creek plant is confined and present within the transition zone bedrock unit (lower residual soil). The transition zone bedrock consists of friable limestone with sand- to gravel-sized chert. This unit is laterally continuous and varies in thickness from 1 to 13 feet. (EPRI, 2002, Fig. 5-2). The shallow aquifer is confined by an overlying silt and clay unit (upper residual soil) that contains up to 30 percent sand- to gravel-sized chert. The upper residual soil unit is laterally continuous and ranges in thickness from 2 to 20 feet (EPRI, 2002, Fig. 5-3). The thinner portions of this unit are present underneath the ash basin. The shallow aquifer is confined below by competent bedrock.

Hydraulic conductivities measured in wells located near the ash basin and screened within the shallow aquifer (transition zone bedrock) ranged from 3.5×10^{-5} to 2.9×10^{-3} cm/sec (EPRI, 2002, Table 5-2). The hydraulic conductivity measured in well FCMW-5, also in the upper aquifer, but located north of the ash basin near the condenser cooling water discharge, was 1.2×10^{-2} cm/sec. This variation in hydraulic conductivity is most likely due to varying degrees of weathering within the transition zone bedrock, and varying units spanning the screened intervals of the wells.

Based on levels measured in August 1996, within the shallow confined aquifer, groundwater contours generally follow the surface topography, which reflects bedrock topography (EPRI, 2002, Fig. 5-4). Groundwater flow is toward the primary ash basin and the SWEPCO reservoir, following essentially historic areas of drainage. Groundwater divides are defined by bedrock (topographic) highs. Horizontal

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[7] Arkansas Pollution Control and Ecology Commission (2007).
[8] https://swepco.com/info/news/viewRelease.aspx?releaseID=944. According to the August 2008 issue of *Rural Arkansas*, the Arkansas Game and Fish Commission recently built a boat launch ramp and fishing pier at the lake: http://www.aecc.com/pdf/0808AUG.pdf
[9] No. AR0037842; however, according to Dewberry & Davis LLC (2011), Appendix A, Document 7, the only monitored parameters are pH, TSS, Oil & Grease, total residual chlorine, and biological toxicity.
[10] According to ETTL Engineers & Consultants August 2010 *Flint Creek Power Station Existing Ash Storage Ponds Embankment Investigation* report [in Dewberry & Davis LLC (2011), Appendix A, Document 13], there are minor faults running northeast and southwest approximately two to five miles in either direction of this site. Structures that formed on the flank of the Ozark dome of the late Paleozoic Ouachita orogeny are identified as monoclinal folds that displace the generally flat lying Boone Formation. Both east striking normal faults and broader northeast striking dextral strike-slip fault zones probably reflect Pennsylvanian-Early Permian deformation of the developing Ouachita orogeny. The caves and voids throughout the Boone can also produce localized sinkholes.

hydraulic gradients (0.15 to 0.027, estimated in EPRI 2002, Fig. 5-4), the geometric mean hydraulic conductivity (4.7 x 10^{-4} cm/sec) for wells finished in the transition zone bedrock near the primary ash basin (FCMW-1, FCMW-3S, FCMW-3D, and FCMW-4), and an assumed effective porosity of 0.30 were used to calculate groundwater flow velocities within the shallow aquifer. Resulting velocities ranged from 250 ft/yr for the area of steep gradient between the ash delta at the inlet to the primary basin and the SWEPCO reservoir, to 46 ft/yr near the secondary settling basin.[11]

Impact and Damage Claims: According to EPRI (2002), based on seven monitoring wells around the main impoundment,[12] down-gradient groundwater samples were dominated by sodium, calcium, and sulfate. Concentrations of all three parameters, as well as boron, were elevated relative to the one up-gradient groundwater location and background levels, suggesting that all down-gradient wells were impacted by seepage from the impoundment.[13]

EIP (2010a) indicates that onsite groundwater is contaminated with barium, cadmium, chromium, lead, and selenium at levels greater than EPA Maximum Contaminant Levels (MCLs) and Arkansas Groundwater Protection Standards (GWPSs); with levels of iron, manganese, and silver above the GWPS; and pH, sulfate, and TDS at levels exceeding EPA secondary MCLs (SMCLs).[14] EIP (2010a) also notes that surface water samples of the landfill leachate were found to contain a number of elevated contaminant concentrations.

EarthJustice[15] claims that a 2009 groundwater assessment yielded selenium at 3-times the MCL, sulfate, at 8-times the SMCL, and TDS, at 5-times the SMCL in monitoring well NE-3. A leachate seep discharges beyond the landfill into a stream that drains into unmonitored impoundments which discharge off-site to SWEPCO Lake, a recreational reservoir devoid of monitoring.[16] Samples collected between 2007 and 2010 had selenium up to 8.4 times the MCL, chromium up to 3.4 times the MCL, boron up to 4 times EPA's Child Health Advisory, sulfate - up to 4.5 times DWA, and TDS - up to 7.4 times the SMCL.

The second Quarter 2011 groundwater monitoring report results show that two of the ten wells exceed GWPS for selenium: B-02 (50 feet west of the landfill) and NE-3 (360 feet southwest of the landfill, an

[11] According to EPRI (2002), the Paleozoic-age rocks of the Ozark Highlands are underlain by seven water-bearing hydrologic unit. These hydrologic units can be grouped into two main aquifer types, referred to as porous rock aquifers and fractured rock aquifers. Porous rock aquifers, consisting predominately of sandstone, yield large quantities of water to wells in the northern plateau. Fractured rock aquifers consist predominately of limestone, dolomite, sandstone, and shale. Groundwater in these aquifers occurs mostly in secondary openings such as fractures, joints, bedding planes, and solution channels. Wells in these aquifers are generally less than 300 feet-deep and yield less than 10 gpm. The Boone Formation is a fractured rock aquifer, and is a source of domestic water supply in the Flint Creek area.
[12] Number of monitoring wells in the mid-1990s based on Figs. 5-1, 5-2, and 5-5, and Table 5-1 in EPRI (2002).
[13] Specifically, highest boron concentration in down-gradient wells was 1.3 mg/L; sulfate – 335 mg/L, and pH: as low as 5.1, as compared to maximum corresponding concentrations of these parameters in background wells: 0.21 mg/L, 84 mg/L, and 6.5 to 8.2, for boron, sulfate, and pH, respectively.
[14] From 1994 through 1996, groundwater monitoring documented barium at 1.2 times the MCL, cadmium at twice the MCL, lead at 33 times the MCL, iron at 4.8 times the GWPS, manganese at 33 times the GWPS, and silver at 1.1 times the GWPS in multiple groundwater wells.
[15] Comment to docket EPA-HQ-RCRA-2009-0640-6315.
[16] A high-pH leachate seep or spring (SW-1) rich in selenium, arsenic, chromium, boron, and molybdenum was discovered discharging 3-5 gallon/minute from the southeastern corner of the landfill in December 2006. The water was flowing toward the impoundment, but most infiltrated into the ground beforehand. The impoundment discharges into SWEPCO Lake.

assessment monitoring well installed in August 2009 down-gradient of B-02),[17] with 108 µg/L and 123 µg/L, respectively. These two wells have also high sulfate and TDS levels. The number of wells with exceedances of secondary guidelines is: TDS – 2; sulfate -2, manganese – 3, iron – 2, and pH – 3. Selenium exceeded the GWPS in a monitoring well first time in the first Quarter sampling event in 2009.

ADEQ claims[18] that selenium and sulfate are the main Contaminants of Concern, and that reports on elevated cadmium and barium are based on one or two early sampling events in 1995/96 that have not reoccurred since. Chromium and lead have never statistically exceeded the MCL at any well. Cadmium and lead are also very low to non-detect in the leachate, though chromium in the leachate is above the MCL during about half of the sampling periods.

Between August 2009 and June 2011, nine wells were installed as part of the Assessment Monitoring.[19] AEP claims[20] that the closest down-gradient drinking water well is located on the power plant's property, about 1,670 feet west of the landfill. This well has been sampled and analyzed for primary MCLs (arsenic, barium, cadmium, chromium, selenium, and mercury), action levels (lead and copper), and SMCLs (silver, iron, manganese, and zinc). According to AEP, the results for all the measured parameters were below their respective standards.

Evaluation against Proven Damage Criteria[21]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded EPA MCLs for barium, cadmium, chromium, lead and selenium. • Onsite groundwater data exceeded EPA SMCLs for pH, sulfate, and TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Surface water samples of leachate collected from a discharge point at the southeast corner of the landfill contain elevated levels of barium, boron, chromium, lead, selenium, sulfate, and TDS and have alkaline pH readings.
Criterion 3: *Where there has been an administrative ruling or court decision*	• ADEQ issued a Notice of Deficiency (NOD) to SWEPCO in 2008 due to an uncontrolled discharge of CCR leachate and requested that AEP install a leachate collection system. As of

[17] EPRI (Comment to docket EPA-HQ-RCRA-2009-0640-9765) claims that this monitoring well is located on site.
[18] Comment to docket EPA-HQ-RCRA-2011-0392-0249.
[19] According to EPA-HQ-RCRA-2011-0392-0249, between 2008 to 'present' - 20 parameters are measured quarterly in wells over the GWPS, 20 parameters are measured semi-annually in the remaining wells, and 31 parameters are measured triennially.
[20] AEP's Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0202, and EPRI's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-9765.
[21] ICF (2010a).

with an explicit finding of specific damage to human health or the environment	March 2010, no leachate collection system has been installed.

Resolution: ADEQ required the facility to start assessment monitoring at 2005 due to statistically significant increase in selenium, sulfate, and TDS. GWPS were set at this time that are based on national MCLs, and otherwise – are risk-based.

ADEQ issued a Notice of Deficiency (NOD) in 2008 due to uncontrolled discharge of CCR leachate and requested that AEP install a leachate collection system and collect leachate samples from the discharge point, when present, at the southeast corner of the landfill. According to both ADEQ and AEP,[22] the SW-1 seep was collected and treated as of April 2010. The number of monitoring wells increased from four[23] (1994-2001) to sixteen (June 2011). In addition, the sampling frequency and the number of analyzed parameters also increased significantly.

AEP prepared a "Nature and Extent Workplan" in June 2009, to "characterize the nature and extent of selenium in groundwater." The facility is assessing corrective measures, with status report due by January 2012. An intermediate liner (i.e., over existing CCR fill) and leachate collection system would be placed over the ash currently in the landfill to minimize infiltration into the lower ash body.

USWAG claims that this site does not qualify as a damage case.[24]

ICF (2010) Rationale: *Potential Damage*. <Groundwater exceedances of the primary EPA MCLs for barium, cadmium, chromium, lead, and selenium, and the SMCLs for pH, sulfate, and TDS have been found onsite. Leachate samples from the landfill contain elevated levels of barium, boron, chromium, lead, selenium, sulfate and TDS; however, there is no scientific study available that explicitly documents evidence of damage to human health or the environment. ADEQ issued an NOD to SWEPCO and requested installation of a leachate collection system; however this also does not have an explicit finding of specific damage.>

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EIP (2010a): In Harm's Way: Lack of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-Nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #1. Environmental Integrity Project, Earthjustice and Sierra Club, August 26, 2010.
http://www.environmentalintegrity.org/news_reports/08_26_10.php

[22] Comments to the October 2011 NODA docket: ADEQ comment EPA-HQ-RCRA-2011-0392-0249 and AEP comment EPA-HQ-RCRA-2011-0392-202.
[23] The statement about only four monitoring wells between 1994 and 2001 is inconsistent with the well-document record in EPRI (2002) of seven monitoring wells associated with the main impoundment during the execution of that study in the mid-late 1990s.
[24] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "Arkansas Department of Environmental Quality (ADWQ) required the site owner to initiate assessment monitoring at the landfill as a result of statistically significant increases in January 2005 for selenium, sulfate, TDS, and pH. There are no other citations or information related to regulatory actions. This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The allegation in the reference claims that there are off-site groundwater exceedances, but there is no off-site groundwater quality data provided. The monitoring well referenced as being located off-site is within the property boundary of the site."

ICF (2010a): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix C, Case #1. ICF, 10/2010.

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http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys/survey-flint.pdf

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http://www.epa.gov/waste/nonhaz/industrial/special/fossil/surveys2/aep-flint-creek-final.pdf

PTb02. Independence Steam Station,[25] Entergy - Arkansas Power and Light (AP&L), Newark, Independence County, Arkansas

Type: Landfill and Wastewater Recycle and Surge Ponds.

Background and Description: The 1,700 MW, two generation units Independence Steam Station site contains a 70-acre fly ash and bottom ash landfill, two wastewater-recycle ponds, a surge pond, and a coal storage pile. The landfill and surge pond are each nearly ¾-mile long. A Class 3N Landfill permit (No. 0200-S3N) was issued in 2002 for the coal combustion residuals' (CCR) landfill which has been in operation since 1983.[26] The permit required that AP&L establish baseline water quality conditions. AP&L has also applied for a landfill expansion and the Arkansas Department of Environmental Quality (ADEQ)

[25] The Plant's nameplate capacity is1700 MW (1678 MW actual), consisting of two generation units (year of in-service in parenthesis): 850 MW (1983) and 850 MW (1984). According to http://www.aecc.com/about/generation-facilities/, the Station is fueled by low-sulfur Powder River Basin coal mined near Gillette, Wyoming.
[26] According to an Arkansas Department of Environmental Quality (ADEQ) comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0249, the facility is still placing waste in the same landfill which has 70 acres used for ash disposal out of a total permitted area of 335 acres. About 90 percent of the landfill has no liner, but rather in-situ clay. Half of the most recent cell was built with 18"-thick compacted clay with a maximum hydraulic conductivity of 1 x 10^{-5} cm/sec.

will require that the lateral expansion to the east of the existing landfill have a leachate collection system. The leachate is to be disposed of in the surge pond. The groundwater monitoring system established according to the Groundwater Monitoring System Certification comprises five up-gradient wells and three new down-gradient wells along the facility's eastern side.[27] There are reportedly 25 irrigation wells and three drinking water wells within a two-mile radius of the landfill. Several wells are immediately adjacent to the plant property; however, no offsite groundwater monitoring data is available.[28] The plant has a National Pollutant Discharge Elimination System (NPDES) Permit.[29]

The Independence Station is located on Quaternary alluvial deposits of the White River. About 15 to 30-feet thick, inter-bedded sand-silt, clay, and clay-silt overlie some 45-65 feet thick older alluvial and terrace deposits of coarse sand and gravel. The alluvial system rests upon the eroded surfaces of Paleozoic-age chert, limestone, sandstone lenses, and carbonaceous shale. These bedrock deposits outcrop further to the west, in the adjacent Ozark Plateau. The coarse alluvial deposits comprise the uppermost, laterally extensive regional aquifer. The top of the semi-confined to confined aquifer is typically at 18-26 feet below ground surface, fluctuating between 1.6-6.5 feet annually.[30] Groundwater flow is to the east to southeast, towards the Black River,[31] but groundwater flow direction will vary depending on recharge conditions and irrigation pumping. Groundwater quality varies from the baseline calcium-magnesium-bicarbonate type to calcium-magnesium-bicarbonate-sulfate and calcium-bicarbonate-sodium-chloride type, depending on potential off-site agricultural and on-site plant source areas.[32]

Impact and Damage Claims: EIP (2010a) indicates that onsite groundwater is contaminated with arsenic,[33] cadmium,[34] and lead,[35] occurring at levels greater than EPA Maximum Contaminant Levels

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[27] Entergy (2002). According to EPA-HQ-RCRA-2011-0392-0249, the monitoring system for the entire power plant site was installed and sampled from 1991 through 2008. Groundwater monitoring has been performed at eight wells around the landfill since 2002. The current permit requires semi-annual monitoring of 16 parameters (general water quality parameters plus strontium, boron, and arsenic). Samples from the most recent sampling events were also analyzed for chromium, molybdenum, mercury, and selenium in anticipation of future changes to the groundwater sampling plan in connection with the proposed permit modification. Statistical analysis is not currently run on chromium, molybdenum, mercury, and selenium.

[28] The Plant has two drinking water supply wells that the Arkansas Department of Health (ADH) tests on a regular basis. According to Entergy's comment to the October 2011 NODA (EPA-HQ-RCRA-2011-0392-0227), all ADH reports have stated, "the finished water quality is within the allowable limits of the primary drinking water standards."

[29] The NPDES Permit (AR0037451) focused on runoff from coal piles and various non-CCR waste streams including metal waste cleaning wastes, sanitary landfill, and cooling tower blowdown outfalls. Along with CCR, the surge pond and the recycle ponds handle various process wastewaters.

[30] Entergy (2004).

[31] The Black River discharges into the White River, 2.5 miles downstream from the power plant.

[32] Entergy (2002).

[33] Entergy counters (in its comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0227) that arsenic has only been detected above the current MCL in two of 379 samples (1991-present) that have been analyzed for arsenic. In September 1992, arsenic was detected in the samples from wells 409 and 410 (located near the recycle pond and cooling towers, respectively) at concentrations that were above the current 10 µg /L MCL but below the 50 µg/L MCL applicable at the time of sampling. Arsenic has not been detected above the MCL since September 1992.

[34] Entergy counters (in its comment to the 2011 NODA docket, ibid) that cadmium was detected in only one of 396 groundwater samples analyzed for cadmium (1991-1996). Cadmium was above the 0.005 mg/L MCL in the sample from well 410 (0.006 mg/L) in February 1993. Cadmium was not detected above the MCL in sampling events subsequent to February 1993.

[35] Entergy counters (in its comment to the 2011 NODA docket, ibid) that lead was detected at a concentration above its MCL in one of 396 samples that were analyzed (1991-1996). In September 1992, lead was above the current 15

(MCLs), and iron, manganese, pH, sulfate, and total dissolved solids (TDS), exceeding EPA secondary MCLs (SMCLs).[36,37] EIP (2010a) also notes that nearby farm irrigation systems draw groundwater from beneath the landfill and surge pond towards the eastern, northeastern, and southeastern property lines; and that a number of wells right on the plant property line have shown exceedances of SMCLs, noting that this would indicate an extremely likely offsite contamination.

According to EIP (2010a), AP&L attributed Statistically Significant Increases (SSIs) of TDS, sulfate, and strontium in one well (C-413) near the coal storage pad to *off-site* agricultural contamination. AP&L based this conclusion upon the well's location near the northern property line (north of the coal pile), on the interpretation of groundwater flow directions during winter and spring months as being towards plant production and drinking water wells, and a change in off-site crops from soybeans to rice in the spring of 1993. EIP (2010a) claims that AP&L's interpretation was flawed for the following reasons: (i) it failed to consider that well C-413 is down-gradient of the coal pile during summer months when off-site irrigation pumping is the greatest and thus pulling groundwater away from coal pile. (ii) Rice generally requires more water for irrigation; therefore, more pumping for rice should increase the rate of flow of contaminated water away from the Plant's property. (iii) Increased TDS, strontium, and sulfate are classic indicator parameters of CCR runoff at C-413, and are consistent with groundwater flow to the north from pumping. Finally, (iv) there are no off-site wells north of the property line to demonstrate that off-site degraded groundwater quality was caused by agricultural uses.[38]

µg/L MCL in the sample from well 410. There was no MCL for lead in 1992, but there was the copper-lead rule where a limit of 15 µg /L lead applied to public drinking water supplies (related to leaching of lead and copper in pipes). No lead was detected above the MCL in sampling events subsequent to September 1992. Consequently, site-wide monitoring for heavy metals ceased in 1997 with ADEQ concurrence because there were so few metal detections during the 1991-1996 monitoring period.

[36] Thirty-four monitoring wells have documented, since the 1990s, exceedances of federal MCL for arsenic (up to 6 times the MCL), cadmium (1.2 times the MCL), and lead (1.5 times the Federal Action Level), and SMCL exceedances for iron (131 times the SMCL), manganese (167 times the SMCL), total dissolved solids (TDS) (3.6 times the SMCL), and sulfate (4 times the SMCL). In addition, low pH levels (5.5 units) have been detected.

[37] Based on the 2002 to 2007 data: (i) Arsenic exceeded the MCL by more than six times in one well (including a September 2006 reading of 0.061 mg/L in 602S). The well is located in the coal pile area near the Plant's production wells. AP&L rejected that result and other metal results because of apparent high turbidity in the well. (ii) The highest reported TDS (910 mg/L in October 2003 in 603S), sulfate (455 mg/L in October 2005, in 603S), and the most frequent exceedances of SMCLs were associated with wells closest to the landfill (wells 511S, 603S, 604S, 605S, and 606S). (iii) TDS concentrations exceeded the SMCL for virtually every sampling event since October 2003 in wells 604S and 605S, located approximately 270 feet and 180 feet, respectively, from the eastern property line where drawdown from off-site irrigation occurs. (iv) A statistically significant increase (SSI) in chloride concentrations was reported in well 605S. (v) A SSI of manganese greater than the SMCL was reported in well 604S, which is located along the eastern property line.

Based on the 2007 to 2009 data, (i) Boron concentrations are the highest in the wells closest to the landfill and the surge pond. These include 0.319 mg/L at well 603S and 0.607 mg/L at well 511S. (ii) The highest reported TDS and sulfate concentrations occurred in wells 511S, 603S, 604S, and 605S, which surround the CCR landfill with maximum TDS of 820 mg/L and sulfate of 288 mg/L in well 603S in October 2007. (iii) TDS concentrations were greater than the SMCL at five wells. Two of them - wells 604S and 605S - are the down-gradient landfill wells adjacent to the eastern property line.

[38] Entergy counters (in its comment to the 2011 NODA, ibid) that (i) TDS and sulfate are also classic indicators of agricultural impacts from irrigation return water and sulfur-containing fertilizers used on rice and soybeans; and (ii) off-site agricultural impacts to groundwater along the northern property have been well documented. Irrigation water returns substantial volumes to groundwater especially where rice is concerned because rice requires more water for irrigation. High mineralization in irrigation return flow makes it a prime source of pollution of groundwater. Geochemical analysis of groundwater samples from the northern perimeter show a water type (having elevated levels of TDS, chloride, and sodium) that is very different from that observed beneath other parts of the Plant.

The 2002 landfill permit required wells to be sampled quarterly for two years to establish “baseline water quality conditions” and samples to be collected semi-annually thereafter. The permit required monitoring for 28 heavy metal and indicator parameters and statistical analyses of increases in concentrations as a basis for corrective actions. However, a 2007 groundwater monitoring report indicates that the in-depth monitoring required by the permit is not being performed: sampling only includes 17 parameters and, of those, only one, arsenic, is a heavy metal.[39] Five new wells, 602S through 606S, have been installed. Two of those, 604S and 605S, are along the eastern property boundary and down-gradient from the landfill. Contamination from these wells is moving east beyond the property boundary.

In a 2009 letter from Entergy to ADEQ to address ADEQ’s concerns that groundwater monitoring was insufficient at the ash landfill and other concerns about the lack of unaffected background or up-gradient wells, Entergy stated that it would not use pre-2002 groundwater data to determine background, pre-CCR disposal water quality, even though monitoring data from 1990 and onwards exists. Instead, AP&L suggested using recent groundwater data to establish statistical “background” levels.[40]

ADEQ states[41] that EIP’s (2010a) claims about MCL exceedances of arsenic, lead, and cadmium within five locations based on the early 1990s data and one – from 2006 data do not amount to SSIs because all six of these locations had only one or two samples that exceeded the MCL out of numerous samples taken; each of the locations had at least six samples where these constituents had been below detection level after the recorded exceedances. ADEQ claims that because high levels of arsenic, lead, and cadmium have not been seen in other monitoring locations, cadmium and lead were dropped as monitoring parameters in 2004. Recent groundwater monitoring results (May 2011 sampling) have no wells with primary MCL exceedances of the following sampled constituents: arsenic, chromium, mercury, and selenium. Of the eight wells around the landfill, the number of wells with water quality that exceeded SMCLs is: TDS – five wells; iron – two wells; and pH – two wells.

Within the 2007-2008 site-wide groundwater monitoring report, of the 35 wells sampled, five had exceeded 250 mg/L, the SMCL for sulfate (natural background wells have sulfate concentrations below 50 mg/L), with the highest values recorded in groundwater beneath the recycle and surge ponds, the coal yard, and in the area where underground water pipes have leaked in the past. Plant operations are considered a source of elevated TDS with 15 of the 35 wells having levels exceeding the SMCL for TDS (500 mg/L).

[39] Entergy counters (in its comment to the 2011 NODA, ibid) that the Class 3N landfill was issued a permit modification to the original October 1982 permit (No. 0220-S) on February 14, 2002. The modified permit formalized the landfill groundwater monitoring program that had been in existence since 1991. The permit required monitoring of 28 parameters and that Entergy submit a statistical approach for evaluating groundwater data that conformed to Regulation 22.1204(a)(1). The permit, as well as the cited Regulation also allowed modification of the list of analytical parameters with ADEQ’s approval. Thus, upon completion of two years of quarterly sampling to establish background groundwater quality for the 28 permit parameters, a Statistical Evaluation Plan was developed (on April 28, 2004) as required by the permit, and based on the data evaluation, the Plan proposed an alternate list of 16 analytical parameters, which ADEQ approved (May 18, 2004). In 2009, the list of analytical parameters was expanded to 21 in anticipation of an additional permit modification.
[40] In other words, the so called ‘baseline’ would be predicated on data collected years after CCR landfill operations began and during which time groundwater contamination has been documented.
[41] ADEQ’s comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0249.

Entergy claims[42] that: (i) contrary to the assertion in EIP (2010a) that other wells around the surge pond, various treatment ponds, and the plant are no longer sampled, Entergy has continued to voluntarily sample a smaller number (seven) of site-wide wells in addition to the ash landfill wells to monitor potential impacts on groundwater quality from these ponds. (ii) Site-wide monitoring for heavy metals ceased in 1997 with ADEQ's concurrence because there were so few metal detections during the 1991-1996 monitoring period; and (iii) EIP's (2010a) interpretation of groundwater flow and water quality data is based on a review of 1995 water level data and historical water quality data and ignores 15 years of subsequent data, which includes data from many more monitoring wells that were installed to improve interpretations of groundwater flow and quality.[43]

Evaluation against Proven Damage Criteria[44]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded EPA MCLs for arsenic, cadmium, and lead. • Onsite groundwater data exceeded EPA SMCLs for iron, manganese, pH, sulfate, and TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: EIP (2010a) claims that the ADEQ has not ordered any "assessment monitoring," taken any corrective action, undertaken any off-site monitoring, or required AP&L to undertake such monitoring despite evidence of groundwater contamination moving off-site and State regulatory requirements prohibiting off-site contamination. Moreover, AP&L has recently stopped voluntary monitoring of 26 plant-area and surge pond groundwater monitoring wells, many of which had documented contamination, without objection from ADEQ. Groundwater monitoring in eight wells around the landfill continues.

[42] Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0227.
[43] Entergy (2004) claims, for instance: (i) based on the May 2004 water level data, groundwater flow beneath the landfill is complex because it is influenced by river stage, mounding beneath the Surge Pond, and pumping of production wells. The data presented on potentiometric surface maps suggests there may be no true *up-gradient* wells at the landfill. (ii) SSIs were identified for iron and manganese at well 605S. Excess turbidity was measured in this well during the May 2004 sampling event, suggesting excess sediment in the well may account for elevated iron and manganese.
[44] ICF (2010a).

According to Entergy and ADEQ,[45] The 2007-08 site-wide well sampling report indicates that five of the 35 wells have exceeded sulfate and 15 - TDS. A number of wells right on the power plant's property line have shown exceedances of SMCLs (TDS, iron, and pH), but the May 2011 results show no exceedances for arsenic, chromium, mercury, and selenium. ADEQ has not undertaken any action to correct or investigate this contamination, because the State does not enforce SMCLs.

USWAG claims that this site does not qualify as a damage case.[46]

ICF (2010) Rationale: *Potential Damage.* < Groundwater exceedances of the primary EPA MCLs for arsenic, cadmium, and lead, and the SMCLs for iron, manganese, sulfate, pH, and TDS have been found onsite. There are no administrative rulings or court decisions associated with the site.>

References

EIP (2010a): In Harm's Way: Lack Of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-Nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #2, Environmental Integrity Project, Earthjustice and Sierra Club, August 26, 2010.
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http://www.epa-echo.gov/cgi-bin/npdespdf.cgi?filetype=P&npdes=AR0037451

[45] Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0227; and ADEQ response to stakeholders' concerns raised in the 2010 Dallas (Texas) CCR proposed rule public hearing, and followed up by EPA Region 6 (a September 2, 2011 email from R. Lawrence, ADEQ, to W. Kelley, EPA Region 6; forwarded to A. Livnat, EPA/OSWER, on October 31, 2011).

[46] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria."

PTb03. Montville Generating Station, NRG Energy[47]/Montville Power LLC, Montville,[48] New London County, Connecticut

Type: Impoundments, Ash Settling Ponds, Coal and Ash Storage Area.

Background and Description: Montville Generating Station is a power plant sitting on a 50-acre site. The Plant began service in 1919, operating as a coal plant until 1971 when it converted to oil.[49] During its 52 years of operation, coal ash and slurry were placed throughout the site including into a number of settling ponds and disposal lagoon. The ash disposal sites have all been inactive since the plant switched to oil. U.S EPA Resource Conservation and Recovery Act (RCRA) investigations at the site identified 14 Areas of Concern (AOCs), of which primarily the Coal Ash Settling Ponds and Disposal Lagoon (AOC 5) are related to coal ash contamination.[50]

The entire eastern portion of the facility is bordered by the Thames River, a few miles upstream from its discharge into the Long Island Sound. The main aquifer in the vicinity of Montville Generating Station is in about 40 feet of alluvium immediately under the Thames River. Bedrock lies at a depth of about 40 feet. The general direction of shallow groundwater flow is to the east and discharging to the Thames River. Groundwater elevations in monitoring wells close to the Thames River vary only by 0.5 feet within a few hours, indicating limited tidal influence. The Connecticut Department of Environmental Protection (CTDEP) estimates that there are over 300 private wells within 2-miles of the station. [51]

Impact and Damage Claims: Fly ash from the Montville Station was transported and dumped outside the station property in three separate sites (the Chesterfield-Oakdale, Moxley Hill, and Linda sites) in the Hunts Brook watershed in the Montville and Waterford communities from the mid-1960s until 1969. Contamination of the watershed by the fly ash (surface water with levels of iron, sulfate, and total dissolved solids – TDS - well above the SMCL downstream from the disposed coal ash) generated considerable environmental concern.[52] In the 1980s, Montville began groundwater monitoring, and, in

[47] On December 14, 2012, NRG Energy, Inc. and GenOn Energy, Inc. completed their merger, creating the largest power generator in the United States. NRG now has almost 100 generation assets with a total capacity of about 47,000 MW concentrated in three domestic regions: East, Gulf Coast and West. http://phx.corporate-ir.net/phoenix.zhtml?c=121544&p=irol-newsArticle_Print&ID=1767507&highlight=

[48] The Station is actually located in Uncassville, about four miles ESE from Montville and six miles north of New London, Connecticut.

[49] For the Station's post-coal fuels (oil, gas, and biomass), see http://www.nrgenergy.com/pdf/factsheets/factsheet_montville.pdf and Petition (2009).

[50] USEPA RCRA Corrective Action – Montville (2001); and USEPA RCRA Corrective Action – Montville (2000). In addition, AOCs 3, 6, 9, and 12 were also identified as areas associated with CCR disposal activities. Some AOCs on the site are primary related to non-CCR disposal, including fuel storage and other sources of contamination associated with the plants operation as an oil facility. This is probably the reason for USEPA having classified this case as "indeterminate" in its 2007 Damage Case Assessments report (Table 2, 'Hunts Brook Watershed', three sites).

[51] According to EIP (2010a), groundwater monitoring began in 1985 with an initial network of 12 wells (NRG and MV series). Sampling of these wells and additional wells installed in 1999 and 2000 identified arsenic above the MCL in the former coal ash lagoon area and arsenic, beryllium, cadmium, copper, nickel and zinc as constituents of concern in the former coal ash storage area.

[52] USEPA Report to Congress (1988), pp. 5-62 to 5-63.

1999, conducted soil and groundwater assessments after an Equalization Basin (EB2) [53] became regulated as a RCRA hazardous waste unit due to corrosivity, as well as occasional presence of chromium and lead.

CTDEP has designated groundwater in the western part of the station as GA/GAA[54] (currently classified as GA, or suitable for drinking water without treatment with a goal of improvement to GAA, which is intended for high volume public water supplies) while groundwater in the eastern part is designated as GB. EIP (2010a) notes that arsenic and beryllium concentrations exceeded the primary EPA Maximum Contaminant Level (MCL) at monitoring wells in both sections of the station.[55] EIP (2010a) also notes iron, manganese, and pH above their secondary EPA MCL (SMCL) in both sections.

In addition, soil sampling in former ash disposal areas in the western part of the Montville Station found multiple metals that exceed the Pollutant Mobility Criteria (PMC) for Class GA designated areas (groundwater designated for private and public supply without treatment) and arsenic and beryllium exceeding the residential and industrial/commercial Direct Exposure Criteria (DEC) for concentrations of these metals in soils.

EIP (2010a) mentions that because groundwater from the site discharges into the Thames River, comparison to CTDEP's Surface Water Protection Criteria (SWPC) is relevant. This comparison identified cadmium, copper, nickel, zinc, arsenic, and beryllium as exceeding the SWPC.

NRG claims[56]: (i) No significant increase in groundwater levels has been observed at the site for any Contaminant of Concern (CoC). (ii) Groundwater levels of CoC at the eastern/up gradient/GA portion of the site (i.e., closest to any potential private or municipal wells) are all below the CTDEP Groundwater Protection Criteria (GWPC, Connecticut's drinking water standards). (iii) All potential private and municipal wells are located hydraulically up-gradient of the site and are not impacted by the site, nor is there a reasonable threat of impact to the wells.

Evaluation against Proven Damage Criteria[57]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater*	• Onsite groundwater data exceeded the primary EPA MCLs for arsenic and beryllium.

[53] EB2 was constructed in 1978 in an area formerly used for coal ash storage waste waters. It was a single membrane-lined surface impoundment that impacted groundwater.
[54] Connecticut Water Quality Standard and Criteria (WQS) classifies surface water and groundwater based on existing water quality, anticipated water quality needs, and proximity to other nearby zones to protect water resources. Groundwater is classified from GAA, GA, GB, GC, through GD in decreasing expectation of groundwater quality. Most discharges are severely limited in GA and GAA classified areas. Classification GB groundwater requires treatment before consumption and allows some greater flexibility in discharge limits.
[55] In the northeastern part of the Montville Station, average concentrations (2007–2009 data) of arsenic in one groundwater monitoring well, NRG-MW-6, were more than 20 times the federal MCL. According to EIP (2010a), data indicate that concentrations of arsenic and beryllium have increased somewhat in the last ten years at this well, even though no new fly ash has been produced at the site in 40 years. See also EarthJustice comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-6314.
[56] NRG's comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0220.
[57] ICF (2010a).

at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns	• Onsite groundwater data exceeded SMCLs for iron, manganese, and pH. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• A partial Remedial Action Plan (RAP) was designed to achieve compliance and reduce potential ecological risk from two AOC's through excavation of soils that had arsenic, beryllium, and other metals contamination above the IC DEC. • Disposal of coal ash outside the station boundary and in the Hunt's Brook watershed was noted in the late 1960s, which significantly degraded the surface water with levels of iron, sulfate, and total dissolved solids (TDS) well above the SMCL downstream.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Other Considerations: Soils in the former coal ash settling pond and disposal lagoons marginally exceeded CT Industrial Direct Exposure Criteria guidance only for arsenic, which was determined to not cause a risk due to incomplete exposure pathways.

Resolution: According to EIP (2010a), soil and groundwater sampling related to Phase I and Phase II Environmental Site Assessments and subsequent investigations led to identification of multiple potential Areas of Concern (AOCs), including metals contamination attributable to coal ash disposal areas in various locations at the project site. This included the classification of groundwater under the western portion of the facility as GA/GAA and thus suitable for human consumption without treatment. An application to reclassify this groundwater as GB and thus suitable for industrial uses with more relaxed standards was made in 2000, but withdrawn based on the CTDEP's opinion that the level of contamination did not merit reclassification.[58]

In 2000, USEPA made a provisional determination that migration of contaminated groundwater at Montville Station was under control and that contaminated groundwater flowing into the Thames River was not having a significant impact on surface water quality.[59] The Thames River in the vicinity of the power station is saline, classified as unsuitable for shellfish harvesting, or as a fish/shellfish habitat. Furthermore, flow calculations indicate that, due to the high base flow in the Thames River, it is highly unlikely that groundwater contaminated in excess of SWPC would adversely impact the River.[60] However, no surface water monitoring data was available from points upstream and downstream of the Montville Station in order to evaluate this claim.[61]

[58] US EPA (2010).
[59] US EPA, ibid.
[60] USEPA RCRA Corrective Action – Montville (2000).
[61] EIP (2010a).

In 2001, both the CTDEP and USEPA made a final determination that current human exposure is under control.[62] One soil boring (MNV-63) in AOC 5 (at the former ash settling ponds) identified arsenic, beryllium, and lead at concentrations exceeding acceptable levels in soil for groundwater areas classified as GA/GAA.[63] Accordingly, the proposed partial remedial action plan is to excavate and remove soil in this area. According to EIP (2010a), the remedial goals of the proposed partial Remediation Action Plan (RAP) are to achieve compliance with GA PMC for metals and reduce potential ecological risk in both AOC5 and AOC9. According to USEPA,[64] the facility is working towards a RCRA Final Remedy. RCRA Closure/Post-Closure work continues on site. NRG has completed an Ecological Risk Assessment, which has been approved by both the USEPA and the CTDEP.

USWAG claims that this case does not qualify as a damage case.[65]

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of the primary EPA MCL for arsenic and beryllium and the SMCL for iron, manganese, and pH have been found on site with no indication of migration. Arsenic in soil potentially related to CCRs was determined to not cause a risk. There are no administrative rulings or court decisions associated with the site that found specific damage related to the CCRs.>

References

EIP (2010a): In Harm's Way: Lack Of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-Nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #3, Environmental Integrity Project, Earthjustice and Sierra Club, August 26, 2010.
http://www.environmentalintegrity.org/news_reports/08_26_10.php

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[62] US EPA, Waste Site Cleanup & Reuse in New England, ibid. Note that a positive "Current Human Exposure under Control" Environmental Indicator (EI) determination indicates that there are no "unacceptable" human exposures to "contamination" that can be reasonably expected under *current land- and groundwater-use conditions*. The EI reflects *near-term objectives that do not consider potential future land- and groundwater-use conditions or ecological receptors*. This long-term mission requires that Final remedies address these issues. The EI identified groundwater, surface soil (< 2 ft) and subsurface soil (> 2 ft) as "contaminated" above appropriately protective risk-based "levels" from releases subject to RCRA Corrective Action. Potential Human Receptors (under current conditions) were identified as workers, construction workers, and trespassers – for surface soil; and construction workers – for subsurface soil. However, "given the contaminant concentration and locations, along with current site use and site development, viable pathways do not appear to exist for human exposure to contaminants detected in various media on-site".

[63] The certification of clean closure of the former ash settling ponds in AOC 5 was approved by the CTDEP in 2001 (EPA-HQ-RCRA-2011-0392-0220).

[64] US EPA, Waste Site Cleanup & Reuse in New England, RCRA Corrective Action, Montville Station, August 23, 2010.

[65] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations: (1) do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria; and, (2) there is no evidence provided of any testing or scientific studies of surface waters (i.e., Thames River) to support any allegation of ecological damage. The power plant converted from coal to oil in 1971. CCRs have not been generated or disposed at the Site since 1971. The only regulatory enforcement action at this site was related to a former (now closed) RCRA hazardous waste impoundment that did not contain any CCRs. There was a USEPA determination that surface water quality is not significantly impacted by groundwater from the Site. In addition, the USEPA determined that human exposure via the groundwater pathway is not a concern."

ICF (2010a): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix C, Case #3. ICF, 10/2010.

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PTb04. Indian River Power Plant, NRG Energy (Formerly: Delmarva Power), Burton Island, Millsboro, Sussex County, Delaware

Type: Wet Disposal Area (Burton Island) and Landfills (Mainland).

Background and Description: Between 1957 and 1980, coal ash from the Indian River Power Plant (a four-generation unit, 784-MW facility)[66] was sluiced into the eastern two-thirds of the Burton Island

[66] Units 1 and 2 are 80 MW of capacity each and were placed in service in 1957 and 1959, respectively. Unit 3 is 155 MW of capacity and was placed in service in 1970, and Unit 4 is 410 MW of capacity and was placed in service in 1980. Units 1, 2 and 3 are fueled with eastern bituminous coal, while Unit 4 is fueled with low-sulfur compliance coal. Pursuant to a consent order (http://www.dnrec.delaware.gov/whs/awm/SiteCollectionDocuments/DNREC%20Portal/NRG%20Consent%20Decree.pdf) dated September 25, 2007, between NRG and the Delaware Department of Natural Resources and Environmental Control (DNREC), NRG agreed to mothball Unit 2 by May 1, 2010, and Unit 1 by May 1, 2011. In the absence of the appropriate control technology installed at this facility, the consent order bans Units 3 and 4 (totaling approximately 565 MW) from operating beyond December 31, 2011. On February 3, 2010, NRG together with DNREC announced a proposed plan to retire the 155 MW Unit 3 by December 31, 2013. The plan extends the operable period of the plant by two years beyond the December 31, 2011 date and avoids the incremental cost of control technology. The 410 MW Unit 4 is not affected by this proposal, and in 2009, the Company began

disposal area, which was originally a tidal marsh.[67] Burton Island is located approximately 3 miles east of Millsboro and 9 miles west of the Atlantic Ocean. It extends east from the Indian River Generating Station, and consists of a peninsula formed between the Indian River to the north and Island Creek to the south. Indian River Bay is a shallow estuarine system with freshwater inflow and a direct connection to the ocean through the Indian River Inlet, located within Delaware Seashore State Park. Both the Indian River and Island Creek are tidally influenced. However, much of the flow in Island Creek comes directly from the cooling water discharge of the generating station.

The unlined disposal area was surrounded by berms built using ash and dredge spoils. Approximately 144 acres were covered with coal ash to a 15-foot thickness before a new mainland landfill was built. This resulted in the conversion of tidal marshes and flats to upland, and the native vegetation has been largely supplanted by invasive plants.[68]

Phase I unlined landfill was built in 1980 on 17.6 acres of the mainland; at the end of its operation, in 2008, it attained a height of 100 feet.[69] The currently active, Phase II landfill disposal site (Permit Application approved September 4, 2008)[70] is underlain by the Pleistocene Columbia sand deposits, which range in thickness from less than 50 to over 125 feet in southern Delaware. They comprise moderately-well to poorly-sorted sand with minor amounts of silt and gravel. Both the ash and underlying coarse grained sediments of the Columbia aquifer form a single unconfined aquifer. The base of this aquifer is marked by Miocene Age green silty-clay. The top of the clay aquitard occurs below -75 ft AMSL in the vicinity of Burton Island. Ash occurs below the water table in some areas and is saturated. As the thickness of ash thins from west to east, so does the zone of saturated ash.[71]

Impact and Damage Claims: EIP (2010) indicates that contamination of groundwater, sediments, and surface water in the Indian River and Island Creek occurred by erosion of an inactive coal ash landfill on Burton Island. Data analysis of samples[72] identified a total of nine constituents of potential concern (COPC) for human and ecological impacts from the sediment contamination based on potential for bioaccumulation and on whether concentrations were above background levels. Levels of arsenic, chromium, and thallium in onsite groundwater exceeded their primary Maximum Contaminant Levels (MCLs). The report also notes that aluminum and iron were found in offsite surface water above Ambient

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construction to install selective catalytic reduction systems, scrubbers and fabric filters on this unit. These controls were scheduled to be operational at the end of 2011: WGMD News (2010) and http://www.sourcewatch.org/index.php/Indian_River_Power_Station

[67] Burton Island was owned by Delmarva Power and Light Company (DP&L), which used Burton Island to dispose of coal ash waste from DP&L's coal-fired Indian River Generating Station's (IRGS) between 1957 and 1979. During this period, DP&L deposited an estimated 200 million cubic yards of coal ash on the Island. In 1979 DP&L began disposing the coal ash into an on-site industrial landfill with state approval. DNREC was not created until 1970 and there was no authority to regulate solid waste until 1974.

[68] Burton Island Ash Disposal Area (2009).

[69] The Phase I coal ash landfill (Permit No. SW-07/01, issued January 24, 2007) is located approximately one-half mile southwest of the power station. The Phase I coal ash landfill facility includes a sedimentation basin for collecting surface water run-off from the landfill area and haul road used for transporting ash from the power station to the landfill

[70] The Phase II landfill lies immediately west of, and contiguous to, the Phase I landfill and will consist of two new cells: Cell 1 (12.7 acres) and Cell 2 (15.7 acres). The two cells are estimated to provide approximately 2 million cubic yards (CY) of disposal volume. Based on an estimated compacted density of 1.12 tons per CY, this volume could provide disposal for approximately 2.2 million tons of ash. The Phase II landfill began operations September 17, 2010: Delaware DENR (2008).

[71] Burton Island OU2 RI (2011) and references therein.

[72] Shaw Environmental (2008).

Water Quality Criteria (AWQC). Arsenic, aluminum, barium, and iron were also reported to exceed DNREC Uniform Risk-Based Standards (URS) in surface water and sediment samples. Average concentrations of arsenic exceeded the URS in all media (by a factor of 12.3 times in the soil/ash; by a factor of 9 to 900 times in groundwater; by a factor of 3.3 times in shoreline sediments; and somewhat above the URS in surface water samples).[73]

NRG Energy claims[74] that based on the 2008 Facility Evaluation (FE),[75] (i) elevated concentrations of multiple constituents in groundwater are not entirely related to the facility, because arsenic and chromium show values that exceed USEPA's MCL in groundwater in background monitoring well; aluminum, arsenic, barium, chromium, iron, manganese, and vanadium exceed DNREC's URS in groundwater in background well; and aluminum and iron are the two major components of soil/sediment. NRG attributes the presence of all these constituents at elevated concentrations in groundwater and the surface to re-suspension of soil and sediment during sampling.

Furthermore, NRG Energy claims that according to the Remedial Investigation (RI) for Operable Unit (OU) 2,[76] the site is surrounded by brackish water bodies, and it has been determined that there is no pathway for on-site groundwater to migrate to off-site residential wells or other drinking water sources. Thus, there is no potential for human health concerns off-site from groundwater. Based on the results of extensive multi-media sampling and risk assessment,[77] DNREC issued No Further Action remedy for off-site sediment and off-site surface water.[78]

The RI of OU2 also demonstrated: (i) no ecological hazard from exposure to sediment through food web interactions; and possible, but not probable potential for adverse effects on benthic invertebrates due to arsenic and barium in sediment; (ii) no ecological hazard from exposure to surface water through food web interactions; the likelihood of adverse effects from exposure to arsenic and barium in surface water is minimal; and that (iii) evaluation of the mass loading for arsenic to Island Creek and Indian River from Burton Island via stormwater runoff confirms that the contribution of landfill material to the surrounding surface waters has been significantly reduced by the shoreline stabilization project. This results in a condition of no significant risk from exposure to surface water and sediment due to potential overland flow contribution.

Finally, NRG energy claims that whereas arsenic is the only constituent in surface soil and sediment that poses potential health risk to human receptors (i.e., trespassing fishermen), under more realistic exposure parameters, the estimated carcinogenic risks and non-carcinogenic hazards associated with exposure to surface material at OU2 are less than the recommended risk/hazard levels specified by the U.S. Environmental Protection Agency (USEPA) and DNREC.

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[73] According to comments to the docket by Citizens for Cleaner Power (CCP): EPA-HQ-RCRA-2009-0640-0378 and EPA-HQ-RCRA-2009-0640-0358, the Burton Island disposal site has up to 1,470 µg/L of arsenic in groundwater, and the arsenic plume moves to the N/NE, towards Island Creek. Well 326C, located on the bank of Island Creek adjacent to the landfill (screened from 30' to 40'), first detected arsenic and selenium exceedances (14ppb and 56ppb, respectively) on April 13, 2009. Well 103B, located closely to the Phase I landfill (screened between 38' and 48') and Well 103C (screened between 22' and 32') have detected arsenic for a number of years, with maximum readings of 20- and 140ppb, respectively. Water sampled on the same date (October 21, 2009) also showed selenium values up to 67ppb and 71ppb, respectively.
[74] NRG's comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2009-0640-0220.
[75] Shaw Environmental (2008).
[76] Burton Island OU2 RI (2011).
[77] Shaw Environmental (2008).
[78] DNREC (2008).

Citizens for Cleaner Power (CCP) claims that Indian River arsenic data in fish and shellfish for 1998-08 exceed $1x10^{-5}$ human health risk estimate. The OU2 RI[79] shows that surface soil samples from OU2 exhibit concentrations of several metals (arsenic, barium, mercury, selenium, and thallium) that may have the potential to affect the site's ecosystem. The results of the terrestrial food web model showed that the calculated ecological hazard quotients (EHQs) for several of the feeding guilds were greater than one, indicating the potential for ecological hazard due to exposures to COPCs in surface soil at OU2. However, if food web models were utilized to assess ecological communities and populations instead of individuals, then the calculated hazards would be less than the *de minimus* hazard levels and no food web impacts to terrestrial populations would be expected.

Evaluation against Proven Damage Criteria[80]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic, chromium, and thallium. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Aluminum, arsenic, barium, and iron above DNREC URS in surface water samples. • Arsenic and barium were found above DNREC URS in shoreline and offshore sediment samples. • A risk assessment is ongoing to determine whether detected contaminants pose a potential risk to human health or the environment.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• Assessment and remediation performed under the DNREC Voluntary Cleanup Program (VCP).

Resolution: *Sediments, surface water and groundwater:* In 2005, after erosion of the ash was observed by DNREC, a voluntary cleanup program (VCP) was agreed upon between NRG Energy and DNREC. The site was divided into 3 Operable Units (OUs): OU 1 (shoreline, intertidal zone, vicinity); OU 2 (landfill, land areas, berms); OU 3 (subtidal sediments, waters seaward of berms). Upon review of the Facility Evaluation (FE) report, DNREC found that for OUs 1 and 3, the FE was sufficient to constitute an RI, allowing a saving of a major step in the remediation process and of at least a year's worth of

[79] Burton Island OU2 RI (2011).
[80] ICF (2010a).

erosion. An initial human health risk assessment estimated carcinogenic risk for adults to marginally exceed DNREC's regulatory guidance, and a screening level ecological risk assessment suggested that ecological risk to riparian and aquatic communities from OU1 and OU3 would no longer be a concern if landfill erosion is controlled.[81]

A Proposed Plan was issued calling for construction of the erosion controls as the remedy for OU1 and No Further Action (based on low human health risks) for OU3. Following a public hearing, and in spite of substantial controversy, a Secretary's Order was issued approving the Proposed Plan as written.[82] The Final Plan was signed on August 1, 2008, and the OU1 remediation was conducted during the winter and spring of 2008-2009.[83],DNERC concluded a Feasibility Study for OU2 in October 2012,[84] and on October 9, 2013, following a public hearing, approved the final plan of remedial action for OU2.[85]

In October 2008, DNREC approved the new, Phase II landfill (28-acres, 2 million cubic yards capacity) on the west flank of the Phase I landfill.[86] The landfill has a liner and leachate collection system. Phase II has been operational since 2010.

Fugitive Dust: A citizens' group estimated that the Phase I landfill mound loses 1.51 tons/year from wind erosion.[87] Current permits and state regulations are ineffective other than to record reported dusting complaints. Concerns that a cancer cluster downwind from the utility is related to emissions and fugitive dust were addressed by a DNREC Air Surveillance Branch short-term study. The study's results were consistent with strong regional source influence, and did not support a strong influence from local sources.[88]

The Delaware Division of Public Health (DPH) issued a report (July 17, 2007) on a cancer cluster investigation in the Indian River area.[89] While the study confirmed the existence of a statistical cancer

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[81] Shaw Environmental (2008).

[82] DNREC (2008).

[83] According to Burton Island Ash Disposal Area (2009), the work comprised regarding the steeper slopes, protecting the newly constructed slopes by a rip-rap layer, and protecting the exposed berms with erosion-control matting and seeding. The work was scheduled for completion by May, 2009.

[84] Shaw Environmental (2012). The study concluded that Alternative S-2, Targeted Soil Cover with Land Use Controls is the preferred remedial alternative for OU2. The Targeted Soil Cover with Land Use Controls alternative includes clearing discrete areas of vegetation, grading and placing approximately 12" thick soil cover over discrete areas of currently exposed ash material in soil and unstable slopes in OU2 (approximately 2.3 acres, see *Final Plan of Remedial Action*, Fig. 3, for targeted soil cover areas), performing perimeter patrols, maintaining 'no trespassing private property' signs, establishing a Uniform Environmental Covenant (UEC) to limit future land use, and long-term monitoring. (UEC is a standardized form of a land use restriction that is recorded on the deed and runs with the land. Provisions governing UECs are found in the Uniform Environmental Covenants Act, UECA).

[85] *Secretary's Order – Approval of Final Plan of Remedial Action for Burton Island Ash Disposal area (Operable Unit 2) near Millsboro, Sussex County* (http://www.dnrec.delaware.gov/dwhs/Info/Pages/NRGIndianRiver.aspx). The Order adopted the findings of the FS, and was immediately followed by *A Final Plan of Remedial Action* (October 10, 2013).

[86] In the public hearing leading to the approval, citizens expressed a strong opposition, contending that the new landfill is going to be located near a flood zone; within an ecologically sensitive area subject to the Coastal Zone Act; and only 3-4 feet above groundwater (rather than 5 feet, as required by the State's standard). http://www.thecoastalpoint.com/content/residents_say_no_nrg_permit_landfill (No longer accessible).

[87] Docket comment EPA-HQ-RCRA-2009-0640-0358.

[88] Delaware Air Quality Management (2008). The study was conducted between December 2, 2007and March 7, 2008 (26 scheduled sampling days, using portable battery-operated monitors), to determine PM2.5 concentrations in the Indian River area.

[89] http://www.dhss.delaware.gov/dhss/dph/dpc/files/irrpt071707.pdf

cluster, it did not identify any increased rate of unusual cancers or cancer incidence among young people. A subsequent study[90] established the probability of other risk factors as the morbidity cause.

Atmospheric dispersion modeling performed by the OU2 RI to estimate ambient particulate matter (PM) concentrations in the local area due to potential wind erosion from OU2 indicates that the National Ambient Air Quality Standards (NAAQS) are not exceeded under current conditions at OU2.[91]

ICF (2010) Rationale: *Potential damage.* <Groundwater exceedances of primary EPA MCLs have been found on site. While exceedances of AWQC and URS criteria have been documented in surface water and sediment, the risk assessment for OU 2 (landfill and berms) is still underway to determine if there is a potential risk from the detected contamination. A final remedial action plan was prepared and approved under the DNREC VCP, not under an administrative ruling or court decision.>

Postscript: The OU2 RI demonstrated human health and ecological risk associated with the sediments at the Burton Island. The level of risk is decreased once less conservative assumptions are deployed. However, in the absence of an actual ecologic and biotoxicity study, the applicability of the mitigated exposure assumptions cannot be reliably assessed.

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[90] Delaware Health and Social Services (2007), and Delaware Health and Social Services (2009).
[91] Burton Island OU2 RI (2011).

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PTb05. Big Bend Station, Tampa Electric Company (TECO), Apollo Beach, Hillsborough County, Florida

Type: Landfill and Surface Impoundments; Gypsum Storage Area.

Background and Description: The first generating unit of the 1,565 MW Big Bend Station was built in 1968[92] on two dredge-filled peninsulas on the eastern shore of Tampa Bay. The site contains several CCR disposal areas including one economizer fly ash pond and two bottom ash ponds, a wastewater recycling pond, a flue gas desulfurization (FGD) gypsum by-product pond, a bottom ash dry storage unit, and a waste disposal management unit.[93] With the exception of the FGD gypsum storage area, all CCR management units at the site presently have liner systems.[94] All of the units, including the FGD gypsum

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[92] This facility was permitted under an Industrial Wastewater Permit. In 1979, another unit was added and permitted under the Florida Power Plant Siting Act (PPSA). Site Certification PA 79-12 and Industrial Wastewater Permit No. FLA017047. According to TECO Energy, Big Bend Power Station's web site (http://www.tecoenergy.com/news/powerstation/bigbend/), the first unit began service in 1970; the second and third generating units were added in 1973 and 1976, respectively; and Unit Four was added in 1985. The Tampa Bay Seawater Desalination Plant, the largest Reverse Osmosis Desalination facility in the western hemisphere (95,000 m^3/day or 25 MGD), co-located at Tampa Electric's Big Bend station, was completed in 2002 (Hillsborough, 2002) and came online in March 2003. The intake and discharge of the desalination plant are connected directly to the cooling water discharge outfalls of the Tampa Electric Big Bend Power Station (Desalination: A National Perspective, 2008). The facility is designed to withdraw up to 44 MGD from power plant cooling water yielding up to 25 MGD of potable water along with about 19 MGD of concentrate discharged back into the cooling water conduits. The withdrawal is a small fraction of the 1.4 billion gallons of cooling water used by the power plant, and the concentrate is returned to Big Bend Power Station's cooling water stream where it is blended and typically diluted about 70:1 with cooling water before discharge. The salinity levels after dilution are approximately 1.0 to 1.5 percent higher than water in Tampa Bay, which is within normal seasonal fluctuations (Yates et al., 2011; De la Parte (2007).

[93] According to Tampa Electric Company (2009, Attachment 1), there are two bottom ash ponds (North and South, 5.7 and 6.0 acres, respectively; both commissioned in 1984 and expanded in 2001), three economizer ash ponds (North, South, both receiving fly ash/pyrite, and Long-Term Flyash, receiving de-minimis amounts of CCR; 5.5, 7.4, and 12.0 acres, respectively; all commissioned in 1984 and expanded in 2001), and three settling-recycle ponds (Settling Pond, North Recycle Pond and South Recycle Pond; 1.0, 2.6, and 8.6 acres, respectively; all receiving FGD/ash residuals; all commissioned in 2009). Liner was installed in the two bottom ash ponds in 2001; (originally installed before commissioning?) liner was repaired in the North and South economizer ponds in 2002. The three settling-recycle ponds have had liner installed from the outset. The South Economizer Pond has been closed and is no longer receiving CCR. See Dewberry and Davis (2011, Fig. 2.1b) for an air-photo of the waste Units, and Appendix A, Document 6 for the Site's layout. According to Dewberry and Davis (ibid), the North and South Bottom Ash Ponds were designed and operated to receive sluiced bottom ash from the plant. The water decanted from the ponds is recycled and pumped back into the plant. Periodically one of the ponds is taken offline, dewatered and all of the ash material is mechanically excavated for reuse.

The North and South Economizer Ponds were designed and operated to receive sluiced fly ash and pyrites for permanent disposal. The water decanted from the ponds is recycled and pumped back into the plant.

[94] According to Tampa Electric Co. (ibid), the two bottom ash ponds and the three economizer ponds are lined with compacted structural fill and 60 mil HDPE liners; and the three settling/recycle ponds – with compacted structural fill and a composite liner system. However, according to Dewberry and Davis (ibid, Appendix B, Documents 7-10), the two Bottom Ash Ponds and the South and North Economizer Ponds are lined with an 80 mil HDPE liner.

area, are zero discharge facilities. More than 90 percent of the FGD wastewater is recycled and less than 10 percent is treated and discharged through a permitted outfall.[95]

Bottom ash produced at Plant Big Bend is marketed to cement companies and fly ash is managed in partnership with Separation Technologies, Inc. The fly ash is pneumatically piped directly from the ash collection systems to a storage dome, treated, and stored in two silos. One of the silos receives the majority of the ash, which due to its high quality is marketed directly to the mixed concrete products industry. The second silo receives the remaining, higher carbon fraction, which is still valuable as cement feedstock or a solid fuel.

The majority of the FGD gypsum material generated at the plant is sold to National Gypsum as raw material for wallboard production. The slag from Units 1-3 is sluiced directly to settling bins from these units, then dewatered and shipped to the customer.

Inter-tidal canals that cross the Big Bend site are considered to be groundwater discharge boundaries where the shallow groundwater is discharged to the surface water of Tampa Bay.[96] The uppermost groundwater occurs in unconsolidated sediments consisting mostly of shell- and silty-sands. At the site, there is a combination of natural landforms and heterogeneous dredge fill units consisting of shell hash, sand, clayey-sand, sandy-clay, and clay. The plant is located just west (and down-gradient) of the westernmost boundary of significant phosphate mineralization in the underlying Pliocene Bone Valley Formation and/or the Miocene Hawthorn Group.[97]

Impact and Damage Claims: *Groundwater*: EarthJustice[98] and EIP (2010) indicate a number of instances of groundwater contamination including onsite (coal ash Disposal Area/DA-2) primary EPA Maximum Contaminant Level (MCL) exceedances of thallium and arsenic, as well as a thallium primary EPA MCL exceedance on a property offsite, which was subsequently purchased by TECO. The report also notes that manganese, sulfate, and chloride were found above EPA SMCLs at this same offsite location. A number of other constituents (chloride, sodium, gross alpha,[99] and TDS) were found in the groundwater Zone of Discharge (ZOD) above EPA SMCLs or Florida Department of Environmental Protection (FDEP) Groundwater Clean-up Target Levels (CTLs).

Surface water: Surface water samples collected in February 2000 from ditches on-site, from a CCR seepage location, from a process water pond, and from a recycled wastewater pond indicated exceedances of state surface water standards for iron and boron above guidance criteria[100] (FDEP, 2001).

[95] Cordiano (2011). The impoundment has been issued in 2005 a National Pollutant Discharge Elimination Program (NPDES) Permit No. FL0000817.
[96] EIP (2010) and references therein.
[97] Effects of Phosphate Mineralization (1977), Fig. 1; Altschuler et al., (1964).
[98] EPA-HQ-RCRA-2006-0796-0446. MCL exceedances of arsenic are at x11 the MCL, and of thallium - at x8 the MCL. SMCL exceedances in DA-2 include boron at over x700 the Florida guidance concentration, manganese at x240, sulfate at x128, aluminum at x25, molybdenum at above the state guidance concentration, chloride at x40, fluoride at x4, and TDS at x46. Contaminants measured in groundwater at the Gypsum Storage Area exceeded the following SMCLs: boron - almost x40, iron - by x66, manganese - by x11, sulfate - by x4, and TDS - by x5.
[99] The gross alpha values are possibly associated with leaching from the phosphate of the Bone Valley Formation and/or the Hawthorn Group.
[100] EIP (2010) and references therein.

The utilities responded[101] that EIP's (2010) allegations fail to account for Florida's regulatory code:[102] (i) All of the alleged exceedances were from temporary micro-wells directly within or adjacent to the waste units and within the Zone of Discharge (ZOD) authorized by Florida's regulations, within which numerical primary and secondary DWSs do not apply; (ii) Under Florida regulations, SMCLs are not applicable to existing industrial facilities discharging to groundwater in the state, and (iii) none of the contaminants in the gypsum storage Area is a primary DW constituent. FDEP supports the utility's arguments[103] about the exceedances being limited to the ZOD, where primary and secondary groundwater standards do not apply. FDEP also indicates that one former disposal unit that has caused stressed vegetation off-site was ordered closed by FDEP. The facility has been in compliance with the 2001 CO and is implementing appropriate changes as needed to their on-site management of CCRs. As to the cited exceedances of guidance concentrations for surface water at the site, these levels were detected in grab samples in a ditch adjacent to DA-2 which was later voluntarily capped and closed by TECO, eliminating the potential for any future impacts. Finally, no impacts to offsite drinking water or surface water resources have ever occurred. According to USWAG,[104] this case does not meet the criteria for a damage case.

Evaluation against Proven Damage Criteria[105]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic and thallium, and exceed FDEP Groundwater CTLs or EPA SMCLs for a number of other constituents. • No offsite groundwater data available
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Discharge from recycled wastewater pond reportedly exceeded unspecified effluent limits for TSS and flow.

101 EPA-HQ-RCRA-2006-0796-0460 and EPA-HQ-RCRA-2009-0640-10498. According to FCG, The exceedances noted in a 2007 EarthJustice report were detected during a contamination assessment, performed in 2001/2002 to determine the potential for offsite groundwater impacts, the findings of which were utilized in a 2003 FDEP report (*Preliminary Evaluation of Analytical Data on CCPs*).
102 Namely, Florida Statutes Chapter 403 and the groundwater protection standards provided in Chapter 62-520 Florida Administrative Code.
103 FDEP's comment to the proposed CCR docket: EPA-HQ-RCRA-2009-0640-6846, FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285, and Florida's feedback in response to EPA's Region 4 inquiry following stakeholders' complaints in the 2010 Louisville Public Hearing (a January 3, 2012 email from L. DiGaetano to A. Livnat, EPA/OSWER).
104 USWAG's comment to the 2011 NODA (EPA-HQ-RCRA-2011-0392-0211): "Because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. No data, studies, or specific damage has been documented to support allegations of off-site impact to surface water."
In addition, in their response to EIP (2010), USWAG claims that prominent intertidal canals' position across Big Bend Station limits potential discharge to human receptors; and claims of thallium offsite exceedance could not be verified. Claimed results from preliminary report could not be verified despite access to all site related groundwater data.
105 ICF (2010a).

	• Surface water samples reportedly exceeded unspecified state surface water standards or iron and boron.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• FDEP issued a Consent Order (OGC File No. 1275) in April 2001 because of identified contamination. The Consent Order required assessment and remedial measures but without explicit finding of specific damage. Under the Consent Order TECO developed a Remedial Action Plan and groundwater monitoring plan approved by FDEP January 2007.

Resolution: FDEP issued a Consent Order in April 2001 for repair/replacement of liner systems on waste management units. The CO required assessment and remedial measures but without explicit finding of specific damage. In January 2007, FDEP approved Remedial Action Plan that will result in lining of the Gypsum Management area, and a groundwater monitoring plan of about 45 monitoring wells.[106] TECO implemented changes in its CCR waste and dredge spoil disposal practices which allowed the company to close the unlined DA-2 Disposal Area in 2005, and has completed its permitted closure and capping. With the planned improvements to the gypsum management facilities, all of the impoundments and landfills at the plant will have been lined.[107] TECO is also implementing an extensive groundwater monitoring plan. According to the utility, previous monitoring in these wells has demonstrated improvements in onsite groundwater quality as a result of the Remedial Actions which have already been implemented.[108]

ICF (2010) Rationale: *Potential Damage.* <Onsite groundwater data exceeded primary EPA MCLs for arsenic and thallium. While discharge and surface water samples reportedly exceed effluent limits and state guidelines, respectively, there is no scientific study available that explicitly documents evidence of damage to human health or the environment. A Consent Order was issued for repair/replacement of the liner systems on the waste management units; however without an explicit finding of specific damage to human health or the environment.>

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[106] TECO's comment to the 2007 NODA docket: EPA-HQ-RCRA-2006-0796-0460.
[107] According to Cordiano (2011), the final project in this program is the Gypsum Storage Area and Conveyor Improvement Project, presently in the preliminary engineering stage. Construction is scheduled for 2013-2015 after approval of the permits.
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PTb06. CD McIntosh Jr. Power Plant, City of Lakeland, Lakeland, Polk County, Florida

Type: Landfills (One on top of a phosphate mine pit), Sludge Dewatering Area, and Process Wastewater Ponds.

Background and Description: The C.D. McIntosh Jr. Power Plant Unit 3 is a 365-MW, coal-fired electrical generating unit originally certified under the PPSA in 1978[109] and became operational in 1981.[110] The McIntosh plant occupies some 450 acres on the northeastern shore of Lake Parker, a well-populated lake often used for recreation purposes. The site contains two unlined Coal Combustion Residual (CCR) landfills, as well as a coal storage area, process wastewater ponds and an FGD

[109] According to FDEP's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-4846 as well as to FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285, the facility was certified under the PPSA in 1974.
[110] This unit is jointly owned by Lakeland Electric and the Orlando Utilities Commission (OUC); OUC has a 40 percent undivided interest in the unit. According to City of Lakeland Annual Report (2002), additional generating units at McIntosh Plant include two gas and oil-fired steam turbine generators (Units 1 and 2, with 204 MW capacity), and a combustion turbine and two diesel generators that provide 26 MW peaking capacity. As of 2002, petroleum coke was used for up to 20 percent of the fuel supply for generation Unit 3. According to Power (2012) and Lakeland Electric (2013), the Unit burns 600,000 tons of coal/year, blends of Central Appalachian (eastern Kentucky) and Illinois Basin (southwest Indiana) coals, hauled by rail line via CSX Transportation, and at times also imports coal from Columbia. Lakeland Electric (ibid) contains additional useful information on McIntosh Generating Unit No. 3 (See pages 2-6 to 2-7, Table 2-1, and Table 2-2b.)
As a supplement to coal, Unit 3 has been designed to burn shredded solid waste that contributes up to 10 percent of its total fuel requirement at full load. According to Sourcewatch (2012), in 2005, the City began selling much of the ash to the construction industry for use in concrete, with revenues growing to more than $1 million in fiscal year 2008. Then, the housing market collapsed, slashing those earnings in the following years: in fiscal year 2010, the city made only $60,347, even though it sold more coal ash than ever, due to falling demand and costs.

dewatering area.[111] A "marsh waste water treatment system" along the northwestern, western, and southwestern property line provides make up cooling water and has been used for unspecified CCR treatment.[112] The site has over 41 monitoring wells, however not all have available data because the Florida Department of Environmental Protection (FDEP) only requires some wells to be tested.[113] No offsite monitoring data is available. The plant has a National Pollutant Discharge Elimination System (NPDES) permit.[114]

The McIntosh/Lakeland Power Plant is located in Florida's Central-Highlands physiographic province, on the Miocene-age phosphoritic Bone Valley Member of the Peace River Formation. The Peace River Formation is underlain by the Miocene Arcadia Formation that comprises sandy, phosphatic, and clayey dolomite and limestone.[115] The southern landfill sedimentation pond and the de-watering and stacking area (for process wastewater dredged sludge) were built on top of an abandoned phosphate mine pit. This mine pit likely has some influence on groundwater flow under the site. Florida's surficial, unconfined aquifer coincides with the Peace River Formation, whereas Florida's semi-confined, "Intermediate Aquifer" is associated with the Arcadia Formation.[116]

Impact and Damage Claims: EIP (2010a) indicates that a 2001 FDEP Consent Order identified arsenic, lead, manganese, selenium, cadmium, vanadium, nitrate, and total dissolved solids (TDS) above the EPA Maximum Contaminant Level (MCL) and Secondary EPA MCL (SMCL) on the site.

EIP (2010a) also notes that groundwater monitoring in January 2010 found arsenic concentrations exceeding the MCL in fifteen wells monitoring three water-bearing zones of groundwater. The highest concentration for arsenic was 0.0165 mg/L (1.65 times the MCL)[117]. Exceedances of Secondary MCLs (SMCLs) for iron, manganese, pH, total dissolved solids, or sulfate have been measured in 32 of 36 wells monitoring the CCR landfill and a coal pile area.

The highest concentrations of sulfate, both exceeding the SMCL, in the January 2010 sampling event were found around the southern landfill in wells 28S and 29S (monitoring the shallow aquifer), at 1,274 mg/L and 485 mg/L, respectively; the sedimentation basin of the southern landfill in well 6I (monitoring

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[111] According to Clean Water Action (2012), *Coal Ash Disposal Table,* 'one pond has 2 liners', and '2 landfills have 2 liners.'

[112] According to City of Lakeland Annual Report (2002), this is part of the City of Lakeland Northside Waste Water Reclamation Facility: treated effluent from the facility is discharged to an effluent storage tank. Effluent held in the tank is reused as cooling make-up water by the McIntosh Power Plant that is located immediately south of the treatment facility. Excess effluent, exceeding the requirements at the power plant, is bypassed, for disposal, to the Lakeland wetlands system. This artificial wetland system occupies 1,600 acres of former phosphate clay settling areas. It uses a combination of biological and physical methods to remove pollutants from the treated effluent prior to its discharge to the Alafia River.

[113] Citing FDEP's Consent Order (2001), EIP (2010a) claims that as of November 2001, 21 shallow surficial aquifer wells, 11 intermediate (deep surficial aquifer) wells, and 9 deep aquifer wells existed around McIntosh Power Plant's two CCR landfills, coal pile area, and sludge de-watering area. Additional wells are near the process wastewater ponds and in a "marsh treatment area" along the western property boundary; however, monitoring results are not available for most of these wells because the FDEP does not require the McIntosh Power Plant to sample these wells.

[114] No. FL0026301; expired 2005, and FLR05A184.

[115] Campbell (1933).

[116] Campbell (1986).

[117] EIP (2010a) claims that that the McIntosh Power Plant used a very high detection limit for arsenic of 0.0113 mg/L, which is higher than the MCL standard of 0.010 mg/L. Therefore, it is impossible to tell from laboratory reports exactly how many wells were contaminated with arsenic at or just below the MCL.

the intermediate aquifer), at 770 mg/L; and near the property line by the northern landfill in well 23I, mentioned above. The highest concentrations of TDS, which were also greater than the SMCL (500 mg/L), were generally associated with wells that had the highest concentrations of sulfate. The SMCL for pH (6.5 – 8.5 units) was not achieved at 25 of the 36 wells sampled. Lowest values, ranging from 3.94 to 4.41 units, were found in wells monitoring the shallow and intermediate aquifers near the coal pile/sludge stack-out pile, the northern landfill area near the property line, and the southern landfill.

The shoreline of Lake Parker is densely populated with residences, and the Lake is used for recreational purposes. There are two private drinking water wells and 20 commercial and municipal wells that are located within a two-mile radius of the plant.[118]

Industry claims that the McIntosh/Lakeland Plant does not present an environmental or public health risk to area groundwater users, because contrary to EIP's (2010a) allegations, all private and public drinking water wells in the vicinity of the plant show no impacts from the power plant's activities and operations.[119]

Evaluation against Proven Damage Criteria[120]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCLs for arsenic, lead, cadmium, and selenium. • Onsite groundwater data exceeded secondary MCLs for iron, sulfate, TDS, manganese, and nitrate. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• FDEP issued a Consent Order in 2001 because of impacts to groundwater and required additional monitoring, though no offsite monitoring. The Consent Order included approximately $180,000 in civil penalties.

Resolution: FDEP issued a Consent Order in 2001 (including approximately $180,000 in civil penalties) because of impacts to groundwater and required additional monitoring. The CO did not require off-site monitoring and therefore none has been performed. FDEP also issued a Warning Letter on November 16, 2000 for failure to notify FDEP of parameter exceedances during quarterly groundwater monitoring, failure to submit required annual reports from 1990 to 1999, and for discharges of process wastewater to the storm water drainage system.

[118] EIP (2010a).
[119] EPA-HQ-RCRA-2009-0640-10498 (Attachment J).
[120] ICF (2010a).

Florida Electric Power Coordinating Group, Inc. (FCG) claims[121] that the McIntosh Plant should not be identified as a site which constitutes a proven damage case, because EIP's (2010a) allegations fail to account for Florida's regulatory code.[122] FCG claims that the power plant is in compliance with applicable FDEP groundwater regulatory standards and requirements: The December 7, 2001 FDEP Consent Order established that Lakeland would further investigate and analyze potential groundwater impacts associated with operations of the power plant, and that associated corrective actions would be required "if necessary." In response, Lakeland has completed considerable groundwater-related data gathering and analyses, determining that no primary or secondary or drinking water standards or groundwater clean-up target levels have been exceeded outside of an FDEP authorized Zone of Discharge (ZOD). Lastly, Lakeland has prepared and implemented a Best Management Plan (BMP), a permanent Waste Management Plan (WMP), and a modified groundwater Monitoring Plan (GWMP) for the power plant so as to ensure that present and future operations will be conducted with minimal impact to groundwater resources.

In its comment to the docket, FDEP concurs with the cited FCG arguments.[123] USWAG claims that this site does not qualify as a damage case.[124]

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of the primary EPA MCLs for arsenic, lead, cadmium, and selenium and the SMCLs for iron, sulfate, TDS, manganese, and nitrate have been found onsite. The FDEP issued a Consent Order because of groundwater impacts that required additional monitoring; however, there was no explicit finding of specific damage to human health or the environment.>

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ICF (2010a): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix C, Case #4. ICF, 10/2010.

[121] None of the data referenced for this alleged damage case satisfies EPA's criterion of an "exceedance[s] of a primary drinking water standard that [is] measured in groundwater at a sufficient distance from the waste management unit to indicate that hazardous constituents had migrated to the extent that they could cause human health concerns." Carl Eldred, Hopping Green & Sams - Attorneys and Counselors on behalf of Robert W. Klemans, Chair, Environmental Committee, Florida Electric Power Coordinating Group, Inc. (FCG): EPA-HQ-RCRA-2009-0640-10498.18 (Attachment J).

[122] Namely, Florida Statutes Chapter 403 and the groundwater protection standards provided in Chapter 62-520 Florida Administrative Code.

[123] FDEP's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-4846 and FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285.

[124] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "A 2001 FDEP Consent Order identified constituents on-site in exceedance of MCLs/SMCLs. The Consent Order required additional downgradient wells, additional off-site assessment activities, Interim Groundwater Monitoring Plan, Contamination Assessment Plan, Source Characterization Work Plan, and Civil Penalties. This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria."

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PTb07. Curtis H. Stanton Energy Center, Orlando Utility Commission (OUC),[125] Orlando, Orange County, Florida

Type: Landfill and Runoff Ponds.

Background and Description: The Curtis Stanton Energy Center site contains an active CCR landfill (in which coal ash is initially hardened with lime and bottom ash is dewatered),[126] three CCR and coal storage area runoff ponds, a recycled water pond, and a plant wastewater pond.[127] EIP (2010) indicates that all of these units are believed to be lined. The site is located near residential areas east of Orlando.

The Curtis Stanton Plant area sits on top of a surficial layer of Pleistocene sand, which is underlain by the highly-variable, Miocene–age Hawthorn Group. The Hawthorn Group consists of various combinations of sand, silt, clay, phosphate, and highly weathered limestone. The Hawthorn Group is underlain by Eocene-age limestone that comprises the highly karstic Floridan aquifer.[128]

Since 2003, the site has reportedly been non-compliant with Florida Department of Environmental Protection's (FDEP) groundwater and surface water monitoring criteria and operational requirements. The Orlando Utility Commission (OUC) has agreed to investigate the extent of groundwater contamination at the site; however no off-site groundwater or surface water monitoring has been required.

Impact and Damage Claims: EIP (2010) indicates that onsite groundwater monitoring data exceeded the EPA Maximum Contaminant Level (MCL) for gross alpha. On-site groundwater data also exceeded FDEP Groundwater Clean-up Target Levels (CTLs) for several constituents, including gross alpha, radium-226, aluminum, chloride, iron, manganese, sodium, sulfate, vanadium, total dissolved solids (TDS), and pH.[129]

EIP (2010) noted that onsite data from surface water discharges had five constituents above FDEP

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[125] Orlando Utilities Commission (chartered in 1923) is a municipally-owned public utility providing water and electric service to Orlando, Florida and portions of adjacent unincorporated areas of Orange County, as well as St. Cloud, Florida, in Osceola County. This facility was permitted under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403 Florida Statutes, Part II, in 1981.

[126] According to FDEP's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-06846 and FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285, for the 1981 PPSA permit, OUC conducted EP Tox testing to show that their process of adding lime sludge to the ash and then compacting it in their landfill was protective because of the pozzolanic, cement-like, nature of the ash.

[127] According to FDEP (2008), the power station is a 930 MW (nominal) facility consisting of two coal-fired Units - No. 1 and No. 2, and ancillary equipment. Unit 1 began operating in 1987 and Unit 2 - in 1996. According to Guidelines for Water Reuse (2004), the Curtis Stanton Plant is a zero-water discharge facility which receives about 10 million gallons of reclaimed water a day from an Orange County wastewater facility for cooling water. Rather than have the blow-down water return to the wastewater facility, which would have eventually increased the concentration of dissolved solids in the reclaimed water to a point where it could no longer be used as cooling water, the blow-down water is evaporated in brine concentrator and crystallizer units crystallized at the Curtis Stanton facility and disposed of at a landfill. See also:
http://www.ouc.com/en/news_and_information_ctr/about_ouc/stanton.aspx

[128] Kuhns et al., (2003).

[129] For reference, water quality measurements of Rock Springs, Wekima Springs, and Witherington Spring, located over 20 miles northwest of the Curtis Stanton Station and representing artesian conditions of the Floridan aquifer, show the following compositions (based on one or more, multi-year analysis of one or more springs per constituent): TDS: 130-140 mg/L, sulfate: 5.3-13 mg/L, chloride: 6.1-10 mg/L, strontium: 240 µg/L, iron: 30-70 µg/L, copper: 10 µg/L, and manganese: 10µg /L (Rosenau et al., 1977).

Surface Water CTLs, including aluminum, sodium, chloride, sulfate, and gross alpha. Overall, since 2003, there have been multiple substantive exceedances of groundwater and surface water clean-up target levels and secondary MCLs.[130]

Considering that the underlying Hawthorn Group contains economic phosphorite that is being mined in the adjacent Polk County, it is reasonable to assume that the acidic water effluents discharged by the facility end dissolving some of the carbonate and phosphate rocks, releasing uranium and its daughter radionuclides,[131] and causing elevated levels of gross alpha and Ra-226.[132]

EIP (2010) noted that FDEP inspections of the Curtis Stanton Energy Center since 2008 have revealed compliance problems such as: the CCR landfill was operating without a required permit, inadequate freeboard in ash ponds, unpermitted discharge of pollutants to a wetland, failure to collect stormwater samples, and water discharges of pH 4.0.

Resolution: EIP (2010) noted that FDEP inspections of the Curtis Stanton Energy Center since 2008 have revealed compliance problems such as: the CCR landfill was operating without a required permit, inadequate freeboard in ash ponds, unpermitted discharge of pollutants to a wetland, failure to collect stormwater samples, and water discharges of pH 4.0.

FDEP has reportedly required upgrades to the facility, additional monitoring of the landfill, and determination of waste type (Class I or Class III); however OUC has not fully addressed FDEP's requests. FDEP concedes that some contaminants have leached and impacted water quality near the landfill; however, the problem is completely contained on-site and there is no danger of any impacts to human health or potable drinking water wells. FDEP is working with the facility to assess the extent of this

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[130] Quarterly *groundwater* monitoring data from upper surficial aquifer wells show the following exceedances of FDEP Groundwater Clean-up Target Levels (citing maximum concentrations): aluminum: 67 mg/L (standard: 0.05 mg/L); chloride: 2,800 mg/L (standard: 250 mg/L); iron: 29 mg/L (standard: 0.3 mg/L); manganese: 0.3 mg/L (standard: 0.05 mg/L); sodium: 1,200 mg/L (standard: 160 mg/L); sulfate: 1,600 mg/L (standard:. 250 mg/L); total dissolved solids (TDS): 13,000 mg/L (standard: 500 mg/L); and gross alpha radiation: 65.4 pCi/L (standard: 15 pCi/L). Wells near the coal ash ponds have exceeded FDEP Clean-Up Target Levels for iron, aluminum, vanadium, TDS, sodium, chloride, gross alpha, and radium-226. Coal storage area wells have exceeded Clean-Up Target Levels for aluminum, iron, and pH (<3). Wells at the coal ash landfill's eastern area have exceeded FDEP clean-up target levels for aluminum, iron, manganese, TDS, chloride, sulfate, gross alpha, radium-226, and pH. *Surface water* discharges exceeded FDEP Freshwater Clean-up Target levels for aluminum: 40,000 µg/L (standard: 13 µg/L); sodium: 770 mg/L (standard: 160 mg/L); chloride: 3,200 mg/L (standard: 250 mg/L); sulfate: 750 mg/L (standard: 250 mg/L); and gross alpha: 27.9 pCi/L (standard: 15 pCi/L). In addition, secondary MCLs were exceeded for iron: 3.5 mg/L (standard: 0.3 mg/L); manganese: 0.086 mg/L (standard: 0.05 mg/L); TDS: 6,500 mg/L (standard: 500 mg/L); and pH: 4.06 (standard: 6 -9). Furthermore, inspections of Curtis Stanton Energy Center revealed compliance problems such as the un-permitted discharge of pollutants to a wetland and water discharges of pH 4.0.
A separate, additional data review by FDEP concluded that groundwater monitoring results since 1987 at four wells along the eastern side of the landfill (MW-11, 12, 13, and 15) were influenced by leachate from the coal ash landfill – as indicated by increases in beryllium, chloride, calcium, magnesium, sodium, sulfate, total dissolved solids (TDS), manganese, and vanadium. The FDEP concluded that the groundwater in those wells was characteristic of CCR.

[131] According to Osmond et al (1986) the median value for the uranium content of the Florida phosphates is from 100 to 200 ppm. Whereas in the tetravalent state uranium is quite immobile, in the hexavalent state, uranium is relatively mobile as the uranyl ion, UO_2^{+2}. Further complexation can occur depending on pH and the presence of other ions. The most stable uranyl carbonate complex in the pH range 4-10 is $UO_2(CO_3)_2^{-2}$

[132] Effects of Phosphate Mineralization (1977).

contamination and conduct corrective actions if necessary. FDEP states that it will also require bottom-liner systems for any future disposal units at their on-site landfill. [133]

Evaluation against Proven Damage Criteria[134]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for gross alpha radiation. • Onsite groundwater data exceeded FDEP Groundwater CTLs for several constituents. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Onsite surface water data exceeded FDEP Surface Water CTLs for aluminum, sodium, chloride, sulfate, and gross alpha.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• FDEP has reportedly required various operational and monitoring actions associated with compliance problem identified during inspections.

ICF (2010) rationale: *Potential Damage*. <Ground water exceedances of the primary EPA MCL for gross alpha have been found on site. While onsite surface water samples have exceeded FDEP Surface Water CTLs, there is no risk assessment or scientific study available that explicitly documents evidence of damage to human health or the environment. The status of enforcement activities is unclear, and there are no administrative rulings or court decisions associated with the site.>

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PTb08. Seminole Generating Station, Seminole Electric Cooperative Inc. (SECI), Palatka, Putnam County, Florida

Type: FGD Landfill and Runoff Ponds.

Background and Description: The Seminole Generating Station (SGS)[135] site contains an active, unlined flue gas desulfurization (FGD) landfill,[136] three lined process wastewater ponds, and two unlined storm water runoff ponds. The FGD sludge is dewatered and stabilized with lime and fly ash. Excess water from the FGD system is collected in the process wastewater ponds. The site is located within one-half mile of the St. Johns River. Deep and shallow aquifers are contaminated far above FDEP standards and secondary drinking water standards, and contaminated groundwater has affected on-site wetlands.

The SGS site is underlain by rock units ranging in age from Paleocene to Recent. Rocks of the Hawthorn Group, located some 30 to 200 feet below the unconsolidated, surficial deposits, are vulnerable to the development of karst phenomena such as sinkholes.[137] A shallow surficial aquifer of a fine to silty sand exists to a depth ranging from 23.5 to 48.5 feet below ground surface. A deeper surficial aquifer occurs underneath this shallow aquifer at an average depth of 43 feet BGS. Eleven groundwater monitoring wells were drilled in the shallow surficial aquifer, and six wells - in the deeper portion of the surficial water table aquifer.[138] As part of an Interim Remedial Action Plan approved by Florida Department of Environmental Protection (FDEP) in 2004, Seminole Electric Cooperative was required to construct a contaminated groundwater capture system and perform groundwater monitoring. The groundwater monitoring is ongoing since 2004 with results reported quarterly to FDEP.

Impact and Damage Claims: According to FDEP report[139] there are exceedances of primary and secondary drinking water and water quality standards in groundwater and surface water. *Groundwater* contamination at the SEP FGD landfill measured arsenic at x19 MCL and lead at over x10, boron at over x40 its guidance concentration, aluminum at over x20 SMCL, and sulfate at over x3 SMCL. Some of

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[135] The Seminole Generating Station (SGS) is located on 2,000 acres about six miles north of Palatka on U.S. Highway 17. This facility was permitted under the PPSA in 1978. Units and in-Service Dates: 715 MW (1984), 715 MW (1985). 11,600 tons of washed-coal (11,700 BTU/lb) are rail-delivered daily, primarily from mines in western Kentucky and southern Illinois. The Seminole Generating Station is permitted to burn up to 30 percent of its fuel as petroleum coke (petcoke). Actual amounts burned depend on the price and availability of petcoke, and plant conditions (http://www.seminole-electric.com/pdf/seminole_generating_station_1.pdf). On September 5, 2008, the FDEP issued final air construction Permit to install the 750 MW, coal and petcoke-fired Unit 3 adjacent to existing Units 1 and 2 (*FDEP Division of Air Resource Management (2009)*. However, in mid-December 2009, Seminole Electric Cooperative announced that it was canceling the 750 MW coal fired power plant project "because of regulatory and legal uncertainties over the future of coal".
Roughly 550,000 tons per year of synthetic gypsum from SGS' wet scrubber are delivered annually by conveyor to Lafarge's drywall manufacturing plant, opened in 2001 adjacent to SGS. Lafarge uses the synthetic gypsum to produce about 900 million square feet of wallboard each year (http://www.powermag.com/coal/Top-Plants-Seminole-Generating-Station-Palatka-Florida_2181_p2.html).

[136] According to FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285, the process water ponds and stormwater ponds in the landfill area are lined with a geomembrane liner to stop the leakage to groundwater. A liner has been installed over an expanded portion of the FGD landfill "and is expected to be put into operation soon."

[137] For description of the SGS site's geology and subsurface hydrology, see Seminole Electric Cooperative (2006), Vol. 1, Section 2, particularly pp. 2-15 to 2-18.

[138] EIP (2010).

[139] Cited in EarthJustice's comment to the 2007 NODA: EPA-HQ-RCRA-2006-0796-0446. Also, FDEP (2012).

these constituents (including chloride, sulfate, total dissolved solids - TDS, boron, and iron) were detected up to one mile from the FGD landfill at concentrations exceeding FDEP Groundwater CTLs.

Surface water data showed boron at over x1000 its guidance concentration. Surface water data also revealed exceedances for aluminum at x 4,100 the Class III fresh surface water Cleanup Target Levels (CTLs). In addition, there are SMCL exceedances in surface water for chlorine (over x30), sodium (over x3), sulfate (over x3) and TDS (over x8.5), and historical surface water data also exceeded s for boron and arsenic.

EIP (2010) identified instances of groundwater and surface water contamination on site. While the onsite data suggest that contamination may have migrated, data from offsite groundwater or surface monitoring locations are not available. The contamination dates at least to 1999, when a hydrogeological study and contaminant assessment charted the approximate extent of the contamination and identified the cause of groundwater impacts from within the FGD sludge disposal area.

In response to these allegations, Seminole Electric Cooperative stated, and FDEP seconded,[140] that EIP's (2010) allegations fail to account for Florida's regulatory code:[141]

(1) The groundwater data were all taken within the state-designated Zone of Discharge (ZOD); these standards do not apply within a ZOD under FDEP regulations and therefore would not qualify under EPA's test of proof as proven damage case; The landfill is monitored by a DEP approved groundwater monitoring system that is fully protective of the groundwater outside of the facility's designated ZOD.

(2) Similarly, surface water samples were taken from ditches adjacent to the FGD landfill, where surface water quality standards are not applicable because they are part of an NPDES Multi-Sector General Permit treatment system;

(3) All the data were generated in 1998 and do not reflect current water quality standards at the site;

(4) Because the Seminole Facility is an "existing installation" under FDEP regulations, the secondary standards do not apply at all.

(5) The Plant has collaborated with the FDEP in developing an interim Remedial Action Plan for the site, and the facility is in compliance with the Department's groundwater requirements.[142]

Seminole Electric Cooperative also challenges additional EIP (2010) allegations:[143] (i) Contrary to allegations in the report, the surficial groundwater aquifer was the only aquifer in which some parameters were detected above background levels. The "deep" aquifer referred to in EIP (2010) is actually a lower portion of the surficial aquifer which is not used as a drinking water source in the area. (ii) The surface water samples referenced in EIP (2010) were taken from an NPDES-regulated stormwater system and not from a Florida Class III surface water. Class III surface water criteria, therefore, are not applicable. Thus, there have been no exceedances of state surface water standards or criteria. Finally, (iii) the referenced

[140] FDEP's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2006-0796-0460 and FDEP's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0285. Also, Florida Electronic Power Coordinating Group, Inc. (FCG), EPA-HQ-RCRA-2009-0640-10498 and Seminole Electric Cooperative, Inc., EPA-HQ-RCRA-2009-0640-10497. These arguments were seconded by FDEP in its comment to the proposed Rule docket: EPA-HQ-RCRA-2009-0640-6846.

[141] Namely, Florida Statutes Chapter 403 and the groundwater protection standards provided in Chapter 62-520 Florida Administrative Code.

[142] The RAP requires the collection of groundwater from the surficial aquifer near the FGD landfill that is fed back into the power plant process.

[143] Comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-10497.

wetland impacts were limited to stressed vegetation located on Seminole property. Ongoing monitoring activities demonstrate that the on-site vegetation diversity and density is improving due to a number of remediation efforts.

Evaluation against Proven Damage Criteria[144]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic and lead. • Onsite groundwater data exceeded FDEP Groundwater CTLs for a number of constituents. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Surface water data exceed FDEP benchmarks boron, aluminum, and arsenic.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• A FDEP-required groundwater capture system was constructed in 2004 and remedial monitoring is ongoing.

Resolution: FDEP-required groundwater capture system was constructed in 2004, and remedial monitoring is ongoing.

FDEP indicates that some areas of past stressed vegetation in an on-site wetland near the FGD landfill appear to be recovering. Seminole claims that water quality has improved in and around the CCR landfill as a result of the lining of all landfill stormwater and process ponds from 1997 to 1999. A drain system was also installed on three sides of the landfill to collect all impacted groundwater beneath the landfill. The facility has implemented a DEP approved Interim Remedial Action Plan (IRAP) requiring the collection of groundwater from the surficial aquifer near the FGD landfill that is fed back into the power plant's process. In conjunction with this activity, Seminole continues to monitor groundwater in wetlands in and around the CCR landfill.

ICF (2010) Rationale: *Potential Damage*. < Ground water exceedances of the primary EPA MCL for arsenic and lead have been found on site near the landfill. While surface water samples have exceeded FDEP benchmarks for boron, aluminum, and arsenic, there is no risk assessment or scientific study available that explicitly documents evidence of damage to human health or the environment. Ongoing remedial action and monitoring is not being driven by an administrative ruling or court decision.>

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PTb09. Joliet Generating Station 9 – Lincoln Stone Quarry Landfill, Midwest Generation, Joliet, Will County, Illinois[145]

Type: 'Landfill' (Actually, a Slurried CCR Receptacle and a Settling Pond in a Former Quarry) and Two Surface Impoundments.

Background and Description: Midwest Generation (under parent company Edison International) operates the Joliet 9 and Joliet 29 generating stations,[146] which have been disposing of coal combustion residual (CCR) in the Lincoln Stone Quarry (LSQ) landfill since 1962. The quarry operates under a landfill permit;[147] however, the site also includes two below-grade surface impoundments for the slurry

[145] In March 2014, a federal bankruptcy court judge approved the sale of all assets and operating companies of Edison Mission Energy -- parent of Midwest Generation, to NRG Energy Inc.: http://www.chicagotribune.com/business/breaking/chi-midwest-generation-nrg-energy-20140311-story.html
[146] Both plants are located approximately 40 miles southwest of Chicago. Based on Midwest Generation's 2008 Annual report (http://www.sec.gov/Archives/edgar/data/1134016/000104746909002059/a2190917z10-k.htm), the operating units comprising the Joliet Station are referred to as Units 6, 7 and 8. Units 6, 7 and 8 came on line in 1959, 1965 and 1966, respectively. Joliet Unit 6 (also known as *Joliet Generating Station 9*) is a 290 MW coal-fired unit located southeast of and across the Des Plaines River from Joliet Units 7 and 8 (1601 South Patterson Rd., Joliet, IL 60436.) Joliet Units 7 and 8 (also known as *Joliet Generating Station 29)*, located on the right bank of the Des Plaines River, are coal-fired and have a (net) combined capacity of 1,036 MW (and a nameplate capacity of 1,326 MW). The Joliet Station burns Southern Powder River Basin coal which is shipped by rail from the North Antelope Rochelle and the Belle Ayr Mines in Gillette, Wyoming.
[147] Permit # IL0002216.

water used to move CCR from the generating stations to the landfill.[148] The landfill and surface impoundments are unlined and most of the site remains active. In 1996 the landfill became exempt from Illinois Class I Groundwater Protection standards and the Illinois Environmental Protection Agency (IEPA) applied relaxed standards (Applicable Groundwater Quality Standards, AGQSs) to a number of contaminants.[149] IEPA identified 94 private drinking water wells within one mile of the landfill.

The Joliet Station area is underlain by the Ordovician-age Maquoketa Shale Group. Unconformities separate the Maquoketa Shale Group from the underlying Galena Group and the overlying Silurian-age dolomites and younger rocks. The Maquoketa[150] consists of three formations (in ascending order): (i) the Scales Shale, a dominantly shale unit; (ii) the Fort Atkinson Limestone, a dolomite and/or limestone and shale; and (iii) the Brainard Shale, a dolomitic-shale. The Maquoketa Shale Group forms a principal Aquiclude. Where the Maquoketa directly underlies the Quaternary-age glacial deposits,[151] limited amounts of water are obtained from joints and fractures. In those areas of the Middle Fort Atkinson Limestone underlying Silurian and Quaternary deposits where dissolution has occurred, yields have somewhat increased. The Maquoketa Shale Group is overlain by several hundred-feet thick, Silurian-age dolomites. These dolomites comprise the main regional aquifer.[152] The Des Plaines River is a major area of discharge for the Silurian dolomite aquifer.

According to EIP (2010a), the area of the LSQ landfill has four main hydrogeologic units: (i) the upper unconsolidated glacial deposits; (ii) the upper weathered Silurian dolomite; (iii) the lower Silurian dolomite; and (iv) the Brainard Shale/Ft. Atkinson dolomite. The underlying Scales Formation is a regional aquitard. The monitoring well network for the LSQ landfill includes 11 shallow zone wells, nine deep zone wells, and one surface water discharge point (S501, main quarry leachate). As a result of groundwater flow shifts caused by quarrying activities to the southeast, three monitoring well clusters were added south of the LSQ landfill.

Natural groundwater flow beneath the LSQ landfill has historically been from south and east to the north and west, toward the Des Plaines River. EIP (2010a) notes studies undertaken by Midwest Generation's (MG's) consultants, according to which dewatering connected to expansion of mining activities at the Laraway Quarry, about 1,000 feet to the southeast of the LSQ, has created a flow component to the south and southeast, toward that quarry. This has resulted in the LSQ landfill losing its "inward" groundwater potentiometric gradient. A proposal by Brandon Road Properties (BRP) LLC, to dewater the inactive

[148] According to EIP (2010a), ash is sluiced into the Main Quarry, which occupies the southern area of the site, and slurry waters collect in a large pond in the north part of the Main Quarry (P1). The North Quarry, designated as the zone of attenuation, includes a settling pond and another pond in the southeast part of this area.
[149] In its comment to the proposed CCR rule docket (EPA-HQ-RCRA-2009-0640-8244) Midwest Generation claims that because Illinois' Parts 811 and 814 landfill regulations have general applicability and therefore, were not developed to address site-specific conditions that may exist at certain Illinois landfills, there is a provision in the Illinois Environmental Protection Act, Section 28.1 (415 ILCS 5/58.1, 1994) under which a landfill owner or operator may seek to "adjust" these regulatory standards to fit the different conditions at its landfill which were not considered as part of the adoption of the landfill regulations. When the required technical demonstration is successfully made, the Act authorizes the Illinois Pollution Control Board to grant an "adjusted standard" that takes site-specific conditions into account while still affording the same level of protection to public health and the environment as the landfill regulations. Therefore, Midwest Generation claims it is incorrect to refer to such adjusted standards as either "relaxed" or "reduced" standards, as does EIP (2010a).
[150] The Maquoketa Shale Group is normally about 200 feet thick in Illinois, with a maximum of 250 to 300 feet. However, in areas where its top has been affected by erosion, the thickness is variable, and frequently, much less.
[151] According to Figure 22 in Visocky et al., (1985), the thickness of the glacial deposits in the Plant's area is less than 200 feet.
[152] Visocky et al., (ibid).

Boyd Quarry immediately east of the LSQ landfill raised concerns that groundwater would also begin flowing east, to this quarry and northeast, toward a residential area.[153] This concern led IEPA to deny BRP's application for an NPDES permit.

Impact and Damage Claims: According to EIP (2011a) and Stant and Barkley (2011), CCR from Joliet 9 and Joliet 29 Stations has been placed in standing water in the bottom of the LSQ landfill for many years. IEPA has known of contamination of surrounding groundwater by coal ash since 1994. Since 1996, MG has been granted an adjusted standard allowing continued degradation of onsite groundwater. IEPA has approved applicable groundwater quality standards at levels exceeding Illinois Class I standards for boron, cadmium, and selenium by 5.9 times, 52 times, and 6.5 times, respectively. Similarly, the applicable groundwater quality standard IEPA approved at this site for molybdenum is more than 34 times above USEPA's long-term health advisory (LTHA) level.

EIP (2010a) also notes that MG undertook sampling of 18 private wells near the LSQ landfill. The only ash-related contaminant examined in the wells was boron, which was found up to five times above background concentrations in eight of the wells south of the landfill (the other wells were to the east or "up-gradient"). EIP (2010a) claims that this would indicate that other contamination from the LSQ landfill would likely affect these down-gradient wells. After the sampling, MG offered to either buy out the properties or drill new, deeper wells for these residences south of the LSQ landfill.

EIP (2010a) also identified a number of instances of groundwater contamination in the monitoring wells around the LSQ landfill, noting reports from 2007, 2008, and 2009. EIP (2010a) notes a total of 50 different exceedances of the IEPA AGQSs[154] at 10 different wells, eight of which are over 150 feet from the LSQ landfill. The AGQSs are generally at or above the Illinois Class I Groundwater standard, which often matches the EPA Maximum Contaminant Level (MCL). The contamination indicated includes arsenic (up to 0.1 mg/L), above the primary EPA MCL at two wells located to the southeast, as well as sulfate (up to 690 mg/L), total dissolved solids (TDS: up to 1,300 mg/L), and pH (up to 9.98), above secondary EPA MCLs (SMCLs) in various wells. There is also contamination of ammonia (up to 5.3 mg/L), above the AGQS, boron (up to 10 mg/L) above the AGQS and EPA Child Health Advisory, and molybdenum (up to 2.9 mg/L) above the AGQS and EPA Lifetime Health Advisory. Exceedances of selenium (up to 0.325 mg/L) and cadmium (up to 0.264 mg/L), above the corresponding primary EPA MCLs, were also noted in earlier reports at unknown groundwater monitoring locations. EPRI challenges this claim.[155]

EIP (2010a) also notes that the NPDES permit issued by IEPA for the LSQ landfill in 2000 identifies Outfall No. 5 as "quarry (ash pond) discharge." Still, this permit requires only testing for pH and total suspended solids.[156] The latest (August 2009) IEPA Inspection Report available at that time indicates that

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[153] MG contends in its comment to the docket (EPA-HQ-RCRA-2009-0640-8244) that MG was actually the party who brought these concerns to the attention of IEPA, BRP and to the community and proposed alternatives to prevent any such risk from occurring.
[154] Namely, the relaxed standards imposed by the IEPA in 1996.
[155] In its comment to the proposed CCR rule docket (EPA-HQ-RCRA-2009-0640-9765) EPRI claims that the calculated limits for cadmium and selenium (based on statistical analysis of background data) in EIP (2010a) appear to have been misinterpreted to represent maximum *observed* concentrations at the Joliet 9 site. However, these concentrations appear to actually be *calculated* Applicable Groundwater Quality Standards (AGQS) for the site.
[156] The current NPDES permit (IL0002216), for which the public notice ended on November 13, 2012, does require monitoring of a rather wide array of metals (As, Ba, Cd, Cr – hexavalent and total, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, and Zn), in addition to cyanide, fluoride, oil, and phenols (IEPA, 2011).

MG is in compliance with the permit.[157] MG concedes[158] that limited amounts of collected leachate discharge into the Des Plaines River: in accordance with the AGQS granted by the IPCB for the LSQ, MG claims it maintains a leachate management system that consists of gravity-fed water from the Main Quarry to the North Quarry that keeps the water level below the natural water table elevation. After settling, the water is gravity-fed to the North Quarry and is then discharged through Outfall 005 to the Des Plaines River. Out of 8.5 million gallons of "leachate" managed daily, this drainage system captures all but 101,400 gpd (1.2 percent) of the water volume leaving the site via groundwater flow. The water volume leaving the site through a groundwater route is allowed to flow directly to the Des Plaines River, because there is no discernible effect on water quality in the River.

MG concedes that the LSQ had been granted six waivers from Class I standards.[159] However, MG denies that a Notice of Violation (NOV) has been issued for non-compliance in the landfill;[160] and that MG's proposal to provide alternative wells to residences south of the LSQ landfill was due to detected groundwater exceedances. MG states that in 2006, it sampled 18 residential wells located immediately to the south and southeast of the LSQ landfill, establishing that these wells were *not* degraded. Boron was used merely as an *indicator parameter* in this sampling of residential wells to search for potential Quarry-related effects.[161] Furthermore, MG claims that it did not "buy out" any residents, but rather made an unconditional offer to provide new, deeper wells for these residents. Also, groundwater modeling done at that time did not show that any excursion of a groundwater standard would affect these residential wells in the future.[162]

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[157] However, according to EIP (2010a), based on that report, from January 2008 to May 2009, pH exceeded the AGQS (6.14 to 8.56) in 7 of the 17 sampling events (maximum pH of 8.8); and apparently separate sampling related to the Groundwater NOV found exceedances of the AGQSs for barium, copper, and nitrate at the No. 5 Outfall.
[158] EPA-HQ-RCRA-2009-0640-8244.
[159] MG's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-8244, states that the LSQ landfill was required to install a-26 groundwater monitoring well network, three of which are off-site. Eighteen of the 24 parameters monitored at the landfill have AGQS values that are equal to or stricter than the corresponding Illinois Class I Groundwater standards. *By inference, this suggests that the remaining six parameters monitored at the LSQ site have AGQS values that are less strict than the corresponding Illinois Class I groundwater standards.* See also a preceding footnote for further clarification about the legal circumstances under which IEPA grants AGQSs.
[160] MG's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-8244 and Edison Mission Energy's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0237. MG claims that a draft NOV, developed based on a hypothetical, modeled set of future conditions that never occurred and which were associated with the proposed dewatering of Boyd's Quarry east of the LQS, has been never finalized nor issued.
[161] MG implemented a boron and boron isotope sampling program for the noted 18 wells south of the facility. Boron was chosen as an indicator of potential Main Quarry water impacts due to its conservative nature in the environment, which means that of all the constituents that may be associated with an ash landfill, boron has the ability to move uninhibited through the groundwater system and thus, it is the parameter that is reasonably expected to be the first indication of off-site migration of groundwater. Water samples were collected from the residential wells for boron isotope analysis as well as a sample of Main Quarry leachate. Based on a comparison of the isotope ratios from the residential wells to that of the Main Quarry leachate, it was concluded that the boron detected within residential wells did not originate from the Quarry. All of the boron results were well below the AGQS for boron (5.9 mg/L) that applies to the LSQ landfill, as well as below the Illinois Class I Groundwater standard for boron.
[162] MG claims it has voluntarily and proactively initiated this residential well sampling program for residents to the south and southeast of the LSQ to both confirm that there was no impact to their wells from the landfill's operations and to address their concerns about potential future developments, by offering to replace their residential wells with wells that obtain water from the Silurian dolomite, a deeper formation that is hydraulically isolated from any potential shallow groundwater impacts. MG also claims that groundwater modeling performed for past and current conditions does not indicate any loss of gradient or migration of constituents to the east/northeast toward the Smiley neighborhood. Groundwater model runs were made under a *potential future scenario* if the former owners of Boyd's Quarry (a.k.a., Brandon Road Quarry) were allowed by IEPA to dewater their quarry for subsequent use as a

MG addresses EIP's (2010a) claims that in August 2009 IEPA issued an NOV for "failure to operate a leachate collection and management system that assures the protection of Class I Potable Resource Groundwater," and that the NOV identified 50 exceedances of groundwater standards in 10 wells, including high concentrations of arsenic, barium, boron, copper, and molybdenum by claiming[163] that evaluation of the 2007 arsenic, boron, and molybdenum data from the off-site wells G38S, G38D and G39S indicates that all values were below both the established AGQSs and Illinois Class I standards. MG concedes that groundwater monitoring *did confirm exceedances of the AGQS* at *on-site* locations G47S and G48S, along the southern side of the LSQ during and since 2007. These exceedances were associated with the LSQ as a result of dewatering operations some 1,000 feet southeast of the LSQ, moving groundwater from the Laraway Quarry to the south/southeast. This resulted in only a limited, temporary loss of inward gradient along the southern side of the LSQ landfill.

Evaluation against Proven Damage Criteria[164]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCLs for arsenic, selenium, and cadmium. • Onsite groundwater data exceeded the IEPA AGQSs for ammonium, boron, and molybdenum. • Onsite groundwater data exceeded EPA SMCLs for sulfate, TDS, and pH.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Boron was found elevated in some sampled private wells, prompting Midwestern Generation to offer to buy the properties or provide a new deeper drinking well. • AGQS exceedances were noted in the discharge at the plant's NPDES permitted outfall.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• IEPA issued a Notice of Violation (NOV) for "failure to operate a leachate collection and management system that assures the protection of Class I potable resource groundwater" citing a number of AGCS exceedances, including some at the NPDES permitted discharge.

construction debris landfill. This particular modeling suggested that there may be a loss of gradient to the east/northeast potentially resulting in migration of LSQ constituents in that direction. MG resolved this potential scenario by purchasing Boyd's Quarry. Finally, MG responds to EIP's (2010a) assertion that there are 94 wells used for drinking water within a one-mile radius of the LSQ landfill by stating that a 'windshield' survey of the area indicates that residential wells within a one-mile radius of the LSQ are located to the northeast and south/southeast of the facility; and that there are no residential wells located within a one-mile radius to the west or north of the LSQ, namely, in the down-gradient direction.

[163] MG's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-8244 and Edison Mission Energy's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0237.

[164] ICF (2010a).

Resolution: According to IEPA,[165] LSQ is a permitted Subpart C facility subject to the regulations of 35 IAC 814 Subpart C and referenced portions of the 35 IAC 811 regulations. Because the LSQ was a pre-existing facility with unique characteristics, the facility did not meet the design requirements intended for a 35 IAC 811 landfill. In order to be permitted under the solid waste program, the facility had to receive an adjusted standard from the Illinois Pollution Control Board (IPCB) for relief from specific regulations, specifically design requirements including the Applicable Groundwater Quality Standards (AGQS). The AGQS is a statistically derived value based on data sets that are unaffected by the facility. The site-specific data set represents ambient background, which often does not reflect any '620 Class' standards (e.g., ambient background may be naturally above or below the numbers listed under 35 IAC 620).

The IPCB granted an adjusted standard that included 35 IAC 620 Class II Groundwater standards for several parameters north of the facility, between the disposal area and the De Plaines River (actually, a designation of a Groundwater monitoring Zone, GMZ). The AGQS is applicable to the remaining wells at the facility. Subsequent to receiving the adjusted standard, the IEPA permitted the facility in 1999.

Subsequent pumping in the adjacent Laraway Quarry area changed groundwater flow direction in the shallow zone such that impacts (e.g., boron, molybdenum, and arsenic) have been seen in a limited area in the southeast corner of the facility: the impacts are off-site, extending less than a quarter mile beyond the permit's boundary. Because of the facility's design and location, the LSQ could not meet the groundwater standards for the 35 IAC 811 regulations.

On August 31, 2009, IEPA issued a NOV to MG for "failure to operate a leachate collection and management system that assures the protection of Class I potable resource groundwater". The NOV cited exceedances of AGQS between July 14 and August 31, 2009 at the site.[166] MG petitioned the IPCB for an extended GMZ, claiming that an inward gradient would be maintained at the site that would disallow contamination to escape the facility. The IEPA approved a corrective action of pumping wells for the southeastern LSQ area in 2009, along with additional groundwater assessment. MG implemented the corrective action in 2010; in 2011, the IEPA approved the assessment reports along with an interim GMZ for the southeast area of the facility, along with a proposal for additional, preventative, corrective action along the southern side of the LSQ. The corrective action has a two-fold purpose: to control the source (and reintroduce an inward gradient required by the IPCB) and to mitigate impacts in the south of the LSQ landfill. Currently, there are two approved GMZs encompassing the LSQ landfill and its immediate vicinity, and groundwater assessment and evaluation continues at the site.

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[165] IEPA (2011), and Richard P. Cobb, Deputy Manager, Division of Public Water Supplies, IEPA: IEPA's September 1, 2011 response to citizens' concerns raised in the 2010 Charlotte Public Hearing (a September 27, 2011 email from J. Gevrenov, EPA Region 5, to A. Livnat, EPA/OSWER).

[166] In the September 16, 2010 Chicago, IL public hearing in the wake of the proposed CCR rule (Comment to the docket TRANS-CHI-0167, Transcript pages 459-461), Jeff Stant of IEP stated that IEPA, in response to a FOIA request, had provided EIP with an NOV dated August 31, 2009, citing 50 violations of the groundwater standard at the site. EIP insist they have this NOV: http://www.epa.gov/osw/nonhaz/industrial/special/fossil/ccr-rule/ccr-hearing.htm. In its comment to the October 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0237), Edison Mission Energy challenges the veracity of EIP's (2010a) disclosure by citing Rick Cobb, IEPA Bureau of Water. EME claims that in an August 27, 2010 (?!) Herald News newspaper article, a draft NOV was posted "based on a hypothetical set of future conditions that never occurred. The hypothetical conditions were associated with the potential dewatering of Boyd's Quarry east of the Quarry. Because these conditions never occurred, the NOV was never finalized or issued."

According to MG,[167] The corrective action program reestablished the inward gradient at the southeastern boundary of the LSQ. A cone of depression has been established between the south perimeter wells G48S, G47S and G38S and the LSQ. Groundwater from the southeastern perimeter of the site is now being drawn back to the north, to the extraction well system. Water from the LSQ that would flow to the south is also being intercepted by the extraction system. The extracted water is being discharged back into the Main Quarry portion of the LSQ. The off-site groundwater investigation is in process and is expected to be completed shortly.

USWAG claims that this site does not qualify as a damage case.[168]

ICF (2010) Rationale:[169] *Potential Damage*. <Groundwater exceedances of the primary EPA MCLs for arsenic, selenium, and cadmium; the IEPA's AGQS for ammonium, boron, and molybdenum; and the EPA SMCLs for sulfate, TDS, and pH have been found onsite. Elevated boron was found in eight nearby private wells; however the concentrations did not exceed any health-based standards. AGQS exceedances were also noted in NPDES outfall discharge; however, there is no scientific study available that explicitly documents evidence of damage to human health or the environment from these effluent discharges. The IEPA has also issued a NOV to Midwestern Generation; however, this was for failure to correctly operate their leachate collection system, and does not indicate a finding of specific damage.>

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[167] EPA-HQ-RCRA-2009-0640-8244.

[168] USWAG comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "The Illinois Pollution Control Board (IPCB) issued an adjusted standard for the Landfill in 1996. The conditions of the adjusted standard include:

Maintenance of an inward hydraulic gradient at the landfill to prevent leachate migration; and, any statistically significant increase above the Applicable Groundwater Quality Standard (AGQS) that is attributable to the facility and which occurs at or beyond the zone of attenuation with 100 years after closure the last unit accepting waste will constitute a violation. There have been numerous modifications to the landfill operating permit since 1994. There are no other citations or information related to regulatory actions provided in the Reference Document concerning alleged off-site impacts to groundwater or surface water.

The allegations for off-site groundwater contamination above a health based standard are based on private party correspondence, including from a private attorney, alleging contamination of off-site drinking water wells. The owner/operator of the facility has contested the validity of these allegations, arguing in public testimony before EPA that the facility is not responsible for the alleged off-site ground water contamination of the identified drinking water wells [Midwest Generation, LLC. 2010. Comments of Midwest Generation, LLC at USEPA Public Hearings in Chicago, Illinois on the USEPA's: Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities; Proposed Rule (75 FR 35128, June 21, 2010). September 16, 2010]. Potential exceedances in off-site groundwater are being further investigated and addressed by the company in coordination with the Illinois EPA (Verbal communication, Midwest Generation (November 4, 2011.)

There is no evidence provided in the Reference Document [i.e., EIP (2010a)] concerning any on-site or off-site impacts to surface water. The allegations in the Reference Document concerning surface water impacts cite samples collected from effluent discharges from the No. 5 Outfall, which is regulated by an NPDES permit. Further confusing the issue, water quality sampling results from the NPDES regulated outfall are compared to the Evaluation of Alleged CCR Damage Cases in the October 2011 NODA, 76 Federal Register 63252 Applicable Groundwater Quality Standard's (AGQS's) for the facility, which are a site-specific groundwater standard for compliance wells within the zone of attenuation of a landfill based on Illinois EPA regulations."

[169] ICF's (2010a) writeup is based on telephone calls to three IEPA regulators: Bill Buscher - Bureau of Water; Dave Hardke - Regional Office; and Gwyneth Thompson - Bureau of Land, October 21, 2010 to October 25, 2010.

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PTb10. Marion Plant, Southern Illinois Power Cooperative, Marion, Williamson County, Illinois

***Type*:** Landfill and Surface Impoundments.

Background and Description: The 293 MW Southern Illinois Power Cooperative (SIPC)[170] has placed coal combustion residual (CCR) from the Marion Power Plant into seven ponds and a landfill on the plant's site since 1963.[171, 172] Only one of the seven ponds is lined. The approximately 1.1 million cubic yard landfill, located between two forks of the Saline Creek, is also unlined. The plant lies about eight miles south of Marion, in a rural area of Illinois.[173] Groundwater monitoring has been required in the vicinity of the landfill and ponds since 1994, and high concentrations of cadmium were first detected in

[170] According to Leonard Hopkins/SIPC (2011), Southern Illinois Power Cooperative is a small Generation & Transmission System, a not-for-profit corporation defined as a "Small Business" by the U.S. Small Business Administration. It serves approximately 250,000 people and businesses located in the southernmost twenty-two counties of Illinois. According to DCEO (2010), in 2009, close to 89% of the plant's fuel was derived from open-pit and underground Knight Hawk Coal Company's coal mines in Jackson and Perry Counties, Illinois. According to http://www.isgs.uiuc.edu/maps-data-pub/coal-maps.shtml and http://www.knighthawkcoal.com/index.html, the bituminous coal contains between 1.3% and 3.2% sulfur and its calorific values range between 11,000 and 11,800 BTU/lb.

[171] Major CCR types are coal fly ash, bottom ash, and (since the late 1970s) flue gas desulfurization (FGD) sludge. According to SIPC (2012) and Sourcewatch (2010), SIPC's Baseload capacity is provided by two coal-fired boilers. In 2003, SIPC replaced three aging small boilers (Units 1-3: 1963 vintage, 33 MW each) with one 120 MW circulating fluidized bed boiler. Capable of burning a variety of fuels, it is currently fueled with locally available mine waste. The second unit (originally, Unit 4) comprises a 173 MW coal-fired unit, which came online in 1978. This unit has been equipped from the outset with a wet scrubber, and since 2003, also with a selective catalytic reduction technology.

[172] According to Marion Plant's Response to EPA's Information Request (2011), there are actually 11 discrete, active surface impoundments, with a total capacity of 411 acre-feet: seven were commissioned in 1976, one – in 1988, one- in 1992, and three – in 1996. They range from the large South Fly Ash Dam and Pond S-1 (103 acre-feet and 71 acre-feet, respectively), to the small Pond S-6 and Pond 1 (16 acre-feet and 9 acre-feet, respectively). Most ponds are designated for the disposal of fly ash and/or flue gas emission control residuals, whereas Ponds 1 and 2 are designated for the storage of bottom ash/boiler slag, ultimately removed for beneficial use.

Kleinfelder (2013) inspected the bottom ash Ponds 1, 2, and 4, claiming that (i) all were commissioned in 1963, (ii) the presence of a liner is 'unknown', (iii) their pool areas are 1.75 acre, 2 acre, and 4.2 acre, respectively, and (iv) their storage capacities are (in acre-feet) 9, 15, and 55, respectively. Bottom ash Ponds 1 and 2 act as a primary settling basin for bottom ash prior to the water being transferred into Pond 4, which acts as a final clarification pond, and then being released into Little Saline Creek. Currently the bottom ash residual produced at the facility is removed from Ponds 1 and 2, and then sold to various organizations for beneficial use such as roof shingle sand.

Kleinfelder (ibid) did not asses the following ponds: South Fly Ash Pond, Fly Ash Disposal Pond B-3, Pond A-1, Pond S-1, Pond 3A, Pond 3, Pond S-6, Pond S-2, and Pond S-3. For locations of all ponds, see Figure 2 in Kleinfelder (2013).

[173] SIPC created the Lake of Egypt in 1962, by damming the South fork of the Saline River, a tributary of the Ohio River, to supply cooling water for the Marion electric power plant. Located six miles south of Marion, Illinois, it covers 2,300 acres with 90 miles of shoreline. The lake is used extensively for recreational purposes (http://www.sipower.org/p/map.pdf). The spillway elevation of the dam for Lake of Egypt located just east of the Marion plant is 500 feet.

1997; however, no offsite monitoring data is available. SIPC also disposes of some CCR offsite.[174] The plant has a National Pollutant Discharge Elimination System (NPDES) permit.[175]

The Marion area is situated near the southern margin of the Illinois Basin, where bedrock strata dip north at less than one-degree.[176, 177] Most of SIPC's ash ponds are located in upland positions a little above or below 500 feet asl. The CCR landfill is located at an elevation of about 460 feet in the floodplain between the confluence of Saline Creek and South Fork Saline Creek. The uplands that confine the floodplain are mantled by rather thin glacial Quaternary deposits, mainly glacial drift and wind-blown silt (loess).[178] These surficial deposits overlie the Pennsylvanian-age Tradewater Formation,[179] comprising primarily sandstone. In the southern two-thirds of Illinois, thin sandstone and limestone beds of Pennsylvanian age and sandstone and limestone formations of Mississippian age yield small quantities of groundwater. Although wells in these rocks commonly yield less than 25 gpm, they are the only source of water for many domestic and small municipal and industrial supplies.[180] According to Gibb (1973), the groundwater yield potential of shallow bedrock formations in Williamson County is estimated to be less than 5 gpm.

Impact and Damage Claims: EIP (2010a) indicates that groundwater monitoring (which only looked for boron cadmium, iron, and sulfate) showed multiple instances of onsite contamination. The 2004 to 2009 average concentrations of cadmium were found above the Illinois Class I Groundwater Standard (0.005 mg/L)[181] in six of eight monitoring wells, with maximum concentrations up to between 10-18 times the federal MCL. The two wells with the highest average concentrations of cadmium (3-4 times the MCL) are adjacent to Saline Creek and discharging into it.

EIP (2010a) also notes that iron exceeded the secondary EPA MCLs (SMCLs) and the Illinois Class I Groundwater Standard in most sampling events. Some relatively higher concentrations of iron were

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[174] According to Barbara L. McKasson's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-11555 ((Louisville, KY, Public Hearing), the offsite locations include: (i) an abandoned strip mine north of the Williamson County Regional Airport, which lacks a monitoring well, liner and state regulation or monitoring. (ii) Near Lake of Egypt, SIPC is dumping CCR into a small lake it drained. "A farmer said that when it rains, water drains off of that lake onto his adjacent field where he grazes cattle."

[175] Permit No. IL0004316.

[176] Jacobson et al., (1991); Nelson (2007).

[177] Follmer and Nelson (2010).

[178] According to USDA (2009), the glacial drift, which is about 150,000 years old, is thin, and the topography is generally controlled by the underlying bedrock of Pennsylvanian age. According to Follmer and Nelson (2010), the Glasford Till, comprising two facies: (i) silty clay loam diamicton (sediment that consists of a wide range of non-sorted to poorly sorted terrigenous sediment, i.e. sand or pebbles that are suspended in a mud matrix) that varies from pebbly, silty clay to silt loam diamicton; very few pebbles in places; fabric is compact and uniform. Underlies most of the gently rolling hills of the county; variable thickness ranging from a veneer of a few feet to over 100 feet thick in buried valleys; (ii) ablation (the erosive processes by which a glacier is reduced) deposits; water transported and glacial debris-flow deposits with soft-sediment deformation features; likely contains gravel at the base and overlies dense basal till where glacial deposits are thick; largely restricted to discontinuous terrace levels (localized level areas) across the uplands at elevations from 420 up to 550 feet; formed on the Illinoian glacier after stagnation; temporary ice-walled lakes accumulated sediments that formed terraces now buried by loess. According to USDA (2009), the thickness of the loess on stable summits in Williamson County ranges from 4 to 5 feet to just over 12 feet.

[179] According to Nelson and Weibel (1996), The Tradewater consists of lithic arenite inter-bedded with shale, siltstone, and thin coal. Maximum thickness of the Tradewater is about 300 feet; its top is eroded.

[180] Visocky et al., (1983).

[181] This standard is equivalent to the Federal Maximum Contaminant Level (MCL).

recently found in two of the wells, which the SIPC attributes to rusting well covers. EIP (2010a) also notes that sulfate occasionally exceeded the EPA SMCL and boron occasional exceeded the Illinois Class I Groundwater Standard (2.0 mg/L) since monitoring began. There are three wells within a one-mile radius of the CCR disposal areas, but their exact locations – including how many wells are down-gradient of the site, are unknown.

According to the Illinois Environmental Protection Agency (IEPA),[182] The Agency has groundwater monitoring well sampling data from eight sampling events ranging from January 2007 to November 2008 that indicate elevated cadmium and iron concentrations. SIPC renovated (repaired and cleaned out) their monitoring wells in 2010 and replaced two monitoring wells. Groundwater sampling reports at their monitoring wells from five sampling events ranging from June 2010 through June 2011 confirmed elevated levels of boron and iron with one detection of cadmium that has not been confirmed since well renovation. Elevated iron may also be due to a nearby coal mined area.

EIP (2010a) notes that the wells with the most significant contamination are those which lie between the CCR sites and Saline Creek, to which the shallow groundwater discharges.[183] It also notes that effluent samples from one ash pond which has an NPDES permitted discharge into the creek indicated aluminum over the EPA Ambient Water Quality Criteria (AWQC), as well as boron over the EPA's criteria for sensitive crop irrigation.[184] According to IEPA,[185] aluminum has no water quality standard or derived water quality criterion in Illinois. Many states do not have an aluminum standard because only dissolved aluminum is a concern for aquatic life and dissolved aluminum does not occur at levels of concern unless a very low pH is present.

According to IEPA,[186] a query run for the last five years of discharge data does not indicate any discharge limit exceedances of aluminum or boron in the surface water. During the same time period, there were five exceedances of TDS, one exceedance of iron, one exceedance of copper, and two exceedances of oil and grease.

Evaluation against Proven Damage Criteria[187]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have*	• Onsite groundwater data exceeded the primary EPA MCL for cadmium. • Onsite groundwater data exceeded the EPA SMCLs for iron and sulfate, and the Illinois Class I Groundwater Standard for iron and boron. • No offsite groundwater data are available.

[182] Feedback from Richard P. Cobb, Deputy Manager, Division of Public Water Supplies, IEPA, on September 1, 2011, in response to EPA's Region 5 follow up on citizen concerns raised in the 2010 Louisville and Charlotte CCR proposed rule Public Hearings (forwarded on September 27, 2011 by J. Gevrenov, EPA R5, to A. Livnat, EPA/OSWER)
[183] EIP (2010a) concedes that there does not appear to be any sampling to determine actual impacts of the discharges on Saline Creek.
[184] According to EIP (2010a), USEPA's boron surface-water criteria for the protection of sensitive crops by long-term irrigation is 0.75 mg/L.
[185] Feedback from Richard P. Cobb, ibid.
[186] Feedback from Richard P. Cobb, ibid.
[187] ICF (2010a).

migrated to the extent that they could cause human health concerns	
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Effluent samples from a pond which discharges to the Saline Creek indicated aluminum over the EPA AWQC and boron over the EPA's criteria for sensitive crop irrigation.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Other Considerations: While EPA AWQCs were exceeded in the effluent, there is no indication of NPDES criteria exceedance.

Resolution: Based on findings of elevated boron, cadmium and iron above Illinois Class I Groundwater Standards, IEPA asked SIPC to submit a "hydrogeologic assessment plan" to determine the source and extent of elevated iron and cadmium contamination at the site. IEPA approved a plan that includes measures to refurbish seven existing wells and replace two groundwater monitoring wells that have been out of service, but the plan does not require groundwater monitoring for parameters other than boron, cadmium, iron and sulfates.

SIPC surface water concerns are given in the PRN document as boron and aluminum. SIPC obtained a boron-adjusted water quality standard in the 1990s from the Illinois Pollution Control Board (IPCB) for a long segment of the receiving stream. Still, SIPC apparently does not meet the boron permit limits dictated by the adjusted standard every month. The new boron WQS does not remove concerns at this site because the 'relief' is set at a higher concentration than the new chronic WQS. SIPC participated in the current rulemaking and it is yet to be determined what if anything the IPCB will do with the existing adjusted standard. In 2009 (?), IEPA approved a plan that includes measures to refurbish seven existing wells and replace two groundwater monitoring wells that have been out of service, but the plan does not require groundwater monitoring for parameters other than boron, cadmium, iron, and sulfates.[188]

According to IEPA,[189] SIPC's impoundments straddle areas ranging between Low to Moderately High Potential for Aquifer Recharge, and further assessment of groundwater impacts is underway.

USWAG claims that this site does not qualify as a damage case.[190]

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[188] EIP (2010a), citing a 2010 IEPA letter.
[189] IEPA's Ash Impoundments Strategy Progress Report (October 2011).
[190] USWAG comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "Illinois EPA requested the site owner to prepare a hydrogeologic assessment plan to determine the source and extent of elevated manganese and cadmium concentrations at the site. There are no other citations or information related to regulatory actions provided in the Reference Document (EIP 2010a) concerning alleged off-site impacts to groundwater or surface water.
This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The allegation in the reference claims that there are off-site groundwater exceedances, but there is no off-site groundwater quality data provided. The monitoring well referenced as being located off-site is within the property boundary of the Site.
In addition, this case does not meet the criteria for a damage case to surface water because there are no surface water sample data provided from Saline Creek. Water samples were collected from an outfall effluent sample from the ash

ICF (2010) Rationale:[191] *Potential Damage.* <Groundwater exceedances of the primary EPA MCL for cadmium and the SMCL for iron and sulfate have been found onsite. While there were exceedances in the effluent which discharges into surface water, there is no study with a specific finding of damage to human health or the environment. There are no administrative rulings or court decisions associated with the site.>

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ponds, which is regulated by an NPDES Permit and have no bearing on actual surface water quality in Saline Creek."

[191] Based on a telephone Conversation with Bill Buscher, Illinois Environmental Protection Agency, Bureau of Water, October 21, 2010.

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PTb11. Venice Power Station, Union Electric Company/Ameren Energy – AmerenUE, Venice, St. Clair and Madison Counties, Illinois[192]

Type: Surface Impoundments.

Background and Description: The Venice Power Plant was a 500-MW coal burning plant from its inception in 1942 until it converted to burning oil in the late 1970s. The plant, located on the east bank of the Mississippi River, lowered capacity in the 1980s but was reconditioned and reopened in 1995. Its current operator, AmerenUE, was formed in 1998 by the merger of Union Electric and Illinois Public Service. Three additional generating units came online in 2005 and are used sporadically as a peak load facility. A series of three unlined ash ponds was constructed in the 1950s and received sluiced coal combustion residual (CCR) from the plant as well as wastewater from the boilers and water treatment plant.[193] The ponds stopped receiving CCR in 1977 when the plant switched to oil, but continued to receive process wastewater until 2005.[194] Authorization for operation of the ash ponds continued until expiration of the facility's Water Pollution Control Permit (No. 2005-EO-3215) on January 21, 2010. There are approximately 1,425,500 cubic yards of CCR located within the ash pond system. Borings indicate that the base of the ash is at an elevation of about 400 feet AMSL. Based on a review of groundwater monitoring well data conducted by Natural Resources Technology (NRT), AmerenUE's consultant, ash is in contact with the groundwater during high water river stages that typically occur approximately 15 percent of the time.[195]

Beginning in 2004, AmerenUE installed three additional combustion turbine generating units (CTGs) at the Venice plant site. To both accommodate the CTGs and dewater the ash pond system, AmerenUE constructed a storm water and wastewater treatment system. As a result, all discharges into the ash pond system were eliminated, and the ash pond system has been completely isolated since 2005. The water table beneath the ponds and the amount of saturated ash has dropped considerably since that time.[196] Ponds 2 and 3, located at the very southern end of the power Station's site, were designated for closure in 2011 by capping with a synthetic liner, with the CCR left in place.[197]

The plant lies near the City of Venice and Village of Brooklyn (just across the River from St. Louis, Missouri),[198] both of which prohibit the use of groundwater as a potable water supply because pre-existing and current industrial facilities in the area, including the Venice Power Plant, provide multiple potential sources of contamination.

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[192] According to Sourcewatch (2012), the Ameren Energy Venice Power Station in Madison and St. Clair counties is the 'now retired'.
[193] For a detailed site facility air photo and adjacent jurisdictional boundaries, see http://www.epa.state.il.us/water/ash-impoundment/ameren-venice-station/ash-pond-plot.pdf
[194] AmerenUE (2010). A new water treatment facility and outfall constructed in 2005 is subject to NPDES Permit # IL0000175.
[195] AmerenUE (2010).
[196] Ibid.
[197] NRT (2010b) and NRT (2010c). According to AmerenUE (2010), the ash pond system was constructed in the early 1950s in conjunction with the flood levee system on the banks of the Mississippi River. The western berm (approximately 1,100 feet) of the ash ponds forms the dike that is part of the U.S. Army Corps of Engineers flood levee system. As such, it cannot be structurally compromised. The combined area of Ponds 2 and 3 is 58 acres (http://www.ameren.com/Environment/Documents/AshPondListingAER.pdf)
[198] For a general location map, see http://www.ameren.com/sites/aue/MyBusiness/UEW/Documents/AU_FactSheet.pdf

The ash pond system is underlain by about 80 feet of alluvial deposits associated with the Mississippi River. The upper 20 to 30 feet of alluvium contain alternating layers of silt, sand, and clay. The lower 50 to 60 feet consist primarily of sand and gravel. Groundwater flow in the region is controlled by the Mississippi River. Groundwater is typically encountered at a depth of 20 to 30 feet. During normal river stage, which lasts the majority of the year, groundwater flows west and discharges into the river. During high river stage, groundwater flow is reversed, flowing east, with the river recharging the aquifer. There is also a perched water table that is influenced by infiltration of precipitation that tends to dilute the concentrations of contaminants from the ash pond system in the shallower wells.

Impact and Damage Claims: EIP (2010a) indicates that groundwater monitoring showed multiple instances of contamination in groundwater. Arsenic and boron exceeded the MCL and SMCL, respectively, in the first round of groundwater sampling on July 27, 1996. When monitoring wells MW4, MW5, and MW6 were added to the network in December 1997, arsenic and boron also exceeded Illinois Class I groundwater standards in all three wells.

Arsenic concentrations exceeded the primary EPA Maximum Contaminant Level (MCL) at a number of wells, including two wells which are about 400 feet east of the ponds and 'off the plant property'.[199] EIP (2010a) also noted exceedances of the Illinois Class I Groundwater Standard for boron at a number of wells, though all onsite.[200] A brief exceedance of the primary EPA MCL for cadmium was reported at one of the wells, as well as secondary EPA MCL (SMCL) exceedances for iron, manganese, and total dissolved solids (TDS) in a number of wells onsite, and one of the offsite wells for iron.

A Hydrogeological Assessment undertaken by NRT[201] determined that lack of boron and arsenic correlation in the wells and the fact that leachate samples from the ash ponds have lower arsenic than the groundwater indicate that the ash ponds are not the primary source of arsenic in groundwater. The assessment also determined that even simulating the seasonal fluctuation of the river, the offsite wells where arsenic was found above the MCL would be considered up-gradient, further indicating that the ash ponds are not the primary source of arsenic.

EIP (2010a) counters that differences in how boron and arsenic interact with the aquifer would allow for little correlation between the two in individual samples. It also notes, and NRT (2010a) concurs (page 4), that seasonal water stage fluctuation in the Mississippi River would cause changes in the groundwater flow gradient and that during the high river stage the two offsite wells to the east could be down-gradient from the pond system. It also notes that while boron did not exceed a standard in the offsite wells, it was elevated and could indicate these wells were affected by the ash ponds.[202]

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[199] The contaminant plume of arsenic that exceeds Class I standards extends beyond the boron plume (up to x38 the federal MCL), 400 feet beyond the inactive impoundments.

[200] The contaminant plume of boron, that exceeds Illinois Class I (potable) groundwater standards, extends 475 feet south of the inactive impoundments.

[201] NRT (2010d).

[202] According to EIP (2010a), several lines of evidence suggest that the ash ponds *are* the main source of arsenic, and that off-site monitoring wells MW8 and MW9 are not truly up-gradient (as claimed by NRT, apparently on the assumption that the dominant direction of groundwater flow is west, toward the river) and are affected by contaminants from the ash ponds:

• Boron tends not to interact with aquifer solids and serves as a good indicator of the zone of influence of ash leachate on groundwater. Arsenic, on the other hand, is sensitive to redox conditions in the ash pore waters and aquifer, so a correlation between arsenic and boron in the same sample would not necessarily be expected.

• In Pleistocene aquifers, groundwater containing boron concentrations greater than 0.5 mg/L can be considered affected by leachate (Schleyer et al., 1992). In MW8, the average concentration of boron in samples taken from

The NRT assessment concluded that boron and manganese onsite were higher than the Illinois Class I Groundwater Standards (and SMCL for manganese) and would be attributable to the coal ash ponds. The assessment also concluded that other contaminants, including arsenic, iron and TDS would not be attributable to leachate from the ash ponds; for arsenic, creosote wood treatment plants formerly located up-gradient of the monitoring wells area, cannot be excluded as potential sources.[203]

Evaluation against Proven Damage Criteria[204]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCLs for arsenic and cadmium. • Onsite groundwater data exceeded EPA SMCLs for iron, manganese, and TDS, as well as the Illinois Class I Groundwater Standard and EPA Child Health Advisory for boron. • Offsite groundwater data exceeded the primary EPA MCL for arsenic and the SMCL for iron. Other sources of arsenic, such as creosote wood treatment plants formerly located upgradient of the monitoring wells area, cannot be excluded.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: When the Venice Plant resumed operations in 1995, a condition for the operating permit was that hydrogeologic investigations be initiated to evaluate the impact of the ash pond system on groundwater. These investigations were initiated in 1996 with the installation of three monitoring wells, and the monitoring well network was eventually expanded to include 17 monitoring wells at varying depths and locations in and around the ash pond system.[205]

1999 to 2009 was 0.68 mg/L and more recent sampling in MW8P averaged 1.48 mg/L, suggesting that this well, 400 feet "up-gradient," has been affected by the ash ponds.
• This influence can be explained by the fact that when the Mississippi River is at a high stage, the groundwater gradient to the east is much steeper (river was 8.34 feet higher than MW8 on July 26, 2008) than when the river is at normal flow (river 3.93 feet lower than MW8 on September 26, 2008), making it entirely possible for contaminants to reach these wells and farther east before the lower westward gradient is reestablished.
• The interpretation that the dominant direction of the flow of contaminants is to the east rather than the west is confirmed by the fact that the monitoring wells set between the ash ponds and the river (MW2 and MW3) has lower average concentrations of arsenic and boron than the wells east of the ash ponds (MW4 and MW5).

[203] NRT (2010).

[204] ICF (2010a).

[205] According to AmerenUE (2010), the three well groundwater monitoring network installed in 1996 was expanded to 17 monitoring wells: wells 7 and 7P were installed to monitor off-site impacts to the south. Wells 2, 2P and 3 are

In March 2010, as part of the plan for final closure of the impoundments, AmerenUE proposed final capping and a "Groundwater Management Zone" (GMZ) to contain contaminant plumes within the property, which extend 450 feet south from the impoundments, covering all boron exceedances.[206] However, it does not cover the two offsite wells where arsenic exceeded the primary EPA MCL.

The groundwater GMZ was approved for this site to limit recharge through the contaminants leaching to groundwater by capping the impoundments with a low permeability synthetic membrane.[207] The well inventory required by IEPA and completed by Ameren confirms that there is no use of groundwater for potable or industrial uses down-gradient of the impoundments. In addition, IEPA concluded that because the area just south of the plume will be beneath the proposed I-70 bridge, virtually eliminating any potential use of the groundwater, contaminated groundwater will not be pumped to control migration. The contaminated groundwater will slowly discharge into the river by subsurface seepage. AmerenUE determined that the concentration of boron that would enter the river through seepage would be 0.0019 mg/L, which is protective of human health and aquatic life.[208] At the end of October 2012, Ameren notified IEPA that it has concluded the closure of the Plant's inactive ash pond system.[209]

USWAG claims that this site does not qualify as a damage case.[210]

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of the primary EPA MCLs for arsenic and cadmium, the EPA SMCL for iron, manganese, and TDS, and the Illinois Class I Groundwater Standard for boron have been found onsite. While offsite groundwater data exceeded the

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located near the river bank to the east, and wells 8 and 9 are located off-site on railroad property to the west. Additional wells are installed along the perimeter of the ash ponds (MW 1, 4, 5, 5P, 6), and within the basins (MW AP-1, AP-1A, and AP-2). AmerenUE performs groundwater sampling on a quarterly basis and has submitted monitoring results to IEPA since 1996. Arsenic, barium, boron, cadmium, chromium, copper, lead, manganese, nickel, zinc, pH, and TDS have been monitored since 1996. And see NRT (2010).

[206] See AmerenUE (2010a). For a series of technical Memoranda related to the closure plans, see http://www.ameren.com/Environment/Pages/ManagingWaste.aspx.

[207] According to Ameren (2014), a GMZ was approved on May 6, 2011.

[208] NRT (2010a).

[209] Ameren (2014a).

[210] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "The allegations are for on-site and off-site groundwater exceedances of CCRs above health-based standards. The alleged off-site groundwater exceedances of groundwater standards are specifically for arsenic, boron, iron, and manganese. Evaluation of the data has demonstrated that the ash impoundment is not a significant source of arsenic and that elevated arsenic concentrations may be from other sources, including historic industrial activities that used arsenic-based compounds such as wood treatment facilities. The documentation that the source of arsenic is from a source other than the ash ponds has been demonstrated to the Illinois EPA's satisfaction2. It has also been documented that there are off-site sources (both anthropogenic and natural) resulting in elevated concentrations of iron, manganese, and Total Dissolved Solids in groundwater unrelated to CCRs. (Natural Resources Technology. 2010. Supplemental Hydrogeological Assessment, Venice Ash Ponds, Technical Memorandum No. 2, March 3, 2010).

Boron concentrations in off-site monitoring wells located upgradient from the site do not exceed groundwater standards; reported exceedances in an off-site well located south of the site and downgradient of the impoundment were observed where the groundwater flow system intercepts the Mississippi River.1 A synthetic cap is proposed for the site, there is a local groundwater ordinance in place restricting the use of groundwater, and the only downgradient receptor is the Mississippi River. There is no potential for groundwater transport of CCR-related constituents to human receptors. The Illinois EPA is overseeing closure activities at the site (Written communications, AmerenUE. November 1 and 3, 2011.)"

primary EPA MCL for arsenic, these (and other) offsite exceedances could not be directly attributed to the coal ash ponds. There are no administrative rulings or court decisions associated with the site.>

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PTb12. Clifty Creek Station, Indiana Kentucky Electric Corporation (IKEC),[211] Madison, Jefferson County, Indiana

Type: Landfill Over a Former Pond (an Overfill) and Surface Impoundments.

Background and Description: The 1,302 MW Clifty Creek power plant, with six separate generation units of 217 MW each was built in 1955/56 on the Ohio River, directly beside the Clifty Falls State Park and between the cities of Madison and Hanover, Indiana. Along with the power plant, the site contains a CCR landfill and two surface impoundments. The impoundments comprise the active, 58 acre, 3,600 acre-feet capacity, West Boiler Slag Pond, and the South Fly Ash Pond that is currently used for stormwater management. The West Boiler slag pond's actual contained slag volume is small because most of the slag is sold for beneficial use or used for structural fill onsite.[212] The impoundments have an NPDES permit for discharges to the Ohio River. Under Indiana regulations, any impoundment with an NPDES permit is exempt from solid waste standards. The impoundments do not have liners or ground water monitoring.

In the northern-most region of the former South Fly Ash Pond, an unlined Type III restricted waste (CCR) landfill, was constructed in 1992 on top of a closed impoundment as the facility began to process dry fly ash as well as boiler slag. In December 2002, The Indiana Department of Environmental

[211] Formed to provide electric power requirements for the Atomic Energy Commission's Portsmouth (Ohio) Area, IKEC has been a subsidiary of Ohio Valley Electric Corporation since October, 1952. The Plant burns 14,000 tons of coal per day (4.5 million tons a year). Over 1.4 billion gallons of Ohio River water cycle through the plant daily to condense the steam and return to the river: http://www.roundaboutmadison.com/InsidePages/ArchivedArticles/2006/0706IKEC.html

[212] IKEC (2009).

Management (IDEM) approved a permit for the construction of a Type I Restricted waste landfill on top of this existing landfill. In 1994, IDEM approved a pH Variance for the disposal of low-sulfur coal ash in the fly ash landfill. Emplacement of low-sulfur coal ash in the landfill began in January 1995 and has continued to date.[213] The landfill is located along the Ohio River, approximately 0.6 to 1.5 miles upstream from supply well fields operated by the Kent Water Company in Hanover and Kent, Indiana and 0.5 to three miles downstream from supply well fields used by the city of Madison, Indiana.[214]

In anticipation of newly installed scrubbers (2010), in 2009-2010 the landfill was redesigned to be permitted as a Type I landfill, to accept flue gas desulfurization (FGD) gypsum along with the dry fly ash.[215, 216] The landfill has three onsite down-gradient monitoring wells and one well located within the old fly ash impoundment. No offsite groundwater monitoring data is available.

The impoundments and landfill are sited over 50 feet of valley fill materials (inter-bedded alluvium, silt, and gravels). The South Fly Ash Pond is located in an abandoned valley that is separated from the Ohio Valley and from the West Boiler Slag Pond by the "Devil's Backbone", a truncated ridge comprised of Ordovician-Silurian carbonates.

There are three discharge areas at the site.[217] (i) Groundwater within the old fly ash flows to the southwest, along the axis of the bedrock valley. Due to the low gradient across the landfill (less than 0.01) and the low permeability of the old fly ash, the groundwater flow velocity is very low. (ii) Southwest of the landfill, groundwater in the old fly ash discharges to the silty sand and gravel deposits along the Ohio River at an estimated rate of 1.6 gallons per minute (gpm). It is also possible that groundwater flows in the alluvial deposits parallel to the Ohio River.

A groundwater flow divide is present near the northeast end of the site; as a result, (iii) a portion of groundwater in this area flows along the bedrock valley to the northeast. Groundwater in this portion of the landfill flows toward the West Bottom Ash Pond and eventually discharges to the Ohio River. Based on flow gradients, there is the potential for a groundwater flow through the bedrock units of the Devil's Backbone to the West Bottom Ash Pond or to alluvial deposits adjacent to the Ohio River. The rate of discharge through the Devil's Backbone was estimated at 1.3 gpm. Groundwater flow through the Devil's Backbone eventually discharges to the alluvial deposits or to the Ohio River. The mean flow in the Ohio River near the site is estimated at 52,000,000 gpm and the 7-day, 10-year low flow - at 4,800,000 gpm.

Impact and Damage Claims: EIP (2010) indicates onsite groundwater with manganese above the secondary EPA Maximum Contaminant Level (MCL) and boron above the EPA's Child Health Advisory.

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[213] AGES (2006). 'To date' refers to the publication date of the AGES report (June, 2006).
[214] AGES (ibid). The Madison wells range in diameter from 16" to 24" and are completed at depths ranging from 102 to 123 feet; the Kent well field includes four wells consisting of 8" to 12", diameter wells completed at depths ranging from 61 to 69 feet, one 12" well at a depth of 100 feet, and one 24" well at a depth of 95 feet.
[215] GZA GeoEnvironmental (2009a), GZA GeoEnvironmental (2009b), and IKEC's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0289. In 2006, IKEC submitted an application to IDEM to upgrade the Type III RWS landfill to a Type I RWS landfill in conjunction with a Flue Gas Desulfurization Retrofit Project at the plant. The permit for construction and operation of the Type I RWS landfill was issued by IDEM on April 15, 2008. Since issuance of the permit, IKEC has begun constructing the Type I RWS landfill, and is now placing coal combustion residuals in Phase I, which was certified in 2010. The permit allows IKEC to maintain approximately 40 acres of Type III landfill that is capped, with the remaining cells to be developed as a Type I facility.
[216] http://www.ovec.com/News%20Release%205-11-06%20IKEC.pdf
[217] This section is from AGES (2006) and SE Technologies (1993), cited in the former study.

EIP (2010) also notes elevated levels of iron and sulfates in onsite groundwater.[218] EIP (2010) mentions that groundwater studies of the area indicate groundwater is flowing north out of the landfill where it could potentially reach Madison's municipal wells;[219] however no monitoring wells are available to confirm this. Surface water monitoring of the discharge from the impoundments has detected levels of aluminum and selenium that are above surface water standards for these contaminants, but the permit has "monitor only" requirements for these pollutants, so these levels have not triggered any enforcement action.[220]

IDEM claims[221] that the parameters that are detected in the groundwater monitoring program are reflective of the active total chemistry of the geologic formation. Whereas the levels of manganese, magnesium, and iron exceed secondary MCLs in some events, these are the reactive phases of the formation and are expected to approach chemical equilibrium.[222] IDEM concedes, however, that (CCR-associated) boron was detected at between 9 and 22 ppm in the down-gradient wells.

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[218] Groundwater monitoring found elevated levels of boron, up to 18 mg/L, manganese, up to 1.9 mg/L, iron, up to 5.2 mg/L, and sulfates, up to 480 mg/L (IDEM data cited in EIP, 2010). A single arsenic exceedance value, 0.046 mg/L, is presented in EarthJustice's comment to the proposed CCR rule, EPA-HQ-RCRA-2009-0640-6314, in Attachment 5 (an excel spreadsheet), with a footnote stating that this value postdates EIP's (2010) report for the Clifty Creek damage case. However, in the absence of further data, it is impossible to establish what well(s) this value was measured in and whether it is an outlier.

AGES (2006) describes the culprit wells - CF-9405, CF-9406, and CF-9407, as completed and screened in alluvial deposits along the Ohio River, southwest (downgradient) of the landfill. The hydraulic conductivity (K) measured in these wells range from 1.1 x 10^{-3} to 1.6 x 10^{-2} cm/sec, and the vertical hydraulic conductivity is even higher, on the order of 10^{-3} to 10^{-2} cm/sec. Both these horizontal and vertical K values in are reasonable for a silty sand or silty sand and gravel deposits and given the large groundwater gradient in this portion of the site. In measurements between June 1995 and 2006, sulfate, chloride and boron, signature fly ash constituents, have been detected in groundwater at these wells at the following range of concentrations: sulfate, <5 to 370 mg/L, boron, <0.05 to 17.1 mg/L, and chloride, 7.2 to 33 mg/L.

[219] IKEC, in its comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0289, responds that to date, the only study that has been alleged to support the claims of off-site groundwater contamination is included in a report filed by HNTB, a contractor hired by the City of Madison to perform a well head protection assessment in 1999. This report was rejected by IDEM for several reasons. According to IDEM, "[i]t is clear from the description of the modeling effort that the author is NOT a qualified groundwater scientist. The report demonstrates that the groundwater modeling was done without an understanding of: 1) how different boundary conditions are defined and how they control flow, 2) the difference between a transient and steady-state simulation, 3) ways to calibrate a flow model, 4) how to determine the appropriateness of the model grid for the task at hand, 5) how river leakance is defined and how it affects the groundwater flow solution near a river, 6) the definition (and the effect) of aquifer anisotropy, and 7) the difference between static and pumping water levels." (Attachment 3, Review of HNTB Delineation report, Madison, IN, page 1, bullet point 3. Emphasis in original.)

[220] EarthJustice comment to the 2007 NODA docket: EPA-HQ-RCRA-2006-0796-0446.

[221] Response to the 2007 NODA comment EPA-HQ-RCRA-2006-0796-0446.

[222] According to AGES (2006, pages 2-3), as a condition of the pH variance, in 1994 IKEC installed three monitoring wells in alluvial deposits (CF-9405, CF-9406 and CF-9407) downgradient from the landfill. Between June 1994 and February 1995, the wells were sampled twice monthly to document background groundwater quality. Low-sulfur coal ash was first emplaced at the landfill in January 1995. Between June 1995 and February 2000, the wells were sampled for various inorganic constituents on a quarterly basis. Because numerous inorganic constituents were not detected and groundwater quality and flow conditions remained very stable, in 2000, IDEM modified the program to include semi-annual sampling and a reduced list of analytical parameters. The monitoring program revealed a large degree of natural variation in groundwater quality at the site. Although statistical analyses have indicated sporadic increases over background for some constituents, these increases have been attributed to natural variation in groundwater quality.

IKEC also concedes that the down-gradient wells have detected statistical increases in boron, with (as of 2007) levels up to 13.7 mg/L. Citing a 2004 hydrogeologic report,[223] IKEC claims that it is not feasible for groundwater flowing out the northern end of the landfill to affect the Madison Municipal Well Field because all groundwater from the site discharges to the Ohio River, which flows away from that Well Field.[224] Also, whatever groundwater discharges into the Ohio River, it will be infinitesimally diluted.[225] Finally, IKEC claims that the aquatic life acute selenium water quality criteria established by IDEM and the Ohio River Valley Water Sanitation Commission (ORSANCO): 130µg/L and 20µg/L, respectively, "are no longer scientifically defensible."[226]

USWAG claims[227] that the Earthjustice allegations concerning the site do not meet the standards for a proven damage case. In the case of the surface impoundment, there is no basis for the claim that wastewater discharges exceed the "applicable surface water standards" for aluminum because no numeric water quality criterion for aluminum is in effect. In the case of selenium, the water quality standards are currently in flux,[228] based on IKEC's reports about the acceptable maximum selenium concentration in undiluted discharge from any NPDES point at the site since 1995. This is not evidence of off-site damage resulting from disposal of boiler slag in the surface impoundment. The claims regarding damage

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[223] In its comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0289, AGES (2006) reports on a 1992/93 study conducted by SE Technologies in the course of which 14 piezometers and eight monitoring wells were installed, hydrologic conductivity and soil studies were performed, and groundwater monitoring was launched. AGES (2006) study included installation of 28 piezometers, 16 soil borings, surveying, and several years of water level monitoring. The results of both investigations indicate that groundwater from the northern end of the landfill discharges to the on-site West Bottom Ash Pond or the West Branch of Clifty Creek before flowing into the Ohio River. According to both studies, the West Branch of Clifty Creek, Clifty Creek and the Ohio River are extremely effective hydraulic barriers to eastward groundwater flow toward the Madison Well Fields, which are located 0.5 to three miles upstream from the landfill (AGES, 2006; attachment 1 to EPA-HQ-RCRA-2011-0392-0289).

[224] Monitoring results cited in AGES (2006) are as follows: *Madison wells:* sulfate results were 0.111 mg/L and 0.03 mg/L in 1995 and 1996, respectively. *Kent wells:* sulfate results were 47 mg/L, 44 mg/L and 23 mg/L in 1987, 1990 and 1993, respectively, and boron were 0.0094 mg/L, 0.0242 mg/L, and below detection level (0.005) in two other wells. The most recent sampling event (November 2005) of four of the wells, yielded the following data: the highest boron levels, registered in two wells, were 0.0172 and 0.0377 mg/L; and sulfate ranged between 37.72 and 67.80 mg/L.

According to IDEM (EPA-HQ-RCRA-2011-0392-0269), during a 2002 permit renewal appeal, contrary to the representation in EIP (2010), an agreement was reached that the groundwater from the landfill flows towards the Ohio River rather than north towards the City of Madison; therefore, any well fields located near Hanover or City of Madison are not downgradient of the landfill. The cited monitoring data for the Madison and Kent (Hanover) well fields support the contention that there is no adverse effect on groundwater quality at either location.

[225] IKEC Response to the 2007 NODA EarthJustice comment EPA-HQ-RCRA-2006-0796-0446 and IKEC's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0289. Based on their study, AGES (2006; Attachment 1 to said comment) determined that it is not feasible for groundwater from this portion of the landfill to affect the Madison Well Fields because all groundwater from the site discharges to the Ohio River, which flows to west/southwest, away from the Madison Well Fields. In addition, the minimal volume of groundwater discharging from the entire site is diluted in the Ohio River by a factor of approximately 720,000 to over 1,500,000. At this rate of dilution, constituents in groundwater from the site would be undetectable with standard analytical methods.

[226] IKEC claims that an EPA, soon to be published acute criterion "is expected to be 186µg/L", and that the maximum NPDES site sampling datum going as far back as 1995, 40µg/L, is well below the upcoming EPA criterion.

[227] EPA-HQ-RCRA-2006-0796-0468: Rebuttal to the 2007 NODA EarthJustice comment EPA-HQ-RCRA-2006-0796-0446.

[228] *See* EPA Notice of Draft Aquatic Life Criteria for Selenium and Request for Scientific Information, Data, and Views, 69 Fed. Reg. 75541 (Dec. 17, 2004).

attributable to the RWS landfill similarly do not satisfy the criteria for a proven damage case. All the groundwater data fall within Indiana state regulatory requirements and Federal MCLs for primary drinking water constituents. The only allegation of impact on groundwater concerns boron, which is not a primary drinking water constituent. Elsewhere, USWAG claims[229] that this site does not meet the criteria for a damage case.

Evaluation against Proven Damage Criteria[230]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	Onsite groundwater data exceeded the secondary MCL for manganese, and exceeded the EPA Child Health Advisory for boron. No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	None

Other Considerations: According to the Utility Solid Waste Activities Group (USWAG) response, IDEM rejected the report that groundwater could be flowing north out of the landfill and possibly to municipal wells on “multiple deficiencies.” This was verified with IDEM.

Resolution: Citizens’ groups appealed December 2002 Type I Restricted waste landfill permit, requesting additional monitoring, and installation of a liner during future construction. IKEC and IDEM rejected the requested changes, and the appeal has been subject to multiple judicial reviews since 2003. IDEM renewed IKEC's permit in April 2008.[231] According to IDEM, the permit appeal was resolved through an Order issued by the Office of Environmental Adjudication on August 24, 2009, in favor of Clifty Creek Station.[232] On March 15, 2012, the Indiana Supreme Court granted a petition to transfer the

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[229] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2022-0392-0211): “This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The allegation in the reference claims that groundwater flows north from the landfill and could impact the City of Madison’s municipal wells, but provides no data to support the claim. In addition, all CCR’s have been placed in a certified Type I landfill, with a geosynthetic clay liner and leachate collection system, since 2010. The former Type I landfill is capped and closed in accordance with the regulations of the Indiana Department of Environmental Management. The USEPA classified this site as “Indeterminate” in their 2007 report (Coal Combustion Waste Damage Case Assessments, EPA-HQ-RCRA-2006-0796-0015) due to insufficient information; no new information has been provided pertaining to this site in the Reference Document.”

[230] ICF (2010a).

[231] IKEC (2009): The permit includes installation of a composite liner with a nominal hydraulic conductivity of 5×10^{-9} cm/sec.

[232] IKEC, in its comments to the October 2011 NODA docket EPA-HQ-RCRA-2011-0392-0269 and EPA-HQ-RCRA-2011-0392-0289, claims that while the Citizens Groups did appeal the landfill permit, IKEC did not “reject” the installation of a liner for future landfill expansions – in fact, IKEC has a Type I landfill that is already permitted and in operation. As part of the landfill upgrade, IKEC installed a Flexible Membrane Liner (FML), consisting of

case and has assumed jurisdiction over IKEC's appeal;[233] however, on March 22, 2012, the Indiana Supreme Court reversed its judgment by denying the transfer petition filed by the appellant (IKEC) and by reinstating the *Indiana-Kentucky Elec. Corp. v. Save the Valley, Inc., 953 N.E.2d 511.*[234]

IDEM claims that the boron SMCL exceedances in down-gradient groundwater monitoring wells do not trigger a Corrective Action, but rather an 'assessment monitoring'. The facility has not shown any consistent release of metals of concern at levels of statistical significance past the monitoring boundary.[235]

ICF (2010) Rationale: *Not a Damage Case.* <There are no onsite or offsite groundwater exceedances of EPA MCLs. Onsite SMCL exceeded for manganese only with no indication of other primary MCL contaminants exceedances. As manganese may be leached from soil under any landfill condition alone it is not enough to specifically implicate CCR in health risk.>

Postscript: Considering the indisputable, statistical increases in the exceedances of boron in down-gradient wells, ICF's rationale is flawed and this site qualifies as a Potential Damage case.

References

EIP (2010): Out of Control: Mounting Damages from Coal Ash Waste Sites, Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #7. The Environmental Integrity Project and EarthJustice. February 24, 2010. http://www.environmentalintegrity.org/news_reports/news_02_24_10.php

ICF (2010): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix B, Case #7. ICF, 10/2010.

IKEC (2009): Ohio Valley Electric Corporation/Indiana-Kentucky Electric Corporation Response Letter to EPA's ICR on Surface Impoundments, March 25, 2009. Accessed Online July 2012. http://www.epa.gov/epawaste/nonhaz/industrial/special/fossil/surveys/ovec-inky-clifty.pdf

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30-mil PVC membrane, and underlain by a Geosynthetic Clay Liner (GCL), which consists of a sodium bentonite layer sandwiched between geotextile fabrics, as well as a leachate collection system. The new liner has a nominal hydraulic conductivity of $5x10^{-9}$ cm/sec, which meets or exceeds all applicable state requirements for a Type I RWS landfill.

IKEC also claims (EPA-HQ-RCRA-2011-0392-0289, Attachment 2) that what has been in dispute is the Citizens Groups standing to appeal IKEC's permit, rather than issues related to the environmental impact of IKEC's permitted landfill. What is relevant to the Citizens Groups' claim that the IKEC landfill is adversely impacting the Madison City water supply are "Findings the Facts and Conclusions of Law" issued by the Indiana Office of Environmental Adjudication (IOEA): (i) "[t]he water from the City of Madison does not exceed any regulatory limits for pollutants in drinking water" (Attachment 2, Findings of Fact 15, page 3) and (ii) "[t]he conclusion after seven years after this Permit was issued, water supplied by the City of Madison meets all federal and state regulatory limits for pollutants." (Attachment 2, Conclusion of Law 14, page 5). The August 24, 2009 Final Order of the IOEA clearly debunks the Citizens Groups' apparent claim that environmental issues are still in dispute.

[233] *Indiana Kentucky Electric Corporation 21 v. Save the Valley Inc.* (2011), and *Indiana-Kentucky Electric Corp., et al. v. Save the Valley, Inc., et al.* (2012).

[234] http://www.in.gov/judiciary/files/order-other-2012-49S02-1202-MI-72.pdf

[235] This position is reiterated in IDEM's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0269: "To date there has not been any testing results that have triggered the need for corrective action under the solid waste rules. Therefore the facility remains in the current groundwater monitoring program."

GZA GeoEnvironmental (2009a): Task 3 Dam Assessment Final Report, Clifty Creek Station West Bottom Ash Pond, Madison, Indiana, September 14, 2009. Accessed Online July 2012. http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/clifty-bot-final.pdf

GZA GeoEnvironmental (2009b): Task 3 Dam Assessment Final Report, Clifty Creek Station West South Fly Ash Pond, Madison, Indiana, September 14, 2009. Accessed Online July 2012. http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/clifty-fly-final.pdf

AGES (2006): Evaluation of Potential Risk to Supply Well Fields, Indiana-Kentucky Electric Corporation, Clifty Creek Station, Applied Geology and Environmental Science (AGES), Inc., June 2006. Attachment 1 to EPA-HQ-RCRA-2011-0392-0289. Accessed Online November 2014. http://www.regulations.gov/#!searchResults;rpp=25;po=0;s=EPA-HQ-RCRA-2011-0392-0289;fp=true;ns=true

IDEM (1999): Review of HNTB Delineation Report, Madison, Indiana. Indiana Department of Environmental Management (IDEM), 1999. Attachment 2 to EPA-HQ-RCRA-2011-0392-0289. Accessed Online November 2014.
http://www.regulations.gov/#!searchResults;rpp=25;po=0;s=EPA-HQ-RCRA-2011-0392-0289;fp=true;ns=true

IDEM (2008): Approval of Major Modification and Renewal of Solid Waste Facility Permit FP39-04, Response to Public Comments. Indiana Department of Environmental Management (IDEM), 2008. Attachment 3 to EPA-HQ-RCRA-2011-0392-0289. Accessed Online November 2014. http://www.regulations.gov/#!searchResults;rpp=25;po=0;s=EPA-HQ-RCRA-2011-0392-0289;fp=true;ns=true

Indiana Kentucky Electric Corporation 21 v. Save the Valley Inc. (2011): Indiana Kentucky Electric Corporation**,** Appellant–Petitioner, Indiana Department of Environmental Management, Party Pursuant to Ind.Code § 4–21.5–5–6(d), v. Save the Valley, Inc., Hoosier Environmental Council, Inc., and Citizens Action Coalition of Indiana, Inc., Appellees–Respondents. Court of Appeals of Indiana No. 49A02–1011–MI–1178, August 9, 2011. Accessed Online August 2014.
http://www.in.gov/oea/.../2010_OEA_21_Clifty_Creek_remanded.pdf

PTb13. Lansing Station Ash Ponds and Landfill – Alliant/IPL, Lansing, Allamakee County, Iowa

Type**:** Landfills and Surface Impoundments.

Background and Description: The Lansing Power Station was first constructed in 1948,[236] with three additional generating units added subsequently.[237] The Lansing Power Station is located on the west bank

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[236] Namely, Unit 1, with a generating capacity of 15 MW.
[237] According to Dewberry, LLC (2011), the expansion constituted Unit 2 in 1949 (12 MW); Unit 3 in 1957 (38 MW); and Unit 4 in 1977 (275 MW). According to plans filed with the Minnesota Public Service Commission on November 1, 2010, Alliant Energy plans to close generation Units 2 and 3 (at that time, Unit 2 was already idle): Plain Justice Today (2010).
According to http://plainsjustice.org/files/IPL%20Action%20Plan%2011-1-10.pdf, IPL announced plans in 2008 to install a selective catalytic reduction (SCR) system and baghouse at Lansing Unit 4 to reduce NOx and mercury emissions, respectively (in July 2010, IPL completed the installation of both emission control systems). Finally,

of the Mississippi River, south of the City of Lansing, Iowa. The site contains an ash landfill[238] which first received CCR around 1985, as well as a14.8-acre main ash pond (Ash Pond 1)[239] and a 0.2 acre lower ash pond (Ash Pond 2),[240] both unlined.[241] All the waste units are currently active. Groundwater monitoring is required for the landfill but not the ponds. The plant is located in a rural area near the Mississippi River with an estimated 33 private wells within a 2 mile radius. However, no offsite monitoring data is available.

According to EIP (2010a), alluvium/colluvium of varying thicknesses lies over bedrock in the area of the CCR Landfill. Alluvial deposits of the Mississippi River are at least 50 feet thick in the vicinity of the Power Plant north of the current Ash Pond. A 1982 soil boring within the area of a closed ash lagoon found a shallow water table in alluvial silt and sand about 25 to 30 feet thick. The ash landfill and ponds are underlain by inter bedded fine sandstones and siltstones of the Lone Rock Formation, which overlies the regional Dresbach Aquifer. Monitoring wells are completed in the Lone Rock Formation and the MW4 and MW5 cluster shows an upward hydraulic gradient, consistent with a groundwater discharge area. The flow of the regional aquifer is north-northwest toward the Mississippi River.[242] However, the potentiometric map of the area does not appear to take into account the localized, more westerly flow in shallow groundwater in the alluvium of the valley in which the CCR landfill and impoundments are located. The alluvium, which is generally more permeable than the fine-grained sandstones of the bedrock aquifer, probably represents a near-surface groundwater system that creates a preferential flow path for contaminants to the west-northwest. The presence of contaminants in the downgradient well MW-11, as well as in MW-11R, its co-located replacement, is consistent with this interpretation.

Impact: According to EIP (2010a), in 2002, the first year of monitoring, arsenic concentrations were measured onsite in one of the two down-gradient well (MW11) above the primary EPA Maximum Contaminant Level (MCL). The report also notes that concentrations of iron and sulfate in this same well were above secondary EPA MCLs (SMCLs), and manganese - far above USEPA's Lifetime Health

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according to the Alliant Energy's 2011 Annual Report, the Utility has committed to install, by 2015, a scrubber to reduce SOx emissions in Unit 4.

[238] Iowa DNR Permit 03-SDP-05-01. According to USWAG's Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211), the landfill has no liner. According to Dewberry, LLC (2011), the 7- acre landfill discharges runoff into the south end of Ash Pond 1. According to BT[2] (2008), A screening berm made of CCR was constructed around the landfill in the September 2002 to August 2003 time frame, the current permit was issued by IDNR on September 11, 2003, and CCR placement in the landfill started shortly thereafter.

[239] Ash Pond 1 has a total storage capacity (measured in 1999) of 474,000 cubic yards.

[240] Ash Pond 2 has a total storage capacity estimated at 2900 cubic yards (March 2009). This pond does not contain significant amounts of ash. Most of the ash settles out in Ash Pond 1; ash was excavated from Ash Pond 2 in 2002. Ash Pond 2 discharges into a channel directly connected to the Mississippi River.

[241] According to Alliant Energy (2009), both ponds were commissioned approximately in 1975. Both pond are in receipt of fly ash, bottom ash, and 'other' CCR-related waste [i.e., ash transport water, boiler water wash, air heater wash (fly ash), steam grade water production wastewaters, storm water runoff from landfill, plant floor drains, and boiler blowdown (steam/water)]. According to Dewberry, LLC (2011), Ash Pond 1 is periodically excavated to remove the ash for beneficial reuse and landfill. As of 2011, the adjacent landfill was estimated to be active for another 5 years.

[242] RMT (2010), Figure 3, and SCS BT[2] letter to IDNR, October 24, 2012, Figure 1.

Advisory Level.[243] The well which measured the exceedances is between the CCR landfill (to the east) and the Ash Settling Pond (to the west), so the source of contamination could be from either area.[244] According to the State,[245] as of the most recent annual water quality report, all down-gradient monitoring wells at this site for arsenic and the secondary contaminants were well below the MCL and the up-gradient control limits. Also, the referenced arsenic exceedance was from a monitoring well that has been dry since August 2004, which likely did not yield valid or representative samples to appropriately characterize the site. However, the latest (April 2010 and November 2011) Annual Groundwater Quality Reports[246] still show exceedances of SMCLs in the down gradient well MW-11R (a 2010 replacement of MW-11) for iron (1,690 µg/L and 27,900 µg/L in 2010 and 2011, respectively)[247] and manganese (3,580 µg/Land 4,950 µg/L, respectively),[248] and significantly higher levels (although still within the corresponding standards) of specific conductance, barium, boron, cobalt, magnesium, and chloride in comparison to the up gradient wells. In addition, in 2011 arsenic exceeded the MCL (11.6 µg/L)[249] in MW-11R, whereas in 2010 arsenic in that well was significantly higher (2.44 µg/L) than in the up gradient and side-gradient wells, although still within the standard.

Alliant Energy claims[250] that arsenic groundwater test results exceeding the MCL have never been detected at any of the other monitoring wells at the CCR landfill, and these exceedances have not been observed again at MW-11 since 2004. While Alliant Energy acknowledges that a single down gradient groundwater monitoring well onsite (MW-11) had arsenic exceedances in 2002, 2003, and 2004, there has been no evidence to suggest that any groundwater contamination has extended to any off-site location.[251]

The sampling contractor (BT^2), in their January 18, 2005 letter to IDNR conceded that during the 2004 quarterly monitoring, the groundwater elevations in MW11 twice dropped below the bottom of the well.[252] They stated that "If MW11 is dry during the spring 2005 sampling event we will evaluate installing a replacement well at a deeper depth." Because MW11 was dry during each of the sampling

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[243] EIP (2010a) presents the following data, which is derived from only three sampling events from 2002 through 2004 (" too few to sufficiently assess trends data"):
• Arsenic averages 0.0143 mg/L (1.4 times federal MCL). Maximum value is 0.023 mg/L (2.3 times MCL).
• Iron averages 13.1 mg/L (43 times the SMCL). Maximum value is 28 mg/L (93 times SMCL).
• Manganese averages 7.1 mg/L (142 times the SMCL). Maximum value is 10 mg/L (200 times the SMCL).
• Sulfate averages 243 mg/L (almost equal to the SMCL). Maximum value is 380 mg/L (about 1.5 times SMCL).

[244] BT^2 (2009) claims that 'based on the water level measurements collected at the site since 2001, MW6 is up gradient of the landfill site. MW4, MW5, and MW11 are down gradient of the landfill site….the site does not appear to be affected by groundwater mounding'. EIP (2010a), however, claims that the groundwater monitoring network at the site does not appear to be designed to detect contamination that may be leaving the site. E.g., MW4 and MW5, located on the north side of the landfill, are identified as "down gradient" wells, but their data do not show significant differences from "up gradient" well MW6, and MW4 and MW5 do not appear to be in a location that would detect the migration of contaminants off-site. This observation is supported by the definition of MW4 and MW5 as 'side-gradient' wells (RMT, 2010).

[245] Iowa DNR comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0236.

[246] RMT (2010), Table 3, and TRC (2011), Table 3.

[247] EPA's SMCL for iron is 300µg/L.

[248] EPA's SMCL for manganese is 50µg/L.

[249] EPA's MCL for arsenic is 10µg/L.

[250] Alliant Energy's November 14, 2011 Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0290: http://s398369137.onlinehome.us/files/Regulation.gov/PublicSubmission/2011%2F11%2F22%2FEPA%2FFile%2FEPA-HQ-RCRA-2011-0392-0290-7.pdf

[251] However, according to EIP (2010a) and to USWAG (EPA-HQ-RCRA-2011-0392-0211), there are no off-site monitoring wells to verify this statement. Furthermore, for the ash ponds, no groundwater monitoring is required.

[252] Based on the 2004 and 2009 Annual Water Quality Reports.

campaigns between 2006 and 2009 (and only a minimal amount of water in the well was recorded in the February 2004, November 2004, and May 2005 samplings which, according to BT^2, rendered the sampling records unreliable), a replacement well (MW-11R) was installed in 2010.

Resolution/Remediation: According to EIP (2010a), IDNR required (in 2009) that MW11 be evaluated to determine why it has been difficult to obtain groundwater samples and to replace it with a water-bearing well if it continues to remain dry. A replacement well (MW-11R) was installed in 2010. Following the exceedances of arsenic, manganese and iron detected in MW-11R, IDNR required an assessment monitoring, to determine if the ash settling ponds or natural variability within the aquifer are contributing sources of the elevated constituents; if the CCR landfill is confirmed as a source, the delineation of the extent of groundwater impacts within the water table aquifer; and identification of any current or potential human health and environmental impacts due to the identified site conditions.[253] In response to IDNR requirement, IPL submitted to IDNR a Groundwater Assessment Workplan for the Lansing Power Station, including the installation of additional monitoring wells, and, for two rounds of assessment monitoring, a more comprehensive parameter list.[254]

There are no administrative rulings or court decisions.

USWAG concludes that the site does not qualify as a damage case.[255]

Evaluation:[256]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCLs for arsenic. • Onsite groundwater data exceeded EPA SMCLs for iron, sulfate, and manganese. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an*	• None

[253] IDNR (2012).
[254] The Plan was submitted in September 2012: see SCS BT^2 (2012). IPL contends that existing dredge fills beneath the landfill might be the source of the contamination.
[255] USWAG's Comment to the 2011 NODA docket, ibid: "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The on-site groundwater data in the Reference Document is from only one monitoring well sampled annually between 2002 and 2004 (only three sampling events). No data from other wells in the monitoring well network were presented."
[256] ICF (2010).

explicit finding of specific damage to human health or the environment	

Rationale for Rejection: "Inadequate information. Groundwater exceedances of the primary EPA MCL for arsenic and the EPA SMCLs for iron, sulfate, and manganese have been found onsite in only one well (MW-11) during limited rounds. However, the ability of this well to provide representative groundwater samples is in question as it has been dry for all but 3 of the past 11 sample collection rounds. Therefore, there is inadequate information to determine if the observed sporadic groundwater contaminant concentrations are attributable to CCRs. While the Iowa DNR has required an evaluation of MW11, there are no administrative rulings or court decisions associated with the site."

Postscript: Based on the two most recent groundwater quality reports (2010 and 2011), MW-11R demonstrated SMCL exceedances of iron and manganese, and in 2011 - exceedance of the MCL for arsenic.[257] IDNR's requirement that IPL launch assessment monitoring due to exceedance of arsenic (2011) and two consecutive SMCL exceedances for iron and manganeses (2010-2011) would provide adequate information to determine whether this site qualifies as a potential damage case.

This case is reinstated as a potential damage case based on a recent industry feedback:[258] "*While Alliant Energy acknowledges a single groundwater monitoring well located on the power plant site (MW-11) had groundwater sampling results that exceeded the arsenic MCL in years 2002, 2003, and 2004*,...these high arsenic groundwater test results have not been observed again at MW-11 since 2004...there has been no evidence reflecting any groundwater quality contamination has extended or is a concern to any off-site location."

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[257] RMT (2010), Table 3, and TRC (2011), Table 3.
[258] Comment to the October 2011 NODA docket, on behalf of Interstate Power & Light Co. (EPA-HQ-RCRA-2011-0392-02900.

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PTb14. George Neal Station North Landfill, Berkshire Hathaway - MidAmerican Energy Company, Sergeant Bluff, Woodbury County, Iowa

Type: Landfill (in a former Sand and Gravel Pit) and Surface Impoundments.

Background and Description: The George Neal North Energy Facility (NNEF)[259] has placed coal combustion residual (CCR) into an unlined monofill since 1978. The landfill was originally permitted in

[259] According to http://www.sourcewatch.org/index.php?title=George_Neal_Station_North, the Plant's nameplate capacity is 1,046 MW; it comprises three generating units (with in-service dates in parenthesis): 147 MW (1964), 349 MW (1972), and 550 MW (1975). It is fueled with Appalachian sub-bituminous coal from Virginia and West Virginia. According to http://www.mcilvainecompany.com/Decision_Tree/subscriber/Tree/DescriptionTextLinks/ITT%20Pumps%20in%20Iowa%20Power%20Plant.htm, Units 2 and 3 have pulverized coal boilers while Unit 1 consists of a cyclone-fired boiler. NNEF has a once through cooling system, drawing water from the Missouri River. According to a January 2013 Consent Decree between MidAmerican Energy and the Sierra Club, boiler one and boiler two (147 MW and

1997 and re-permitted in 2001.[260] The landfill has two sections: a 32-acre west area, which receives mostly fly ash and a 50-acre east area, which receives other CCR. Permits for expansion are currently under review. The west area of the landfill is capped and closed while the east area of the landfill was scheduled for closing late in 2010. The Plant's site also contains three unlined surface impoundments, covering a total of about 116 acres.[261] The Plant lies in a rural area on the east bank of the Missouri River, approximately 5 miles south-southwest of Sergeant Bluff and approximately 4 miles west-northwest of Salix, Iowa. The plant has a National Pollutant Discharge Elimination System (NPDES) permit and an Iowa Landfill permit.[262]

Most of the region is covered by variable thickness of Pleistocene and Recent sediments: glacial till, loess, glacial outwash, and river deposits. The NNEF is located on the outside of a meander bend on the Missouri River's floodplain. The site is underlain by up to 140 feet-thick alluvial deposits (gravel, sand and silt). The topmost underlying bedrock comprises 340-feet thick sandstone and shale of the Cretaceous Dakota Group.[263] The alluvial sequence contains two aquifers: a shallow, unconfined aquifer, which coincides with fine-grained, near-surface alluvium; and a deeper, semi-confined aquifer, which coincides with thick sand and gravel deposits.[264] There is a general vertical hydraulic gradient between the shallow and deeper alluvial aquifers. The shallow aquifer is encountered at depth ranging from just below the surface to 18 feet; it may contain elevated iron and/or hydrogen sulfide. The natural flow of both alluvial aquifers is to the southwest, toward the Missouri River; however, mounded water table conditions are evident in the area of the monofill, which result in localized flow to the east and south.

The deeper, Dakota sandstone artesian aquifer is the main regional aquifer.[265] As of the mid-1970s, the closest wells tapping the Dakota aquifer were in the Sergeant Bluff area, some six miles to the north. These wells yielded between 20 and 600 gpm.

Impact and Damage Claims: According to EIP (2010a), when a groundwater monitoring program was implemented in 2001, every down-gradient well in the shallow and deeper alluvial aquifers exceeded the federal Maximum Contaminant Level (MCL) for arsenic, with average values in all but one of the wells ranging from 0.0251 to 0.0882 mg/L (2.5 to 8.8 times the MCL) and a maximum concentration recorded of 0.218 mg/L (22 times the MCL). Available information indicates that the monofill is the primary source of arsenic in the shallow and deep aquifers, though there may be some contribution of arsenic to

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349 MW, respectively) will be retired by April 16, 2016 (Sourcewatch, 2013). This agreement is in resolution of an action brought by Sierra Club against MidAmerican Energy Co. pursuant to sections 304 of the CAA, 42 U.S.C. §7604, for injunctive relief for alleged violations of the Act.

[260] Earthjustice et al., (2008) claim that the MidAmerican Neal North CCR Landfill permitted in 2001is located in an abandoned sand and gravel pit (IDNR ID No. 97-SDP-12-95P).

[261] MidAmerican Energy Response (2009) and Dewberry & Davis (2011): The NNEF has three surface impoundments in series, designated as Pond 1, Pond 2, and Pond 3 (comprising ponds 3A, 3B North, and 3B South). Pond 1 receives boiler slag; Ponds 2 and 3B North receive bottom- and economizer-ash; Pond 3A receives sluiced inflow from Pond 2; and Pond 3B South serves as a 'polishing' pond. Two of the impoundments were constructed in1972, and one – in 1975. The corresponding disposal capacities of impoundments 1, 2, and 3 are 220,000, 477,000, and 1,351,000 cubic yards, respectively.

[262] NPDES permit No. IA0004103 and Iowa Landfill permit 97-SDP-12-95P.

[263] EPA-7-IA-Salix-Woodbury-NSDP-77-004 (1977)

[264] The deeper alluvial aquifer is rather high-yield. According to EPA-7-IA-Salix-Woodbury-NSDP-77-004 (1977), five, 12" diameter and 110-feet deep wells drilled in 1965 for the Terra Chemical Company adjacent to the NNEF produced 650 gallons per minute (gpm) with only two to six feet of drawdown.

[265] According to EPA-7-IA-Salix-Woodbury-NSDP-77-004 (1977), in the mid-1970s it supplied Sioux City with 28 million gallons per day from 16 wells, yielding up to 1,400 gpm per well.

the deep aquifer from an up-gradient source. High levels of manganese, iron, and sulfate have also been found in groundwater down-gradient of the CCR monofill.[266]

The risk evaluation report prepared by MidAmerican Energy Company's consultants identified no known human receptors or water wells down-gradient of the CCR Monofill. However, the report did note that the closest water wells are two wells MidAmerican Energy uses for drinking water at the NNEF. These wells were sampled four times for arsenic in 2002, but the detection limit (0.08 mg/L) was eight times higher than the current MCL, making it impossible to determine whether there were any exceedances of the MCL.

EIP (2010a) notes that some up-gradient wells, particularly in the deep aquifer, also indicate contamination by arsenic. MidAmerican Energy suggests[267] that the up-gradient arsenic contamination is due to up-gradient sources of contamination, and is not CCR-related. EIP (2010a) counters that some of the up-gradient wells are improperly classified because groundwater does flow from the monofill towards these wells due to mounding, and because the impoundments may also contribute (though this could not be confirmed as there is no monitoring data available for the impoundments). EIP (2010a) also notes that down-gradient concentrations are on average higher than the up-gradient levels, even within the same groundwater path, indicating some of the contamination is likely from the landfill.

According to both IDNR[268] and MidAmerican Energy, the background levels of arsenic naturally exceed the MCL at the site. Late in 2010, a series of tests was conducted to evaluate water quality at two drinking water wells close to the power plant site. In these sites, arsenic levels were below EPA's drinking water standards. Further review of annual groundwater quality reports for this site has identified several instances of contaminant levels being misrepresented in EIP (2010a) by failing to consider background levels, citing data outliers as current site conditions, and due to incorrect application of current up-gradient control limits.

According to MidAmerican,[269] multiple studies have reported arsenic is a common constituent in groundwater and soil in the state of Iowa.[270] The IDNR Study Report noted, "because of the high percentage of detections (100%) and the state-wide distribution of arsenic in the soil, it is thought to be naturally occurring from the breakdown of arsenic bearing minerals, such as pyrite, in the glacial till and rock parent material." A review of contour maps indicates that soil surrounding the George Neal Station facilities has some of the state's highest concentrations of arsenic from naturally occurring sources.

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[266] According to Rowden (2010), The mean concentration of arsenic in the soil samples was three orders of magnitude greater than typical arsenic concentrations found in surface water samples collected across Iowa by the USGS and the IDNR (www.igsb.uiowa.edu/web apps/iastoret/, no longer accessible). In a recent groundwater study, 48 percent of the water samples from Iowa rural drinking water wells contained arsenic, with eight percent of the samples containing arsenic at levels above the USEPA maximum contaminant level (MCL) of 10.0 ppb for public water supplies (SWRL2, 2009).

[267] Mid American comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0233.

[268] IDNR comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0236.

[269] MidAmerican Energy comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0233.

[270] E.g., University of Iowa and others' statewide private wells studies in 2004 and 2006-2008, and IDNR 2010 study on the geochemistry of soil samples collected from across the state (Rowden, 2010). According to Table 3 of that study, using inductively coupled plasma-atomic emission spectrometry/acid dissolution (ICP40), the arsenic median concentration and standard deviation of statewide shallow soil samples are 8.40 ± 2.70 ppm, and the corresponding statewide values for deep soils are 9.50 ± 3.25 ppm. Using ICP40 or atomic absorption spectrometry (AA), the median arsenic levels in northwestern Woodbury County range between 12-13 ppm (ICP40) or between 10-12 ppm (AA) for the shallow soil samples, respectively, and between 13-14 ppm (ICP40) or between 13-15 ppm (AA) for the deep soil samples.

Evaluation against Proven Damage Criteria[271]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCL for arsenic. • Onsite groundwater data exceeded EPA SMCLs for iron, sulfate, and manganese. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: No enforcement action has been taken at the Neal North Generating Facility Ash Monofill. MidAmerican Energy Company submitted a risk evaluation for arsenic to IDNR in 2006, and IDNR requested more data to support the conclusion in the risk evaluation attributing the high concentrations of arsenic to off-site sources or the submission of a plan to address the arsenic plume.

The George Neal Station North landfill completed construction of a new composite lined cell in 2009 and the older cells are being closed and capped.

USWAG claims that this site does not qualify as a damage case.[272]

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[271] ICF (2010a).

[272] USWAG comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. Allegations in the Reference Document also claim damage to the Missouri River but provide no surface water sample data or scientific study to support the claim.
MidAmerican tested the groundwater and surface water in various locations of the Missouri River, drinking water wells, and the drinking water systems at both George Neal Station North and George Neal Station South on August 30 and 31, 2010….. Where there were detectable levels of arsenic in the samples, they were still below the drinking water standards (i.e., MCLs) – meaning that the raw river water and raw well water at or around the two George Neal Station sites meets USEPA drinking water standards for arsenic. The actual processed drinking water at both of the sites was below detectable levels." Reference: Test America. 2010. Analytical Reports (2) prepared for MidAmerican Energy, Sioux City, Iowa. September 3, 2010. The same information is also cited in MidAmerican Energy's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0233.

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of the primary EPA MCL for arsenic and the EPA SMCLs for iron, sulfate, and manganese have been found onsite. There are no administrative rulings or court decisions associated with the site.>

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PTb15. George Neal Station South[273] Ash Monofill, Berkshire Hathaway – MidAmerican Energy Company, Salix, Woodbury County, Iowa

Type: Landfill (Formerly a Sand and Gravel Pit).

Background and Description: The George Neal South plant has placed coal combustion residual (CCR) into an onsite monofill since the early 1980s. The 30-acre landfill was issued a state permit in 2000, approximately 20 years after it was first used.[274] The plant has also a National Pollutant Discharge Elimination System (NPDES) permit.[275] The plant lies in a rural area next to the Missouri River, south of Sioux City, Iowa; it began groundwater monitoring around the landfill in 2000.

The monofill rests on alluvial sediments about three-quarters of a mile east of the Missouri River. The natural direction of groundwater flow is west toward the Missouri River. Paired, shallow (23 to 28 feet deep) and deeper wells (49 to 59 feet deep) show very little difference in head, indicating lateral flow is dominant with little vertical component. The ash monofill is 20 feet higher than the surrounding area, and groundwater mounding may have altered groundwater flow directions in the vicinity of the monofill.[276]

Impact and Damage Claims: EIP (2010a) indicates that average arsenic concentrations from the landfill were above the primary EPA Maximum Contaminant Level (MCL) in onsite down-gradient monitoring wells. The report also notes that average concentrations of iron, manganese, and sulfate were above secondary EPA MCLs (SMCLs) at various onsite groundwater monitoring wells.

When a groundwater monitoring program was implemented in 2000, the average concentrations of arsenic in two down-gradient wells ranged from 0.011 to 0.035 mg/L, 1.1 to 3.5 times the MCL, and the maximum concentration was more than x8 the MCL. High levels of manganese, iron, sulfate, barium, selenium, and zinc have also been found in groundwater down-gradient of the landfill. The Iowa Department of Natural Resources (IDNR) uses Up-gradient Control Limits (UCLs) to determine the spread of contaminants based on historical up-gradient monitoring well concentrations. EIP (2010a) indicates that barium, selenium, and zinc have all exceeded the UCLs in wells down-gradient of the landfill, indicating the migration of contaminants. There are indications that the only "up-gradient" monitoring point (MW4) has been affected by CCR constituents as a result of groundwater mounding within the landfill.[277]

EIP (2010a) claims that MidAmerican Energy did not address the question raised by IDNR (2005) of whether there are any off-site receptors such as private residential wells or other uses of water that may be

[273] George Neal Station South is located about two-miles south of George Neal Station North. It is fueled with Appalachian sub-bituminous coal from Virginia and West Virginia. According to http://www.sourcewatch.org/index.php?title=George_Neal_Station_South, the nameplate capacity of the single generating-unit Plant (*Neal Unit 4*, serial with Neal Station North's Units 1-3; online since 1979) is 640 MW. George Neal Station South has a once through cooling system, drawing water from the Missouri River.
[274] Earthjustice et al., (2008) claim that the MidAmerican Neal South CCR Landfill permitted in 2000 is located in an abandoned sand and gravel pit (IDNR Permit No. 97-SDP-13-98).
[275] NPDES Permit No. IA0061859.
[276] EIP (2010a).
[277] EIP (2010a) claims that the up-gradient monitoring well MW4 is close to the edge of the CCR monofill, and the relatively high concentrations of iron, manganese, and sulfate in this well suggest the possibility that it is affected by ash constituents as a result of groundwater mounding within the monofill, which is elevated 20 feet above the floodplain. There are not enough monitoring wells next to this monofill to determine whether mounding has taken place, but mounding is evident at the Neal North CCR monofill which is in a similar hydrogeologic setting.

adversely affected by the CCR contamination documented at the Neal Station South Ash Monofill. Data obtained from the University of Iowa's GIS department shows a total of two public drinking water sources within a two-mile radius of Neal South.

According to both IDNR[278] and MidAmerican Energy,[279] the background levels of arsenic naturally exceed the MCL at the site. Late in 2010, a series of tests were conducted to evaluate water quality downriver in the Missouri River and at two drinking water wells close to the power plant site. In all these sites, arsenic levels were below EPA's drinking water standards. Further review of annual groundwater quality reports for this site has identified several instances of contaminant levels being misrepresented in EIP (2010a) by failing to consider background levels, citing data outliers as current site conditions, and due to incorrect application of current up-gradient control limits.

According to MidAmerican Energy,[280] multiple studies have reported arsenic is a common constituent in groundwater and soil in the state of Iowa.[281] The IDNR Study Report noted, "because of the high percentage of detections (100%) and the state-wide distribution of arsenic in the soil, it is thought to be naturally occurring from the breakdown of arsenic bearing minerals, such as pyrite, in the glacial till and rock parent material." A review of contour maps indicate that soil surrounding the George Neal Station facilities has some of the state's highest concentrations of arsenic from naturally occurring sources.

Evaluation against Proven Damage Criteria[282]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCL for arsenic. • Onsite groundwater data exceeded EPA SMCLs for iron, sulfate, and manganese. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None

[278] IA DNR comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0236.
[279] MidAmericam Energy comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0233. According to Rowden (2010), The mean concentration of arsenic in the soil samples was three orders of magnitude greater than typical arsenic concentrations found in surface water samples collected across Iowa by the USGS and the IDNR (www.igsb.uiowa.edu/web apps/iastoret/, no longer accessible). In a recent groundwater study, 48 percent of the water samples from Iowa rural drinking water wells contained arsenic, with eight percent of the samples containing arsenic at levels above the USEPA maximum contaminant level (MCL) of 10.0 ppb for public water supplies [SWRL2 (2009)].
[280] MidAmericam Energy comment to the 2011 NODA docket, ibid.
[281] E.g., University of Iowa and others' statewide private wells studies in 2004 and 2006-2008, and IDNR 2010 study on the geochemistry of soil samples collected from across the state [Rowden (2010)]. According to Table 3 of that study, using inductively coupled plasma-atomic emission spectrometry/acid dissolution (ICP40), the arsenic median concentration and standard deviation of statewide shallow soil samples are 8.40± 2.70 ppm, and the corresponding statewide values for deep soils are 9.50 ± 3.25 ppm. Using ICP40 or atomic absorption spectrometry (AA), the median arsenic levels in northwestern Woodbury County range between 12-13 ppm (ICPM40) or between 10-12 ppm (AA) for the shallow soil samples, respectively, and between 13-14 ppm (ICPM40) or between 13-15 ppm (AA) for the deep soil samples.
[282] ICF (2010a).

Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: According to EIP (2010a), despite high levels of arsenic and other contaminants in down-gradient shallow groundwater, IDNR has not required any off-site monitoring, or even monitoring at an appreciable distance from the ash ponds. IDNR has not taken any enforcement actions with respect to the contaminated groundwater. However, in 2005 IDNR requested that future groundwater reports fromMidAmerican Energy discuss the potential for groundwater mounding under the landfill, evaluate if listed wells are truly "upgradient," and discuss potential for migration and possible receptors. MidAmerican Energy's 2008 Annual Water Quality Report, however, does not address any of these points.

USWAG claims[283] that this site does not qualify as a damage case.

ICF (2010) Rationale: [284] *Potential Damage.* <Groundwater exceedances of the primary EPA MCL for arsenic and the SMCL for iron, sulfate, and manganese have been found onsite. There are no administrative rulings or court decisions associated with the site.>

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[283] USWAG comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. MidAmerican tested the groundwater and surface water in various locations of the Missouri River, drinking water wells, and the drinking water systems at both George Neal Station North and George Neal Station South on August 30 and 31, 2010…. Where there were detectable levels of arsenic in the samples, they were still below the drinking water standards (i.e., MCLs) – meaning that the raw river water and raw well water at or around the two George Neal Station sites meets USEPA drinking water standards for arsenic. The actual processed drinking water at both of the sites was below detectable levels." The same information is also cited in MidAmerican Energy's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0233.
[284] ICF's (2010) writeup is based on viewing pertinent IDNR documents and a telephone call to Nina Koger, IDNR's Permitting Department, October 25, 2010.

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PTb16. Mill Creek Station, Louisville Gas and Electric (LG&E), Louisville, Jefferson County, Kentucky

Type: Landfill, Surface Impoundment, and FGD Processing Ponds.

Background and Description: The Mill Creek Plant, with a gross generation-capacity of approximately 1,600 MW, is located in the Kosmosdale neighborhood of Louisville, Kentucky, about 20 miles southwest of Downtown Louisville.[285] The Plant has been disposing of coal combustion residuals (CCRs) from Louisville Gas and Electric (LG&E) in landfills since 1972.[286] The first two phases of the

[285] 14660 Dixie Hwy., Louisville, KY 40272.
[286] According to O'Brien & Gere (2009), the plant is comprised of four coal-fired electric generating units commonly referred to as Unit 1, Unit 2, Unit 3, and Unit 4. Units 1 and 2 began operating in 1974, while Unit 3 was brought online in 1978 and Unit 4 went into service in 1982. According to http://www.lge-ku.com/plant_info.asp, the Plant's net summer capacity is 1,472 MW. Mill Creek burns approximately 5 million tons of coal annually. Most

landfill were unlined since they were permitted as "inert" by the Kentucky Division of Waste Management (KDWM). In 2009, a third phase was constructed with a composite liner, and the total area of the landfill reached 185 acres.[287] The landfill, located on the north side of the power plant and approximately 175 feet from the Ohio River, receives fly ash, bottom ash, and FGD gypsum.[288] Additionally, there is a 79 acre ash pond[289] (in receipt of bottom ash, fly ash, boiler slag, flue gas desulfurization sludge, coal fines, process water drainage, and pyrites) and four flue gas desulfurization (FGD) processing ponds (2 acres or less each) located onsite.[290] Groundwater has been monitored around the landfill since 1994;[291] however, no offsite assessment or monitoring has been required. Neither the KDWM nor the Kentucky Division of Water (KDOW) requires groundwater monitoring of the ash pond; however, plant production wells (PW-1, PW-2, and PW-3) south of the pond can be used as indicators of CCR constituent migration from the ash pond. The ash pond discharges ultimately outfall to the Ohio River under KPDES permit # KY0003221.

The Ohio River Alluvium, predominantly Pleistocene glacial-outwash sediments, consists of unconsolidated sand, gravel, silt and clay deposits along the river. The coarse sand and gravel beds supply large volumes of water to industrial, municipal, and domestic wells. Sediments in the Ohio River floodplain in Jefferson County generally yield 200 - 500 gal/minute in most wells that penetrate the full thickness of alluvium and over 1,000 gal/minute in large-diameter wells.[292] Groundwater can migrate quickly through these coarser sediments and consequently is rated as highly sensitive to pollution.[293]

Impact and Damage Claims: EIP (2010a) indicates that levels of arsenic exceeded the primary EPA Maximum Contaminant Level (MCL) in onsite groundwater.[294] Additionally, in 1996 and 2009 monitoring data of sulfate and total dissolved solids (TDS) exceeded secondary EPA MCLs (SMCLs) in onsite groundwater. EIP (2010a) also indicates that nine wells onsite have groundwater parameters that

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coal (Illinois Basin bituminous coal—much of it mined in West Kentucky) was delivered in 100-ton railroad hopper cars until 1983, when the company's first permanent coal-barge unloading facility was constructed at the plant. Mill Creek Station produces over 650,000 tons of gypsum scrubber by-product per year in an onsite processing plant (http://www.eon-uk.com/about/949.aspx), and plans on selling some of it for the manufacturing of sulfur fertilizer (http://wfpl.org/post/lge-announce-plans-reuse-coal-byproducts-mill-creek).

[287] According to the LG&E and KU Energy comment to the October 2011 NODA (EPA-HQ-RCRA-2011-0392-0251), the composite liner of the newly expanded landfill has a drainage collection layer and a compacted clay liner. The latter 'likely' has a permeability of less than 1×10^{-6} cm/sec and significant cation exchange capacity.

[288] According to the KDWM, CCR in landfill Sites A, B, and C will eventually cover the entire property except where the plant structures and ash pond exist. Site B was the original landfill that was constructed in 1980 and was operated until 1990. Disposal in Site A, situated along the Ohio River, began in 1990 and is still active. The Site A landfill was vertically expanded in 2004. Site C is a lateral expansion that was commissioned in 2009, and is used concurrently with Site A.

[289] According to O'Brien & Gere (2009), sited on natural clay substrate but without a liner.

[290] These ponds were commissioned in the late 1970s and early 1980s. They receive wastes associated with the FGD system, a gypsum processing unit, cooling tower blowdown, and storm water runoff (O'Brien & Gere, 2009). Solids are periodically removed from at least one of the ponds that takes gypsum waste water and disposed in the on-site landfills. The KDWM does not regulate these ponds and as a result, there are no monitoring data, nor information on whether they are lined.

[291] According to EPA-HQ-RCRA-2011-0392-0251, the current groundwater monitoring program or the substantial equivalent have been in place since 1981 and have resulted in nearly 200 sample collection events for each well and a similar number of opportunities to evaluate groundwater flow direction.

[292] Carey and Stickney (2005), http://www.uky.edu/KGS/water/library/gwatlas/Jefferson/GWavailability.htm

[293] Ray et al., (1994).

[294] Groundwater has been contaminated with arsenic at x1.5 the federal MCL in three wells down-gradient from the landfill and ash pond adjacent to the Ohio River.

exceed one or more drinking water standards and that the horizontal extent of contamination is one-mile wide.

LG&E claims[295] that groundwater monitoring conducted at the site since 1982 has not identified an exceedance of a primary MCL at any off-site location. Furthermore, there is no significant potential for adverse impacts on local water supplies. The groundwater flow for the location is in the direction of the Ohio River and there are no residential wells (or non-company owned properties) between the plant and the river. All local households are connected to public water supplies. KDEP presents arguments in support of LG&E's claims concerning the confinement of the groundwater impacts to the utility's property, as a result of which it is highly unlikely to affect any domestic groundwater well users. Past reports that surveyed off-site potential drinking water locations in the area found two domestic wells and nine industrial wells near the facility, but all were up-gradient.[296] In addition, KDEP claims, concerning EIP's (2010a) allegations that arsenic levels (0.015 mg/L) exceed the MCL of 0.01 mg/L, that the last KDEP analyses report (May 6, 2011) shows 0.0019 mg/L arsenic for the down-gradient MW-6 and 0.00635 mg/L for the up-gradient MW-3.

Elsewhere, LG&E and KU Energy LLC claim[297] the following: (i) the Utility does not deny SMCL exceedances. (ii) By alleging that arsenic exists in three wells down-gradient of a CCR landfill at the Mill Creek site at levels x1.5 the Primary MCL, EIP (2010a) fails to acknowledge that similar MCL exceedances for arsenic were observed in other compliance wells *before* landfilling activities began and in background wells, suggesting that arsenic levels at the site may be at least partly the result of naturally occurring conditions. Also, prior to 2001, the arsenic MCL was still 0.05 mg/L. (iii) Considering that the six CCR metals (arsenic, cadmium, chromium, lead, mercury, and selenium) were routinely monitored by LG&E for a 16-year monitoring period (1981 to 1996) over more than 20 episodes in each of six down-gradient wells at the site, the five specific events with a Primary MCL exceedance cited by EIP (2010a) constitute fraction of a percent chance of the analytical outcome resulting in a value that was sufficient to merit an expression of concern. With perspective, this information does not indicate a pattern of contamination or a trend towards the endangerment of human health. (iv) All groundwater effects attributed to CCR storage and handling were confined to the site itself and did not extend off site. The findings of a 2006 well survey of potential users for properties within one mile of the facility, and a risk evaluation and river sampling required by KDWM, all demonstrate that the effects of CCR management at the site would not negatively affect human health or water quality in the Ohio River. These findings support the conclusion that extensive data with respect to on-site conditions render further off-site investigation unnecessary.

Evaluation against Proven Damage Criteria[298]

Criteria	**Evaluation**
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have*	• Onsite groundwater data exceeded the primary EPA MCL for arsenic. • Onsite groundwater data exceeded EPA SMCLs for sulfate and TDS.

[295] LG&E and KU Energy, comment to the Proposed Rule docket, virtual pp. 15-16, http://www.uswag.org/pdf/2010/CCR%20Comments/LGEKE11192010.pdf
[296] Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0219.
[297] Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0251.
[298] ICF (2010a).

migrated to the extent that they could cause human health concerns	• Nine wells onsite have parameters that exceed one or more drinking water standards. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Other Considerations

- The CCR landfill permit issued by KDWM requires that onsite monitoring occur semi-annually; however, no offsite investigations have been required.
- There are reportedly 15 private wells within a two-mile radius and four public wells within a five-mile radius of the landfill.
- The 79 acre fly ash pond is rated a high hazard by EPA due to its close proximity to a residential development and a school. The embankment failed in 1978 during a flood; however, no release of CCRs occurred.
- The USEPA classified this site as "Indeterminate" in its 2007 damage case report due to insufficient information.[299] However, USWAG's claim that there has been no new information since to support groundwater impacts is factually incorrect.[300]

Resolution: According to EIP (2010a), KDWM required Mill Creek Plant to conduct groundwater assessment monitoring in October 1996 due to elevated indicator parameters. A groundwater assessment report was submitted on September 10, 1997. By November 12, 1997, the Mill Creek Plant had returned to normal detection monitoring. Apparently, the KDWM has never required any off-site sampling, any off-site drinking water well investigations, or on-site corrective actions.

KDEP claims[301] that the groundwater flow from the ash pond is to the Ohio River, and because the plant owns the land, there are no residential drinking water wells between the pond and the river. The samples exceeding arsenic are from on-site wells. Kentucky has discretion under 401 KAR 45:160 Sect.1, to require or not require a groundwater corrective action, based on which the owner/operator is currently not required to perform a corrective action. The ash pond is subject to a permit-by-rule under 401 KAR 45:060, i.e., it has a permit as long as its KPDES permit is current. The data quoted in EIP (2010a) is from the landfill permit. Due to the direction of groundwater flow towards the river, only the wells next to the Ohio River down-gradient from the power plant may be of some interest and those are most likely industrial wells. Past reports that surveyed off-site potential drinking water locations in the area found two domestic wells and nine industrial wells near the facility, but each was upgradient. Households in the Louisville-Jefferson County Metro area are connected to municipal drinking water lines.

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[299] USEPA (2007), Table 2.

[300] According to EIP (2010a), the May 2009 groundwater sampling of monitoring wells around the ash landfill detected exceedances of TDS (in landfills Sites A, B, and the just installed MW-11, next to the newly opened Site C) and of sulfate (in Sites A and B). As stated under *Resolution* above, KDEP has acknowledged sulfate and chloride exceedances (MW-6) in a May 2011 sampling.

[301] Kentucky Department of Environmental Protection comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-6260, and Kentucky DEP, Division of Waste Management's comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0219.

KDEP states[302] that the Commonwealth required assessment monitoring for high sulfates levels. Since sulfate is an SMCL, the Commonwealth allowed continued monitoring based on the condition that sulfates remain below the SMCL of 250 mg/L. Sulfates in MW-6 are at 570 mg/L based on the last groundwater monitoring report (May 6, 2011). Using the ANOVA statistical method, chloride is at 776 mg/L; because it is statistically significant, KDEP is currently evaluating this information.

USWAG claims that this site does not qualify as a damage case.[303]

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary EPA MCLs have been found onsite. Additionally, several other groundwater parameters have exceeded drinking water standards onsite. There has not been any assessment of groundwater or surface water offsite and there are no other impact or damage claims. Onsite monitoring is required semi-annually; however, there are no other regulatory corrective actions, administrative rulings, or court decisions associated with the landfill.>

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http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys2/mill-creek-final.pdf

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[302] Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0219.

[303] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "The Kentucky Division of Waste Management (KDWM) required Mill Creek Plant to conduct groundwater assessment monitoring in October 1996 due to elevated indicator parameter concentrations. In response, a groundwater assessment report was submitted on September 10, 1997. There are no other citations or information related to regulatory actions in the Reference Document.
This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The USEPA classified this site as "Indeterminate" in their 2007 report (USEPA. 2007. Coal Combustion Waste Damage Case Assessments, EPA-HQ-RCRA-2006-0796-0015. July 2007) due to insufficient information; no new information has been provided pertaining to this site in the Reference Document. There are no human or ecological receptors between the points of alleged on-site MCL exceedances and the Ohio River. Additionally, groundwater in the area is not being used as a drinking water resource. Finally, the cited groundwater assessment and associated investigations found no indications of potential off-site effects associated with the management of CCRs. Landfill Site C was constructed in 2009 and is currently in use, along with Site A (Written communication, Louisville Gas and Electric Company. November 2 and November 9, 2011.)"

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PTb17. Shawnee Fossil Plant, Tennessee Valley Authority, Paducah, McCracken County, Kentucky

Type: Landfills (Dry Ash Stacking Area) and Surface Impoundments.

Background and Description: The Shawnee Fossil Plant[304] is located 10 miles west of the City of Paducah,[305] Kentucky, along the south side of the Ohio River. The Plant has disposed of coal combustion residual (CCR) from the Tennessee Valley Authority's (TVA) plant in two unlined surface impoundments,[306] one of which was commissioned in the late 1950s and the other, in 1971; and in unlined landfills (Consolidated Waste Dry Stack, CWDS), since 1984.[307] The facility utilizes one impoundment

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[304] The Shawnee Fossil Plant is located in the Jackson Purchase Region of western Kentucky, which represents the northern tip of the Mississippi Embayment portion of the Coastal Plain Province. According to TVA's Shawnee Fossil Plant website: http://www.tva.com/sites/shawnee.htm, Shawnee has nine active coal-fired generating units, with nameplate capacity of 175 MW each, with a summer net capability of 1,206 MW. One unit (#10) at Shawnee was idled in October 2010. Shawnee Units 1 and 4 either will be converted to renewable fuel (biomass), controlled by adding scrubbers and selective catalytic reduction systems, or retired by December 31, 2017. This decision follows violations by TVA of the New Source Review requirements pursuant to the Clean Air Act amendments of 1977, and agreements between TVA and EPA, the states of Alabama, Kentucky, Tennessee and North Carolina, and three environmental advocacy groups – the Sierra Club, the National Parks Conservation Association and Our Children's Earth Foundation.

The first generating unit went into operation in April 1953. By October 1956, all ten of the plant's coal units were generating power. Unit 10 is the site of the first U.S. demonstration of a commercial scale atmospheric fluidized bed combustion (AFBC) boiler for using high-sulfur coal. The plant consumes some 9,600 tons of coal a day.

[305] The Shawnee Fossil Plant is located about three miles north of DOE's Paducah Gaseous Diffusion Plant (PGDP), at 7900 Metropolis Lake Road, West Paducah. Since 1955, PGDP has been supplying enriched uranium for commercial reactors and military defense reactors. In the fall of 1988, DOE and the EPA entered into an "Administrative Order by Consent" under Sections 104 and 106 of CERCLA to address the PGDP's off-site contamination. On June 30, 1994, EPA placed PGDP on the National Priorities List (NPL).

[306] According to TVA (2009a), Ash Pond No. 1, going back to the Plant's inception in the 1950s, was taken out of service in 1971. The active Ash Pond (No. 2) occupies over 142 acres and has a storage capacity of over 4.7 million cubic yards. Persistent seepage along the northeastern toe of the dike's slope has been reported for over 20 years. Northeast of the CWDS there is a 29-acre Inactive Dredge Cell, which between 1983 and 1984/5 received some 750,000 cubic yards of dredged ash from Ash Pond No. 2. It was drained and closed following the collapse of the interior (coal-ash constructed) dike that separated it from Ash Pond No. 2.

[307] For a Site Location Map and Photo Location Plan, see O'Brian & Gere (2013), Figures 1 and 2, respectively. According to TVA (2009a), approximately 600,000 tons of dry ash is collected in silos each year and hauled to an onsite dry stack disposal area (Consolidated Waste Dry Stack, CWDS). Approximately 40,000 tons per year of

known as Ash Pond No. 2 for liquid-borne CCR management. Ash Pond No. 2 was initially constructed over native clay in 1971 with 15-foot high compacted clay dikes.[308] Water that is routed through Ash Pond No. 2 is discharged from the stilling basin via a multi-riser structure which outfalls into an outlet channel and ultimately back to the Ohio River. The discharge is permitted under Kentucky Pollutant Discharge Elimination System (KDPES) Permit No. KY0004219.[309]

Recently, the Kentucky Division of Waste Management (KDWM) permitted the expansion of the landfills without a liner, which are designated as "special waste landfills." The landfills and fly ash ponds are located approximately 500-700 feet from the south shore of the Ohio River just east (upstream) of the confluence of the river and Bayou Creek, and groundwater from the site discharges to surface water via Little Bayou Creek (LBC) located onsite. Groundwater was assessed onsite already in the 1980s, but consistent monitoring began only in 2003. No offsite groundwater data are available.

The predominant natural physiographic features of the site are the recent floodplain of the Ohio River and the low upland terrace developed on loess deposits.[310] The floodplain along the south bank of the river averages about 2,000 feet in width and generally lies at or above approximately 320 feet AMSL. The floodplain is characterized by a natural levee immediately adjacent to the river and a lower, locally swampy area, extending south of the levee to the base of the upland terrace. At the southern margin of the floodplain, the topography rises some 20 to 30 feet to a relatively flat upland terrace bench. Most of the plant facilities are situated on this terrace.

Plio-Pleistocene-age alluvial terrace deposits lie directly below the ash and fill deposits over a large portion of the site, including the dry ash stacking facility. Most of the loess originally present above the terrace deposits is believed to have been removed during construction of the former ash pond. The upper portion of the terrace deposits are characteristically fine-grained and lenticular, consisting of variable mixtures of clay, silt, and fine sand. Thickness of the upper terrace sediments ranges from 4 to 25 feet and averages 9 feet in the landfill area. These sediments are distinct from the lower part of the terrace deposit, which is composed predominantly of rounded chert gravel with sand and very minor amounts of clay and silt. Occasional sand lenses occur within the gravel unit, and fairly continuous micaceous sand was encountered below the gravel layer at most borings. The lower gravel unit and associated sand layers are

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bottom ash is wet-sluiced to the Active Ash Pond No. 2. Dewatered bottom ash is reclaimed from the Active Ash Pond No. 2 and stacked within the CWDS. The CWDS was constructed (with a slight offset) over the original Ash Pond No. 1. The CWDS was horizontally expanded in 2009 to a total area of 200 acre and over 33 million cubic yards of storage capacity. Currently 80-100 feet high, the new expansion would attain an ultimate height of 270 feet. Note: Based on an interview with a KDWM regulator, EIP (2010a) cites *two* contiguous CCR landfills designated as "special waste landfills" under the same permit, mentioning that both landfills are active although one is nearing closure (the one closest to the coal ash ponds has a partial final cover), while the other was approved for operation by KDWM in 2007. It is probable that the apparent inconsistency between these two sources can be reconciled by assuming that what TVA (2009a) cites as a single CWDS unit that has been recently laterally expanded is considered in EIP (2010a) as two discrete cells of the same landfill. For additional information on the Shawnee Fossil Plant's waste handling system and the 1989-1990 mechanical modifications to Units 1 and 4, see Section 3.2 in TVA (2005) and EIP (2011), respectively.

[308] According to O'Brian & Gere (2013), the pond's pool area is 142 acres. The dikes were reportedly raised 10 feet using the upstream method of dike raising with compacted clay fill, founded partially on bottom ash and partially on the original dike crest. Originally and up to about the mid-1980's, the ash pond received both sluiced bottom ash and fly ash, but later only received sluiced bottom ash. Bottom ash is wet sluiced into the pond via influent lines located at the southeast corner of the impoundment. The bottom ash is periodically dredged from the influent channel using long-stick excavators, which place the material in stockpiles within the eastern portion of the impoundment.

[309] O'Brian & Gere, ibid.

[310] TVA (2005).

commonly referred to as the Regional Gravel Aquifer (RGA), the principal aquifer in the site region. Borings in the landfill area indicate RGA thicknesses of 30 to 65 feet, with an average thickness of 47 feet. Regionally, the RGA is thinnest near the Ohio River, with thickness increasing with distance from the river.[311]

Bedrock at the site consists of the Upper Cretaceous and Tertiary-age Clayton and McNairy Formations, comprising fine- to medium-grained quartz sand inter-bedded with micaceous clay.[312] They are underlain by Mississippian–age Warsaw limestone, which lies at an approximate elevation of 6 feet AMSL. Bedrock surface dips to the southwest toward the axis of the Mississippi Embayment.[313]

Groundwater monitoring comprises 14 wells: four wells (D-8A, D-11, D-19, and D-27) have been in place since the late 1987-1988, whereas the other ten wells were installed in 2007. Unlike other TVA plants, the monitoring wells at Shawnee are screened in three distinct aquifers under the plant: the alluvial aquifer, the Upper Continental Deposits (UCD), and the Regional Groundwater Aquifer (RGA).

According to EIP (2010a), the uppermost water-bearing zones are alluvial aquifers consisting of a perched water table underlain by a lower aquifer that intersects the adjacent Little Bayou Creek. The perched water table has a negative groundwater gradient, whereby the contaminated shallow groundwater migrates into the lower aquifer. Groundwater potentiometric surface maps from 2000 and 2004 show mounded groundwater beneath the CWDS and a radial groundwater flow from that high point; the radial groundwater flow directions are influenced by the adjacent stream bank groundwater storage.[314]

Impact and Damage Claims: According to TVA (2005), the dry ash stacking area is the primary focus of groundwater quality impacts. EIP (2010a) indicates that levels of arsenic and selenium exceeded the primary EPA Maximum Contaminant Levels (MCLs) in onsite groundwater. Additionally, sulfate and total dissolved solids (TDS) exceeded secondary EPA MCLs (SMCL), and boron exceeded the EPA Lifetime Health Advisory Level in onsite groundwater.[315] EIP (2010a) also indicates a reddish leachate

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[311] TVA (2005). According to Clausen and Richards (1994), measured hydraulic gradients within the RGA are very low, on the order of 1 x 10^{-4} across the entire PGDP site. Localized areas of increased gradient occur near the Ohio River and the Pleistocene terrace. Slug test pumping well test and computer modeling indicate the hydraulic conductivity of the RGA ranges from 10^{-4} to 1 cm/s. Assuming porosity of 0.3 and the above data flow, they estimate velocities within the RGA to be on the range of 0.3 to 2.7 m/day.
[312] TVA (2009a).
[313] TVA (2005). For additional information on the geology and geohydrology of McCracken County and the Paducah area, see Free et al., (1957), Hopkins (1966), Clausen and Richards (1994), Clausen et al., (1995), and Carey and Stickney (2005).
[314] EIP's (2010a) hydrogeologic summary is endorsed by TVA in its comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0208). According to Section 3.4.1 in TVA (2005), groundwater potentiometric levels measured on June 27, 2000 in the RGA indicate mounding of the potentiometric surface in the dry stack area. Potentiometric levels range from about 316 to 317 feet AMSL at the perimeter of the landfill to a maximum of approximately 323 feet AMSL near its center. The overall potentiometric surface configuration suggests that groundwater originating within the limits of the dry ash stack ultimately discharges to LBC and to the Ohio River.
[315] Arsenic and selenium exceeded the MCLs in onsite groundwater (by up to x1.2 and x1.7, respectively); sulfate and TDS exceeded the SMCL (by up to 5.6 and x4, respectively), and boron exceeded the EPA Lifetime Health Advisory Level (by up to x7.5) in onsite groundwater. According to TVA Inspector General (2011), Shawnee had Maximum Contaminant Level exceedances for boron repeated throughout the two years of monitoring reports that were reviewed. However, the monitoring reports noted that the data used in computing the mean boron value is over 17 years old. Additionally, Shawnee's personnel have said that background data has been insufficient to monitor for statistical exceedances. According to Shawnee's personnel, TVA has installed new monitoring wells at Shawnee and

has been seeping into Little Bayou Creek onsite, which discharges into the Ohio River a few hundred feet downstream. Finally, EIP (2010a) infers that TVA contaminants have affected Metropolis Lake, a natural meander cutoff east of the site, where a fish-consumption advisory has been issued by the Kentucky Department of Fish & Wildlife Resources because of mercury and PCBs in fish tissue.[316]

Following the expansion of the groundwater monitoring well system in September 2008 from three to 14, semi-annually sampled wells (eleven of which are down-gradient), and an increase in the number of parameters analyzed, additional evidence for recent (2008-2010) groundwater impacts has emerged:[317] based on the 2008 monitoring data, in two of the down-gradient wells levels of arsenic and selenium exceeded the MCLs in onsite groundwater, and all 14 wells exceeded at least one of the following SMCLs: boron, sulfate, and TDS (the impact on the three up-gradient wells is attributed to groundwater mounding). Groundwater data from 2009/2010 detected new MCL exceedances, including beryllium in one well (5.8 ppb), chromium in one well (150 ppb), and lead in one well (120 ppb, eight times the MCL). Exceedances of other health-based guidelines were also identified for cobalt, nickel, molybdenum, and vanadium. EIP (2010a) states there are reportedly 24 private wells within a two-mile radius of the Site.

In general, wells with the highest contaminant concentrations were located the closest to CCR disposal areas. According to KDWM, with the exception of a single well, there are no wells adjacent to CCR disposal areas that have not been affected by CCR because of the radial groundwater flow component from those areas.[318]

Two springs on-site that are contaminated with TCE and technetium from the Paducah Gaseous Diffusion Plant (PGDP) are groundwater discharge points for a 3-mile long groundwater plume.[319] Whereas TVA presents correspondence from KDEP which affirms the radiologic, TCE and PCB impacts from the

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developed background levels. Background levels are required by Kentucky regulations and are used to determine exceedances. The exceedances for boron did not result in an assessment.

316 Citing from EIP (2010a): "The well nearest the lake, well D-77, is at times hydraulically downgradient from the plant and CCW disposal areas. Exceedances of MCLs and SMCLs have been measured at this well."

317 Risky Business (2011), Page B.4; and Quarles and Segall (2010). TVA did not begin performing site-wide up-gradient-down-gradient statistical analyses until 2010, after it had eight quarters of quarterly monitoring data from the new wells. After statistically analyzing the limited available data, TVA observed that the majority of wells in the UCD and RGA aquifers showed "statistical exceptions" for boron, pH, sulfate, and other parameters; "The prevalence of elevated levels of boron, sulfate, and TDS compared to background suggests that local groundwater might be affected by coal combustion byproduct leachate." Results of 2010-2012 samplings indicate that manganese values in down-gradient wells (e.g., Well D-75A: 64-69 mg/L) are higher between one- and three-orders of magnitude as compared to corresponding levels in up-gradient wells, and for boron - between one- and two-orders of magnitude (e.g., Well D-76A: 15-25 mg/L) as compared to corresponding levels in up-gradient wells. See Tables 11-2 and 11-3, there.

318 The least impacted is the background well D-19, located the farthest from the CCR disposal areas, with the only reported exceedance being pH. KDEP, as presented in TVA's comment to the docket EPA-HQ-RCRA-2011-0392-0208, believes that the only well representative of groundwater baseline is D-77. In light of statistically significant increase (SSI) of concentrations of total organic carbon (TOC) and chemical oxygen demand (COD) in the Site's groundwater monitoring well data from 2003 to 2008, KDWM acknowledges that higher than normal concentrations of TOC and COD are commonly found in groundwater associated with CCR sites in Kentucky.

319 Areas of contaminated groundwater within the RGA extend beyond the PGDP/DOE property boundary on the north and northeast. These areas are referred to as the Northwest and Northeast Plumes, respectively. A portion of the Northwest Plume discharges to Little Bayou Creek, a perennial surface water body located northeast of the DOE property. For the extent and reach of the PGDP's RGA plumes (TCE, its degradation products, and Technetium-99) three miles towards the Ohio River and TVA's Shawnee Station area, see: Figure 1 in Clausen and Richards (1994), figure 1.3 in Focused Feasibility Study (2010), and Explanation of Significant Differences to the ROD (2010).

PGDP, which cause mutations in populations of midge larvae, KDEP also asserts that TVA, in the groundwater assessment they did in the 1980s, determined that the whole site has groundwater issues caused by CCR.[320] Elsewhere, KDEM states[321] that most of the shallow groundwater impact appears to be caused by the Ohio River.

The Kentucky Department of Water (KDOW) is critical of the data that EIP (2010a) chose to present for demonstrating primary MCL exceedances,[322] suggesting that the highest values were selected from the facility's reporting without evaluating first whether the exceedance was statistically credible. For example, (i) regarding the presence of "selenium at almost twice the federal drinking water MCL", KDOW claims there are no current MCL exceedances for selenium: the most recent, highest data point was 0.009 mg/L in Well D-74B while the MCL is 0.05 mg/L. (ii) Regarding the presence of "arsenic slightly exceeding the MCL", KDOW claims there are no current MCL exceedances for arsenic. The most recent, highest data point was 0.0045 mg/L of arsenic in Well D-33A while the MCL is 0.010 mg/L.

Regarding at risk populations, the closest private water wells in the KDOW database are between 0.79 miles and 1.05 miles to the southwest and the southeast, respectively, of the waste boundary, all situated up-gradient of the waste disposal areas. Moreover, all three wells are situated within the PGDP Water Policy Boundary and are therefore not used for consumption. No residential wells exist on TVA property. Groundwater from the landfill and surface impoundment area discharges to Little Bayou Creek and the Ohio River before it can impact any residential well users.

Finally, KDOW rejects EIP's (2010a) inference about the possible nexus between the contamination of Metropolis Lake and the Site's CCRs by stating that (i) a fish advisory for mercury has been issued for every stream in the state, including the Ohio River, which also has an advisory for PCBs; (ii) data does not exist which allows the determination of the origin of the mercury and PCBs in the fish tissue. KDOW suggests that the contaminated fish are most likely coming from the Ohio River, which inundates Metropolis Lake during floods, restocking the lake with new fish during each flooding event.[323, 324]

Evaluation against Proven Damage Criteria[325]

Criteria	**Evaluation**
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic and selenium. • Onsite groundwater data exceeded EPA SMCLs for sulfate and TDS. • Onsite groundwater data exceeded the EPA Lifetime Health Advisory Level for boron. • No offsite groundwater data are available.

[320] Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0208.
[321] Kentucky Department of Environmental Protection, EPA-HQ-RCRA-2009-0640-6260.
[322] KDEP comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0219.
[323] KDEP comment to the 2011 NODA docket, ibid.
[324] Still, EIP et al., (2013) claims that according to KDEP PDES No. KY0004219, issued July 13, 2005, the Shawnee Plant discharges daily nearly 20 million gallons of 'ash fouled water' into the Ohio River without limits on any toxic metals. In the absence of monitoring at the outfall and immediately downstream, KDOW's contentions cannot be substantiated.
[325] ICF (2010a).

Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• A reddish leachate has been observed seeping into Little Bayou Creek located onsite, which discharges into the Ohio River downstream. No data, however, to support that the reddish leachate is causing damage to human health or environment.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: On August 20, 2009, TVA's Board of Directors decided to convert Shawnee's waste management by switching from wet bottom ash handling to dry storage.[326]

Groundwater was assessed in the 1980s, but consistent monitoring began only in 2003.[327] The early and subsequent impact findings have not elicited any enforcement action by KDWM, including the failure to require offsite groundwater monitoring. Monitoring for CCR-associated metal started only in September 2008. As recently as 2007, KDWM permitted the expansion of the landfills as "special waste landfills" without a liner, over old, unlined ash ponds. There are no regulatory corrective actions, administrative rulings, or court decisions associated with the Site.

USWAG claims that this site does not qualify as a damage case.[328]

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary MCLs, as well as EPA's Lifetime Health Advisory Level have been found onsite. While reddish leachate has been observed seeping into surface water onsite, there are no data to support that this is causing damage to human health or the environment. There are no regulatory corrective actions, administrative rulings, or court decisions associated with the site.>

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[326] TVA (No date, presumably 2009)

[327] According to TVA Inspector General (2011), for the first quarter of 2008, Permit #073-0041 required that the Dry Ash Stack be tested for seven constituents. The permit was then modified, which increased the number of constituents to 12. Semiannual testing was required for the first half of calendar year 2008 and then switched to quarterly to determine baseline data for a new well.

[328] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. Allegations in the Reference Document also claim Damage to Little Bayou Creek and the Ohio River but provide no surface water sampling or scientific studies of these water bodies to support the claim."

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PTb18. Spurlock Power Station, Eastern Kentucky Power Cooperative (EKPC), Maysville, Mason County, Kentucky

Type: Landfill and Surface Impoundment.

Background and Description: The Spurlock Power Station is a 1,557 nameplate generation capacity facility,[329] located in Maysville, Kentucky. The Station has disposed of coal combustion residual (CCR) from the Eastern Kentucky Power Cooperative (EKPC)[330] in a landfill since the 1970s.[331] The landfill was permitted as an "inert landfill" in 1979 and a construction/operation permit was issued in 1982 and renewed in 1996.[332] It is unknown if a liner is present at the original phases, however a 389 acre expansion in 1996 was lined with two feet of clay.[333] A 57-acre, 1976-constructed bottom ash pond with a capacity of 1,750,000 cubic yards is also present at Spurlock Station.[334] The site is located approximately one mile from the Ohio River, over Quaternary Ohio River alluvium and glacial outwash. The landfill is located on Upper Ordovician-age limestone and shale of the Outer Bluegrass structural dome and

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[329] The Plant consists of the following generation units, with their nameplate/net generating capacity and their corresponding commissioning dates: Unit 1: 358/325 MW (1977); Unit 2: 592/525 MW (1981); Unit 3: 329/268 MW (2005), and Unit 4: 278/278 MW (2009). Units 3 and 4 use circulating fluidized bed technology (http://www.ekpc.coop/pressreleases/2009%20press%20releases/2009-04-01_Spurlock4_commercial_start.pdf), burning high-sulfur bituminous coal from Kentucky. The gross calorific value of this high-ash (20%) coal is 10,400 BTU/lb (http://www.alstom.com/Global/Power/Resources/Documents/Brochures/spurlock-station-4-datasheet.pdf). The boiler technology provides Spurlock Unit 4 with the capability to fire a wide range of coals and up to 20% co-firing of petroleum coke, biomass, and approximately five million tires per year. As part of an innovative four-year project to study using switchgrass, in December 2008 University of Kentucky and EKPC demonstrated switchgrass' potential as an alternative fuel to generate electricity at the Spurlock Station. The switchgrass was mixed with the coal feedstock, replacing 1 to 2 percent of the coal normally used (http://www.kentuckycleanfuels.org/resources/fuelsandtechnologies/powerplant.htm).

[330] The Eastern Kentucky Power Cooperative (EKPC) is a not-for-profit generation and transmission electric utility with headquarters in Winchester, Ky.

[331] Currently in receipt of fly ash and FGD gypsum.

[332] RCRA Permit # 081-00005. According to KPEC's comment to the October 2011 NODA (EPA-HQ-RCRA-2011-0392-0209), the total permitted area of the Spurlock Landfill is 389 acres, of which 177 acres are designated for fill. According to EIP (2010a), one phase of the Spurlock Station ash landfill (Area A) is located on a ridge and two phases (Areas B and C) are located in spring-fed hollows, each containing an intermittent stream. The horizontal expansion of Area C, permitted in 2005, occupies 54.48 acres.

[333] The liner has a permeability of 1 x 10^{-7} cm/sec. According to EIP (2010a), citing an EKPC report, EKPC performed a "liner risk analysis" as part of their application for a horizontal expansion further into adjacent hollows. The risk analysis included a Synthetic Precipitation Leaching Procedure (SPLP) for fly ash and bottom ash. The result of that test showed arsenic leaching from the ash at 0.066 mg/L, or 6.6 times higher than the current EPA MCL. EKPC was not concerned about the SPLP result, concluding that the proposed liner meets permit standards.

[334] East Kentucky Power Cooperative (2009). According to Dewberry and Davis (2011, Appendix B, Document 9), the impoundment is lined with a 15-18" clay liner, with a leak rate (estimated at construction) of 91 (± 20 percent) gallon/minute. According to EIP (2010a), the impoundment is located 200 feet from the Ohio River: for location, see Dewberry and Davis (ibid, Appendix A, Document 1). It is regulated under KPDES Permit No. KY0022250.

physiographic region, underlain by the Grant Lake Limestone, presumably a karst substrate.[335, 336] Groundwater has been evaluated at the site employing shallow wells that are screened in fractured bedrock, but not offsite. The monitoring is confined to the landfill, and there is no monitoring associated with the bottom ash pond.

According to EKPC reports cited in EIP (2010a), shallow groundwater conditions exist in weathered, fractured bedrock, and the flow direction is a reflection of the surface topography. Groundwater flows in secondary fractures and joints in a karst limestone and shale aquifer. The soil above the bedrock is less than one foot deep along the sides-lopes of the hollows; therefore, there is little naturally-occurring pollutant attenuation beneath the liner. The groundwater flow velocity at Spurlock Station is very high – up to 400 feet per year. A dye trace investigation performed at the landfill showed that groundwater from the landfill area emerges at springs in the hollows. The dominant direction of groundwater flow is probably to the northeast, toward the Ohio River.[337]

Impact and Damage Claims: EIP (2010a) indicates that levels of arsenic exceeded the primary EPA Maximum Contaminant Level (MCL) in onsite groundwater. Additionally, sulfate and TDS exceeded the secondary EPA MCL (SMCL) in onsite groundwater. EKPC considered well IW-8 (also known as MW-1) the "base well" to which all other wells are compared, even though IW-8, like the other wells, is down-gradient from the CCR disposal areas. Nevertheless, EKPC used the mean concentrations from IW-8 as the baseline for comparison. The results indicated that contaminated groundwater has migrated to hollows to the northeast (IW-7), east (Well A and IW-8), and southeast (IW-6).

The landfill has been leaking since at least 2005: arsenic reached concentration levels of x16 MCL, sulfate - x3.5 SMCL, iron - x3 SMCL, and TDS - x4 SMCL. Arsenic concentrations in well IW-7 were greater than the EPA MCL for every sampling event, and the concentrations ranged from 0.0193 mg/L (November 2008) to 0.16 mg/L (June 2009).[338]

According to EIP (2010a), the oldest accessible groundwater data are from May 2005, when the monitoring system included no up-gradient wells, three down-gradient wells, and one side-gradient

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335 In response to EIP's (2010a) statement about the underlying karstic substrate, in its comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0219), KDWM claims that this formation does not develop extensive karst features ("The landfill is located on Upper Ordovician limestones and shales of the Outer Bluegrass physiographic region. Outer Bluegrass karst with its higher occurrence of inter-bedded shale layers does not develop extensive karst features resulting in much slower groundwater movement than very rapid flow." KDWM assigns the site with a groundwater sensitivity rating of #2 to #3, on a scale of 5). This claim is affirmed by Kentucky Geological Survey's map designation of the area south of the Spurlock Station as "area of less potential for karst" (http://www.uky.edu/KGS/water/general/karst/where_karst.htm); see Kentucky Geological Survey (2006) and Currens (2002).

336 For the geology and structure of the Outer Bluegrass region/Mason County, see Hopkins (1966), Weir et al., (1984), McDowell (1986), and Carey and Stickney (2004) http://kgs.uky.edu/kgsweb/download/gwatlas/gwcounty/mason/MASONGEO.pdf

337 According to Carey and Stickney (ibid) (http://www.uky.edu/KGS/water/library/gwatlas/Mason/Overview.htm), the Ohio River alluvium is the best source of groundwater in Mason County. Many properly constructed drilled wells will produce several hundred gallons per minute from the alluvium, with most wells able to produce enough for a domestic supply at depths of less than 100 feet. Water is hard or very hard, but otherwise of good quality.

338 EIP (2010a) claims that the exceedances in groundwater are located 750 feet beyond the coal ash landfill boundary, which is later described as 750 feet beyond the permitted area at IW-7. However, later in the EIP (2010a), IW-7 is described as being an onsite well. It appears that although IW-7 might be beyond permitted boundaries, it is still within the property limits and is therefore onsite.

well.[339] Whereas statistical analyses of groundwater data have been required since at least 2005, such analysis was only performed once (2006) in four years. In a January 2008 letter to the Division, EKPC concluded that "no meaningful statistics can be performed" because the data set was so small, even though the 2006 analysis indicated multiple statistically significant increases (SSIs) in parameter concentrations. The Kentucky Division of Waste Management (KDWM) does not require that a potentiometric surface diagram be submitted with groundwater reports and as a result, it is unable to determine the location of any well or the direction and rate of groundwater flow at the site. Given that there is no true reported up-gradient well, the results of the statistical analyses likely indicate more significant contamination because there is no ambient, unaffected background well to compare down-gradient and side-gradient well results. Instead, down-gradient wells are compared to wells that have already been affected by CCR.

EKPC submits that[340] EIP's (2010a) annotation of the sites of wells MW-1, MW-2, and MW-3 is incorrect; and that MW-l (also known as IW-8) is the reference well, that is located side-gradient to the fill Areas in a location that is unaffected by landfill operations, as required by Kentucky regulations. EKPC claims also that the results of groundwater sampling do not indicate the presence of contamination in MW-1, MW-2 or MW-A; and that Kentucky's permitted groundwater standard for arsenic is 0.050 ppm, not 0.010 ppm. Finally, in response to EIP's (2010a) map (p. 73), which shows a drinking water well within the plant boundary, EKPC states that no drinking water well exists on the site, and that the groundwater at the site is not used as a drinking water source. Contrary to the claims made in In 2010(a), all of the monitoring wells are within the permit boundary, there is no demonstrated impact to groundwater beyond the permit boundary, and there are no drinking water wells within one mile of the permit boundary as required by the permit conditions.[341]

KDWM does not deny the secondary MCLs exceedance claims. In addition, KDWM states the following:[342] (i) EKPC replaced the monitoring wells now inside the waste boundary with new wells MW-2A and MW-3A down-gradient and outside waste area C, which is down-gradient of Areas A and B. The new monitoring wells are still on the power plant's property, but beyond the new solid waste boundary. Arsenic has not been detected in the replacement wells MW-2A and MW-3A during the two initial characterization samples required by the 401 KAR 45:160, Section 7. Therefore, there is no violation of federal or state open dumping requirements. (ii) EKPC owns the land between the landfill and the Ohio River, the natural destination for the groundwater under the landfill. Therefore, there is no damage shown to off-site groundwater. With the non-detect readings in the new monitoring wells, there is

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[339] In KPEC's comment to the October 2011 NODA (EPA-HQ-RCRA-2011-0392-0209), KPEC states that the Spurlock Landfill and its groundwater monitoring system have been permitted by the Kentucky Division of Waste Management in accordance with the requirements of 401 KAR Chapter 45, and that EKPC has followed all design requirements in effect at the time of development of each phase of the landfill.
[340] Comment to the proposed CCR rule docket: EPA-HQ-RCRA- 2009-0640-6991, and KPEC's comment to the October 2011 NODA: EPA-HQ-RCRA-2011-0392-0209.
[341] KPEC also states: "The picture showing the location of the drinking water wells on page 72 shows all of the wells to be upgradient of the shallow water flow. The one well downgradient appears to be on Spurlock property and is most likely the withdrawal point for the power station…Moreover, the direction of groundwater flow beneath the Spurlock Landfill is away from the drinking water wells shown on the map." (Reference to the EIP 2010a aerial map on page 72).
[342] Comment to the 2011 NODA docket: EPA-HQ-RCRA- 2011-0392-0219.

little threat to the 25 private wells and three public wells within a two- and five-mile radius, respectively, of the site.[343, 344]

Evaluation against Proven Damage Criteria[345]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary EPA MCL for arsenic. • Onsite groundwater data exceeded EPA SMCLs for sulfate and TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Resolution: In September 2010, EKPC was directed by the KDWM to conduct an assessment to determine the cause of the detection of arsenic in MW-3 at a concentration exceeding the permit limit. However, because MW-3 was abandoned as part of the landfill's expansion, EKPC was directed instead (March 30, 2011) to provide a Remedial Action Plan (RAP). The RAP demonstrated that impacts to groundwater are confined to within the permit's boundary. Groundwater monitoring of MW-2A and MW-3A has not indicated contamination. The assessment concluded that the migration of arsenic is impeded by natural attenuation.[346] However, out of an abundance of caution, the RAP proposed as a remedy the collection of leachate from landfill Areas A and B in the leachate drainage layer of Area C, which will prevent impacts to groundwater from all three fill areas.[347]

[343] In an earlier comment (EPA-HQ-RCRA-2009-0640-6260), KDEP states that there only appears to be one residential well down-gradient from the landfill within the two-mile radius. This well needs to be investigated for its actual use, as it appears it may be on plant property.
[344] A detailed (1:24,000), Kentucky Geologic Survey 2012 *Groundwater Data Repository, Water Well and Spring Location Map* of the alluvial and glacial till terraces in the Spurlock Station's area between Route 8 and the Ohio River depicts four groundwater monitoring wells; two wells (one 'domestic' and one 'other) that straddle the northeastern margins of the Station's coal pile; two wells (one 'industrial' and one 'other') just south of the Bottom Ash Pond; and one well ('other'), next to the northeastern corner the Bottom Ash Pond: http://kgs.uky.edu/kgsmap/KGSWater/viewer.asp?startLeft=5423774.79&startBottom=4057600.36&startRight=5528259.37&startTop=4175344.13&QueryZoom=Yes
[345] ICF (2010a).
[346] More recently, KDEP stated (KDEP Division of Waste Management comment to the October 2011 NODA: EPA-HQ-RCRA-2011-0392-0219) that the Commonwealth placed the facility in the groundwater assessment phase, the owners performed corrective action and recent monitoring confirmed a return to compliance.
[347] KDWM and KPEC comments to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0219, and EPA-HQ-RCRA-2011-0392-0209, respectively.

USWAG claims this site does not meet the criteria for a damage case.[348]

ICF (2010) Rationale: *Potential Damage.* <Although the EIP/EJ/SC August 2010 Report indicates that exceedances of primary and secondary MCLs had occurred offsite, it is apparent that these exceedances actually occur at well IW-7, which is located onsite.[349] Therefore, there has not been any assessment of groundwater or surface water offsite and there are no other impact or damage claims. There are no regulatory corrective actions, administrative rulings, or court decisions associated with the landfill.>

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[348] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The alleged off-site impacted well is not off-site, but is located within the property boundary of the site."

[349] However, as stated in greater detail in EIP (2010a) and in Quarles and Segall (2010) and summarized above, SMCL exceedances were also recorded in additional onsite wells, i.e., IW-6, IW-8, and Well A.

http://books.google.com/books?id=BiUsAQAAIAAJ&pg=SL5-PA115&lpg=SL5-PA115&dq=Palmquist,+W.N.,+Jr.,+and+Hall,+F.R.,+1960,+Availability+of+ground+water+in+Bracken,+Harrison,+Mason,+Nicholas,+and+Robertson+Counties,+Kentucky:+U.S.+Geological+Survey+Hydrologic+Atlas+HA-16,+scale+1:125,000.&source=bl&ots=T2ogxLS_Ca&sig=AdzeG95XclZOIkIwJjc1ArCOukw&hl=en&sa=X&ei=djvVUOCQE5SF0QGG2oH4Dg&ved=0CEMQ6AEwBA

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PTb19. Big Cajun 2 Power Plant, NRG Energy - Louisiana Generating, LLC, New Roads, Pointe Coupee Parish, Louisiana

***Type*:** Surface Impoundments, Surge- and Treatment Ponds.

Background and Description: The Big Cajun 2 Power Plant,[350] located in New Roads, Louisiana (approximately 35 miles northwest of Baton Rouge), has disposed of coal combustion residuals (CCRs)

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[350] According to NRM's website: http://www.nrgenergy.com/about/assets.html, the Plant's coal-fueled generating capacity is 1,742 MW. According to Sourcewatch, the Plant's nameplate capacity is 1,871 MW, comprising the following units (with their commissioning dates): 626 MW (1981), 626 MW (1982), and 619 MW (1983) (http://www.sourcewatch.org/index.php?title=Big_Cajun_II_Power_Plant). A recent NRM pilot project at the Big Cajun II electrical generating station to evaluate local conditions for locally growing switchgrass and high-biomass sorghum as renewable biomass fuels, to determine their capacity for replacing a portion (10 percent) of the coal at the plant to reduce its carbon intensity failed when the crops yielded only a fraction of the expected biomass. (Dallas

from NRG Energy d/b/a Louisiana Generating in ash ponds since 1980. There are five ponds that extend over one mile on the disposal site: a 175 acre fly ash pond,[351] a 66 acre bottom ash pond, two water treatment ponds (Primary and Secondary, 25.4 acres and 7.1 acres, respectively), and a rainfall surge pond.[352] The site, in general, is approximately 1,500 feet from the west bank and within a recent meander lobe of the Mississippi River, with the closest pond being approximately 2,750 feet from the river. Groundwater has been monitored onsite since 1989; however, no offsite assessment or monitoring has been performed. The groundwater table is, on average, within 3-feet of the ground surface.

According to Shaw Environmental and Infrastructure Inc. (2006), the two ash-basins and two LPDES Treatment Ponds have 'liners of naturally occurring clay from at least 3 to over 10 feet thick'. Over 97 percent of the rainfall surge pond is underlain by a 2-foot thick, re-compacted clay and silt clay layer, 'which met the required coefficient of permeability'.[353]

According to Shaw Environmental and Infrastructure Inc. (ibid), the Facility is subject to several types of flooding/drainage issues, including (i) a widespread flooding from the Mississippi River during the spring and summer; (ii) backwater flooding caused by excessive rainfall draining into low-lying areas and backing up into the drainage ways; and (iii) flash floods in small streams caused by rainfall of high intensity and short duration. "The design of the solid waste facilities at the Plant and the Mississippi River levee protection system insure that uncontaminated surface runoff will not drain through the operating areas, even in an event of excessive rainfall or any of the three types of floods."

According to Shaw Environmental and Infrastructure Inc. (ibid), the subsurface sediments beneath the site comprise a complex series of southerly dipping point bar deposits of clay, silt, sand, and gravel. These sediments deep at a rate of about 20 feet per mile (about 0.7^0). The freshwater-bearing sediments beneath the Pointe Coupee Parish are classified ito four aquifer zones: Alluvial aquifer, Zone 1, Zone 2, and Zone 3.

News, Sept. 30, 2009: http://energyandenvironmentblog.dallasnews.com/archives/2009/09/nrg-to-try-replacing-coal-with.html and http://theadvocate.com/home/279165-79/its-not-easy-going-green.html.

[351] According to Shaw Environmental and Infrastructure Inc. (2006), the total acreage of the fly ash ponds is cited as 295 acres (in Dewberry & Davis, LLC, 2011, Appendix A, Document 4).

[352] According to the Response to EPA Request for Information (2009), the corresponding waste capacities of the two ash ponds and two water treatment ponds are (in the sequence cited above): 1,750, 1,188, 457.2, and 127.8 acre-feet. As of 2009, the fly ash pond was 65 percent full and the bottom ash pond was 54 percent full. The surge pond was not evaluated by Dewberry & Davis, LLC (ibid), because it is below grade and has no dam or embankments. Two of the five ponds are clay-lined, while it is not clear whether the two remaining ponds are also lined. According to EIP (2010a), the permit application for the bottom ash and fly ash ponds was submitted to LDEQ in 1982, and the permit was issued on June 20, 1986. According to Dewberry & Davis, LLC (ibid), the Louisiana Department of Environmental Quality (DEQ) granted the most recent LPDES permit to Big Cajun II Generating Station for wastewater discharge (permit No. LA0054135) in March, 2010, and also has permitted the solid waste management units as Type I Industrial Surface Impoundment (Permit No. P-0108.) According to Shaw Environmental and Infrastructure Inc. (2006), the Plant sells its fly ash for beneficial reuse as cement additive.

[353] According to Shaw Environmental and Infrastructure Inc. (ibid), this finding is based on some 230, 10-foot borings. Approximately 7 percent of the test boring indicated a clay thickness ranging from 2 to 3 feet: a 1-foot layer of re-compacted clay was added to these areas to insure that the liner had the required minimum of 3 feet of re-compacted clay.

The up to 200-feet thick Alluvial Aquifer consists of coarse sands and gravels, characterized by a high degree of sinuosity. It is covered by 20- to 80-feet of surficial silt, clay and fine sand.[354] Its TDS content ranges from 200 to 600 ppm.[355] The Zone 1 Aquifer occurs about 400 feet beneath the site area and is about 100 feet thick. The Zone 2 Aquifer occurs about 650 feet beneath the site area and consists of several sand units that range in thickness between 50 to more than 100 feet. Its TDS concentration ranges from about 200 to 450 ppm. The Zone 2 Aquifer occurs atabout 1,350 feet BGS and consists of several sand units that average about 50 feet in thickness. Its TDS ranges from about 225 to 1,250 ppm.

According to Shaw Environmental and Infrastructure Inc. (ibid), of the four freshwater aquifer zones, only the Alluvial Aquifer has the potential to receive any leachates from the waste disposal area. The Alluvial aquifer beneath the site is separated from the Zone 1 Aquifer by about 100 feet of very low permeability clay and silt, which provide an effective barrier to migration of groundwater between these aquifers.

Groundwater levels at the Big Cajun 2 Power Plant CCR disposal areas range from 8 to 14 feet below the top of the well casing. Five groundwater monitoring wells were installed in 1985. Potentiometric surface diagrams from November 1992 illustrated a flow direction towards the Mississippi River for all wells, with MW-85C and MW-85D being the most hydraulically down-gradient wells. These wells, located on the eastern-most edge of all ponds, are located almost one mile west of the Mississippi River. Beginning in approximately 1998, Cajun Electric began reporting that at times the groundwater flowed west and *away from the river*. This westerly trend, for wells that are located almost a mile or more away from the river, continues. Shaw Environmental concluded in 2007 on behalf of Cajun Electric that the flow away from the river was due to higher river stages. This conclusion was not supported by their own data which indicate the surface water elevations measured at the river were 13 feet (March 2007) to 15 feet (September 2007) *lower* in elevation than the potentiometric surface elevations reported one mile west at the treatment pond area wells.

Historically, the highest groundwater elevations have been found at MW-85C and MW-85D, which are down-gradient of all ponds and are located nearest the Primary Treatment Pond, the Surge Pond, and the Bottom Ash pond. Big Cajun recently recognized that "divergent flow exists to the east and west originating from the center of the ash impoundment area".[356] The higher groundwater elevations in pond area wells suggest groundwater mounding beneath the ponds due to leakage from one or more of those ponds, causing localized reversal of groundwater flow to the west away from the river.

Impact and Damage Claims: EIP (2010a) indicates that levels of selenium exceeded the primary EPA Maximum Contaminant Level (MCL) in onsite groundwater. Additionally, total dissolved solids (TDS) exceeded the secondary MCL (SMCL) in onsite groundwater. EIP (2010a) claims that there is a statistically significant increase of calcium concentrations in the groundwater, which is an indicator of CCR leachate.

EIP (2010a) also reports that the Louisiana Department of Environmental Protection (LDEQ) issued a Notice of Deficiency (NOD) to NRG during permit renewal. LDEQ found that the groundwater

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[354] According to Shaw Environmental and Infrastructure Inc. (ibid), the surface soils at the plant site are heavy clays with high Cation Exchange Capacity and with permeability ranging from 0.69 x 10^{-7} cm/sec to virtually impermeable.
[355] Shaw Environmental and Infrastructure Inc. (ibid) claims that the quality of the Alluvial Aquifer is marginal due to its 'relatively high TDS content and high iron and manganese content. Because of this, the aquifer is not used except for a few small-diameter, low yield stock wells."
[356] Shaw Environmental Inc. (2010).

monitoring system of five wells was inadequate for monitoring the ash ponds and required NRG to install ten additional down-gradient wells.[357] Selenium levels in the groundwater from 1994 to 1999 exceeded MCL in all five monitoring wells, at levels up to 1.32 mg/L (MCL is 0.05 mg/L). Concentrations of other metals have not been measured in the monitoring wells. Since at least 1989, TDS in the groundwater have been greater than the SMCL with maximum levels of 1,800 mg/L (SMCL is 500 mg/L). According to NRG consultant's 2007 report,[358] by 2001, TDS levels in down-gradient wells, and the number of wells with TDS levels greater than the SMCL has increased; this trend continues into more recent monitoring periods.[359]

LDEQ and NRG state[360] that the 1999 selenium exceedance of 1.32 mg/L in MW-85C was not corroborated in subsequent samplings, and that all subsequent selenium levels at that well were either non-detects or below 0.015 ppm.[361] Likewise, wells 85B and 85E have been non-detect for selenium since 2001. Beacuse no SSI of selenium has been confirmed since 1999, the facility is not currently under Assessment Monitoring, pending evaluation of data from the new groundwater monitoring wells. Recently, Cajun 2's consultant stated[362] that analytical results for groundwater samples collected from monitoring wells MW-85A through MW-85E on January 15, 2010, indicated detectable concentrations of barium in four of the five monitoring wells. In addition, arsenic was detected in one well (MW-85E) and re-sampling is recommended in order to confirm the presence of arsenic.

According to EIP (2010a), beginning in 2006, LDEQ approved requests to fill hollow barge mooring cells in the Mississippi River with bottom ash and fly ash originating in the Big Cajun 2 Plant (NRG, 2008). Over 11,500 cubic yards of fly ash and bottom ash from Big Cajun 2 Power Plant were placed in barge mooring cells in the Mississippi River as a "beneficial use" project. LDEQ could not confirm if any water or sediment is monitored in the Mississippi River near the mooring cells to ensure that heavy metals or other harmful constituents are not leaching from the coal ash.

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[357] According to LDEQ's EPA-HQ-RCRA-2011-0392-0256, however, the groundwater monitoring system installed actually exceeded the regulatory requirements current at the time of the original permit. More monitoring wells were required for the new groundwater system only because of new regulations in existence at the time of the permit renewal.

[358] Shaw Environmental (2007).

[359] For example, between March 2000 and March 2007, MW-85C had TDS exceedances in 12 of 15 monitoring events; MW-85D had exceedances in 10 of 15 events; and MW-85E had exceedances in all 15 events, with the highest levels up to 1,800 mg/L. As of 2009, Shaw Environmental found SSIs of calcium and TDS in wells MW-85C, MW-85D, and MW-85E.

[360] LDEQ and NRG comments to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0256 and EPA-HQ-RCRA-2011-0392-0220, respectively.

[361] According to the LDEQ comment to the October 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0256), the selenium detection in MW-85C of 1.32 ppm was at the time of its detection in 1999, a statistically significant increase (SSI). But a SSI does not automatically trigger an assessment. The prescribed way to evaluate an SSI, as per Louisiana Solid Waste regulations (LAC 33:VII.805.C.6), is first to confirm a SSI by verification resampling. Subsequent data from the 1999 detection are all below detection limits except a 0.015 ppm detection in September 2000 in well 85C, thus disconfirming the SSI. In fact, with the exception of minor detections of selenium in monitoring wells 85B and 85E in March of 2003, all wells have been non-detect for selenium since 2001. Consequently, the facility in not currently under assessment monitoring but rather under detection monitoring, pending evaluation of data from the new groundwater monitoring system.

[362] Shaw Environmental Inc. (2010).

Evaluation against Proven Damage Criteria[363]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded the primary MCL for selenium. • Onsite groundwater data exceeded the secondary MCL for TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• LDEQ issued a NOD to NRG with regards to the inadequacy of the monitoring well system and required that ten additional downgradient wells be installed. • No other regulatory corrective actions, admin. rulings, or court decisions.

Other Considerations: According to EIP (2010a), there are reportedly 11 public drinking water sources within five miles of the site, each of which serves at least 60 citizens. There are also reportedly three private drinking water wells within two miles of the site.

Resolution: LDEQ issued a Notice of Deficiency (NOD) during permit renewal regarding inadequacy of monitoring well system and required that 10 additional downgradient wells be installed. However, none of the new wells are off-site.[364] NRG claims[365] that the NOD from LDEQ was administrative, issued only to complete the permitting process. Specifically, the reason why additional monitoring wells were required for this permit was because of the new regulation in effect at the time the permit was issued. Current regulations, LAC 33:VII.805.A.2.d, require that a maximum spacing between down-gradient wells should not exceed 800 feet.

USWAG claims that this Site does not meet the criteria for a damage case.[366]

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[363] ICF (2010a).

[364] Furthermore, LDEQ is requiring that a true background well be installed, although NRG Big Cajun concluded that "it is not possible at this time to conclusively specify an up-gradient . . . well" (Shaw Environmental, 2010, in EIP (2010a). Of the ten new wells, seven wells are required for the extreme western edge of the fly ash pond in an area that was once believed to be "up-gradient" and three are required along the eastern boundary of the primary treatment and surge ponds. The additional down-gradient wells along the western boundary confirm that well MW-85A, which is located at the western property line and at times has exceeded groundwater standards (most notably for selenium), is not an "up-gradient" but rather down-gradient, and has been affected by CCR. According to EIP (2010a), the location of well MW-85A at the western property line suggests that contaminated groundwater above regulatory standards has migrated off-site. Despite this evidence, LDEQ has never required any off-site groundwater sampling.

[365] NRG's comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0220.

[366] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria."

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary EPA MCLs have been found onsite. There has not been any assessment of groundwater or surface water offsite and there are no other impact or damage claims. LDEQ issued a NOD to install additional downgradient monitoring wells onsite; however, there are no other regulatory corrective actions, administrative rulings, or court decisions associated with the ash ponds.>

References

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PTb20. Dolet Hills Power Station, CLECO Power LLC, Mansfield, De Soto Parish, Louisiana

Type: Landfill and Surface Impoundments.

Background and Description: The Dolet Hills Power Station, a mine-mouth plant,[367] is located near the town of Naborton, approximately 6 miles east of Mansfield, northwestern Louisiana. The Dolet Hills Plant has disposed of coal combustion residual (CCR) from CLECO Power LLC since its inception, 1986. There are ten disposal units onsite including one landfill, three bottom ash ponds, three surge ponds,[368] a metal cleaning waste pond,[369] a plant discharge collection pond, and a limestone runoff pond.[370] Ash Ponds 1 and 2, as well as the Secondary Ash Pond (Ash Ponds) contain bottom ash and sluice water.[371] Surge Ponds 1 and 2, as well as the Auxiliary Surge Pond contain flue gas desulfurization (FGD) sludge, ash, and sluice water. The Fly Ash/FGD Landfill Pond receives stormwater runoff from the Landfill; therefore, this pond would contain traces of bottom ash, fly ash, and FGD sludge.[372]

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[367] According to CLECO's website: http://www.cleco.com/site209.php, Troy (1993), and http://www.reuters.com/article/2009/04/30/idUS181733+30-Apr-2009+PRN20090430, the Plant generates 650 MW of electricity using lignite, which is mined since 1986 in the fully dedicated Dolet Hills mine (in 2008, 3.3 million tons annually) in Desoto Parish near Mansfield and since 1989, in the Oxbow mine (in 2008, 550,000 tons annually), in Red River Parish. According to Louisiana's DENR website, a seven-mile conveyor belt sends the Dolet Hills mine lignite directly from the mine to the plant, whereas crushed lignite is hauled 19 miles from the Oxbow mine to the plant in specially designed tractor trailers with a 30 ton capacity: http://dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=305#types

[368] It is unknown whether these three ponds are lined. The Auxiliary Surge Pond acts as an emergency storage basin for scrubber waste slurry from the flue gas desulfurization (FGD) process. The Auxiliary Surge Pond has a surface area of 0.35 acres and a storage capacity of 1.54 acre-feet (2,485 cubic yards).
Surge Pond 1 is a collection basin for various plant waste streams. It has a surface area of 2.25 acres and a total storage volume of 24 acre-feet (38,720 cubic yards).
Surge Pond 2 provides additional storage volume during peak flow periods. This pond's surface area is 4.8 acres and it has a total storage volume of 48.4 acre-feet (78,085 cubic yards).

[369] The metal cleaning waste pond receives two liquid waste streams: fly-ash laden wash water from the air heater system, and boiler and turbine wash water. The primary solid collected in the pond is fly ash.

[370] According to AMEC (2011), the Plant's bottom ash is sluiced into either Ash Pond 1 or Ash Pond 2. Decant water from Ash Ponds 1 and 2 is gravity discharged into the Secondary Ash Pond. Flow from the Secondary Ash Pond is discharged by pumping for either reuse by the facility or to the permitted LPDES Outfall 002. Discharge directed to the LPDES outfall is released to an earthen channel that flows to Mundy Bayou.
Bottom ash dredged from the ash ponds is hauled to the on-site Fly Ash/Scrubber Sludge Landfill. A portion of the fly ash is gathered and sold as product in its dry state, while the remainder is mixed with sludge from the flue gas desulfurization (FGD) process to produce a final product that is suitable for transportation to the Fly Ash/Scrubber Sludge Landfill. FGD is practiced at Dolet Hills and sludge produced from this process is sent to the Auxiliary Surge Pond, which discharges into Surge Pond 1. Surge Pond 2 is used when additional volume is required for FGD process waste products.

[371] All three ponds have a liner 'equivalent to 3' clay, with permeability of $1x10^{-7}$ cm/sec.' Ash Pond 1 is located directly adjacent to and south of the Secondary Ash Pond. The pond receives sluiced bottom ash and has a surface area of 30 acres and a storage capacity of 400 acre-feet (645,333 cubic yards).
Ash Pond 2, which also receives sluiced bottom ash, is located directly adjacent to and north of the Secondary Ash Pond. The surface area of Ash Pond 2 is 31 acres, and its storage capacity is 425 acre-feet (685,667 cubic yards). The Secondary Ash Pond, which is located between Ash Pond 1 and Ash Pond 2 and collects decant from both ponds, has surface area and total storage capacity of 6.5 acres and 138 acre-feet (222,640 cubic yards), respectively.

[372] The Fly Ash/FGD Landfill Pond embankment has a cross valley configuration. Design documents provided for the Fly Ash/FGD Landfill Pond indicate that the pond would be constructed to include a "re-compacted clay liner as required 3 feet thick" beneath the entire water surface of the pond. The minimum barrier and permeability requirements are as specified by the Louisiana Department of Environmental Quality (LDEQ) Solid Waste Rules and Regulations. This pond was placed into service in 1986 and was enlarged in 1998 through the installation of a reinforced concrete wall along the embankment to hold a volume equal to 1,225,000 cubic yards.

Discharges from the facility are directed to Mundy Bayou which flows into the Red River. The distances between the closest point of the ash ponds and Mundy Bayou and the Red River are approximately 0.4 miles and 9.3 miles, respectively. Groundwater has been monitored onsite at 36 wells and piezometers at six of the disposal units. No offsite assessment or monitoring has been required.[373]

Soil borings drilled in the area of Ash Basins and Secondary Pond indicated silty clay close to the surface. This unit, about 2 feet thick, had lenses of silty sand. It is underlain by the up to 800 feet of thick silty clays of the Porters Creek Formation. The marine, Paleocene age Porters Creek Formation contains a high-fraction of highly adsorbent smectite clays.[374] Laboratory tests conducted on the soil samples indicated their permeability is in the range of $8.3x10^{-7}$ to $1.08x10^{-7}$ cm/sec.[375]

Four distinct permeable zones of groundwater exist at the site in predominantly sandy soils. Groundwater Zone 4 (the deepest) is present beneath all surface impoundments and ponds in the plant area and beneath the landfill. Groundwater Zone 3 is found predominantly beneath the metal cleaning pond. The upper-most zones (Groundwater Zones 1 and 2) are only located south at the FGD landfill, and Zone 1 discharges to surface water.[376]

Impact and Damage Claims: EIP (2010a) indicates that levels of arsenic, lead, and selenium exceeded the primary EPA Maximum Contaminant Level (MCL) in onsite groundwater.[377] Additionally, sulfate and total dissolved solids (TDS) exceeded the secondary EPA MCLs (SMCLs) in onsite groundwater. Sulfate also exceeded the EPA Health Advisory Level.[378] The report claims that low pH, and statistically significant changes in specific conductance, alkalinity, and calcium, all are indicative of CCR leachate.

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[373] According to EIP (2010a), the current groundwater monitoring program includes these parameters: pH, specific conductance, total dissolved solids (TDS), alkalinity, sulfates, chlorides, iron, copper, calcium, phosphorus, and zinc; however, the program does not routinely monitor for other metals present in coal ash.
[374] Thomas and Murray (1989).
[375] Soil and rock sequence descriptions are from: *Seepage Impact Assessment Plan for Surface Impoundments*, a report prepared by Environmental Management, Inc., October 1988, cited in AMEC (2011).
[376] EIP (2010a), citing a CLECO report.
[377] Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, challenges EIP's (2010a) assertions: (i) in a December 2009 groundwater sampling, monitoring well OW-33 yielded an arsenic exceedance (0.0156 mg/L). However the same well in the August 2009 sampling event and both 2010 semiannual sampling events yielded non-detects for arsenic, implying that the December 2009 sample result was an outlier. (ii) Monitoring well OW-36 was newly installed when first sampled during the August 2009 sampling event. In both the August 2009 and December 2009 sampling events, this well yielded lead exceedances (0.023 mg/L and 0.019 mg/L, respectively). However both of the 2010 semiannual sampling events in this well yielded non-detects for lead. This suggests that the initial sample results were caused by turbidity that is typically associated with a new well. In addition, none of the sample data discussed in (i) and (ii) above revealed a statistically significant increase in concentration above background, indicating that contamination may be due to natural variation.
[378] Groundwater monitoring has documented MCL exceedances for arsenic in one surge pond compliance well and lead in one well at a metal cleaning waste pond that also receives fly ash. Selenium has been reported at the CCR landfill monitoring wells at 3.5 times the MCL in a groundwater zone that discharges to the surface water. Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, denies that the source of the selenium exceedance was in the landfill, because it was measured in MW-2A, a well located up-gradient of the landfill. Onsite groundwater exceeded EPA SMCLs for sulfate, and TDS - in 28 of 30 coal ash pond-area wells at up to a half-mile from the nearest disposal unit and at concentrations up to x28 the SMCL. When the April 2008 compliance well groundwater results are compared to the sole "reference well" or background well (OW-27, Zone 4) at the site, the reported groundwater values far exceed the reference values, which are as follows: TDS, 513 mg/L; sulfates, 224 mg/L; chlorides, 17 mg/L; iron, 0.522 mg/L; and pH, 6.82 units. CLECO concluded that the high concentrations in the down-gradient wells may be due to lignitic clays and lignite beds that are present

EIP (2010a) also indicates that LDEQ required assessment monitoring of the disposal units in 2008; however, no offsite evaluation was required.

Evaluation against Proven Damage Criteria[379]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic, lead, and selenium. • Onsite groundwater data exceeded EPA SMCLs for sulfate and TDS. • Onsite groundwater data exceeded the EPA Health Advisory Level for sulfate. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Other Considerations

- There are reportedly two private drinking water wells within a two mile radius and one public drinking water well within five miles of the site.
- Although the landfill and ponds are separate units, co-managed wastes such as the limestone runoff pond, the lignite runoff pond, and the metal cleaning waste pond are located onsite and could have an effect on groundwater beneath other CCR disposal units.

Resolution: According to EIP (2010a), in 2008, LDEQ required that assessment monitoring activities be conducted at the bottom ash ponds, the surge/auxiliary pond, the metal cleaning waste pond, the plant discharge pond, the lignite runoff pond, and the fly ash-scrubber sludge landfill. However, no assessment activities have included any off-site or off-property sampling points. LDEQ later approved a return to detection monitoring and the revised groundwater sampling and analysis plan submitted in May 2009. Statistically Significant Increases (SSIs) for specific conductance and alkalinity for the August and December 2009 sampling events required that the facility initiate re-sampling and assessment monitoring, and/or demonstrate that the contamination was due to an alternate source or natural variation.

USWAG claims that this Site does not meet the criteria for a damage case.[380]

in the subsurface, and promised to evaluate the trend further in future sampling events. Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, reiterates its claim that variable SMCL levels from the 2009 second semiannual ground water sampling are due to natural variation in groundwater quality.

[379] ICF (2010a).

[380] Comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0211. "Louisiana DEQ required assessment-monitoring activities for the bottom ash ponds, surge/auxiliary pond, metal-cleaning waste pond, plant discharge pond, lignite runoff pond, and fly ash scrubber-sludge landfill. No off-site monitoring was required. This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site

ICF (2010a) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary EPA MCLs have been found onsite. There has not been any assessment of groundwater or surface water offsite and there are no other impact or damage claims. Onsite monitoring has been required by LDEQ; however, there are no other regulatory corrective actions, administrative rulings, or court decisions associated with the landfill and ash ponds.>

References

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PTb21. Rodemacher Power Station[381], CLECO Power, LLC, Lena, Rapides Parish, Louisiana

groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria."

[381] Now: The Brame Energy Center. Cleco Corporation's comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278.

Type: Landfill, Ash Ponds, and Coal Pile.

Background and Description: The Rodemacher Power Station located in Lena, Louisiana has disposed of coal combustion residual (CCR) from CLECO Power, LLC in landfills and ash ponds since 1982.[382] The site consists of a coal pile, as well as several disposal units including a 109 acre, 560 acre-feet capacity fly ash pond; a 36 acre, 740 acre-feet bottom ash pond;[383] a landfill;[384] two metal cleaning waste ponds; a coal sedimentation pond;[385] an 8 acre landfill leachate collection pond;[386] and an unpermitted clarifier sludge sedimentation pond. The overall disposal area extends over about 0.75 of a mile and it straddles Lake Rodemacher and the Red River and Bayou Jean de Jean.[387] Groundwater has been monitored onsite since 1983; however, no offsite assessment or monitoring has been required. The impoundments have a Louisiana Pollutant Discharge Elimination System (LPDES) permit[388] to control their effluents discharge into Rodemacher Lake. In 2009, CLECO submitted a request for a vertical expansion of the existing Type I industrial landfill and an associated leachate collection/run-off pond, to

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382 The Power Station began operation in 1975. Its total nameplate capacity is 1,523 MW. However, only the 523 MW, Unit 2 (online since 1982) is coal-fueled (with Powder River Basin coal). The other two units are fueled as follows: the 440 MW Nesbitt Unit 1 (online since 1975), natural gas and low-sulfur fuel oil; and the 600-MW net circulating fluidized bed Madison Unit 3 (online since 2010), multiple solid fuels (the plant was designed to burn Illinois #6 coal, Powder River Basin coal, lignite, biomass, and petroleum coke). Currently, Unit 3 is the largest 100% petcoke–fired CFB plant in North America. http://www.cleco.com/site209.php and http://www.powermag.com/coal/Clecos-Madison-Unit-3-Uses-CFB-Technology-to-Burn-Petcoke-and-Balance-the-Fleets-Fuel-Portfolio_2878.html

383 The surface areas of the Bottom Ash Pond and the Fly Ash Pond cited above in Rodemacher Power Station (2009) are different from the corresponding size figures cited in CDM (2011). According to CDM (2011), the Bottom Ash Pond's surface area is 43 acres. This pond is the only impoundment that receives influent from a wet sluice process: bottom- and fly ash from generation Units 1 and 2, leachate from the CCR landfill, and stormwater runoff. Note that CDM's (2011, appendix C) Coal Combustion Dam Inspection Checklist Forms' information concerning the liners of both the Bottom Ash Pond and the Fly Ash Pond mismatch the narrative section of the same report. Based on the narrative section of CDM (2011), the Bottom Ash Pond has a 3-foot-thick, compacted clay liner placed in horizontal lifts of 8 to 10 inches. According to the Permit, the liner was constructed with high-plasticity clay with a permeability of 1.1×10^{-7} to 2.1×10^{-8} cm/sec, as measured in laboratory permeability tests. The Bottom Ash Pond embankments were constructed on very soft to medium stiff clay and silty clay with organics that extended at least to 20 feet below the bottom of the pond. Silty sand and sandy silt were encountered in one of the test borings at a depth of 12 feet.

According to CDM (2011), dry Fly Ash material is delivered by trucks to the 28-acres Fly Ash Pond. The Fly Ash is moistened with water as it is unloaded and placed into the pond. The Fly Ash Pond is lined with a 3-foot-thick clay liner constructed with material excavated from within the pond. According to the Permit, the liner was constructed with material with a permeability of 1.1×10^{-8} cm/sec, as measured in laboratory permeability tests on remolded samples of the clay used for liner material. Based on subsurface soil profiles included in the 1981 Permit, portions of the Fly Ash Pond and Leachate Pond embankments were constructed on very soft to medium stiff clay and silty clay with layers of silt and sand which extended at least to 50 feet below the bottom of the pond.

384 According to EIP (2010a), the current coal ash management area/Type I landfill seems to have been constructed over an old coal ash pond. It was constructed within the existing footprint of the perimeter levee system that was constructed in the 1980s and permitted by the Army Corp of Engineers in 1977.

385 The metal waste cleaning ponds and a coal sedimentation pond are not used for storage or processing of CCR

386 Based on CDM's (2011, appendix C) Coal Combustion Dam Inspection Checklist Forms, the Leach Pond has a 60-mil HDPE liner with permeability of 1×10^{-7} cm/sec.

387 The Site, occupying 6,000 acres, uses man-made Rodemacher Lake as a cooling source for the plant's generating units. The lake covers about half of the site. Bayou Jean de Jean is a semi-abandoned meander of the Red River.

388 Permit # LA0008036.

receive the fly ash and bed ash to be generated from the combustion of fuel(s) slated for operating the CFB Madison Unit 3 (coal, petcoke, and biomass).[389]

According to the Geologic Map of Louisiana, the southeastern portion of the Plant site is underlain by Holocene alluvium and natural levee deposits of the Red River and its tributaries. The alluvium deposits consist of sandy and gravelly channel deposits mantled by sandy to muddy natural levee deposits, with organic-rich muddy back-swamp deposits. Based on subsurface soil information provided in the Permit, existing soils present below the embankments consist of clay with layers of sand and silt.[390] The northwestern, topographically higher parts of the site are within the terrace deposits of Pleistocene-age. They comprise more competent silt, clays and sands than their Holocene counterparts, and occasionally also contain gravel.[391]

Lake Rodemacher and the Bayou Jean de Jean are located approximately 50 feet from CCR disposal units. Citing recent CLECO reports, EIP (2010a) claims that the uppermost aquifer beneath the waste management units flows towards those surface water bodies. Groundwater in the power station area where the metal cleaning ponds, the coal sedimentation pond, and a sludge pond are located flows towards Lake Rodemacher. Groundwater beneath the ash ponds and the ash management area/landfill area flows towards Bayou Jean de Jean to the west and south and the Red River to the north. The groundwater gradient is steep – up to approximately 13 percent – and is the steepest nearest the receiving water bodies. CLECO Power has determined that the groundwater seepage velocity is the greatest (3.5 feet per day) at the bottom ash and fly ash ponds where the property line is adjacent to the CCR disposal units and where groundwater discharges towards Bayou Jean de Jean and the Red River.

Impact and Damage Claims: EIP (2010a) indicates that levels of arsenic and lead exceeded primary EPA Maximum Contaminant Levels (MCLs) in onsite groundwater. Additionally, chloride, pH,[392] and total dissolved solids (TDS) exceeded secondary EPA MCLs (SMCLs) in onsite groundwater.[393] EIP (2010a) claims that there have been statistically significant changes in specific conductance and chloride and sulfate concentrations, which are indicative of CCR leachate.

EIP (2010a) claims that groundwater monitoring wells at compliance boundaries for a CCR landfill, seven ponds, and a coal pile at the Rodemacher Station have been contaminated with arsenic up to 5.75 times the federal MCL. The contamination is documented at multiple groundwater wells in two areas separated by Lake Rodemacher.[394] The contamination is flowing from two distinctly separate areas: (i) the

[389] According to CLECO Power LLC (2009), the new landfill (Permit No. P-0379) will have a composite liner and a leachate collection system.
[390] CDM (2011).
[391] CLECO Power LLC (2009).
[392] For instance, the September and November 2009 samplings events detected pH values of less than 6.5 (the minimum SMCL) in 15 of 21 wells on-site.
[393] Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, claims that there was no statistically significant increase in SMCLs such as TDS, calcium, pH, conductivity and alkalinity, suggesting that the CCR units did not cause the observed dissolved substances.
[394] Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, challenges EIP's (2010a) assertion, by claiming that two of the wells discussed, W1 and W21, were background wells. The other wells mentioned with respect to the arsenic exceedances (W4, W15, W17, and W7) did not show in combination with the up-gradient wells that a statistically significant increase had occurred, indicating that the arsenic was most likely from natural variation and not from the CCR units.

power plant, coal pile area and runoff pond, sludge pond and metal cleaning ponds on the north side of Lake Rodemacher; and (ii) the coal ash ponds and CCR landfill area east of the Lake.[395]

Evaluation against Proven Damage Criteria[396]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater exceeded primary EPA MCLs for arsenic and lead. • Onsite groundwater exceeded EPA SMCLs for chloride, pH, and TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• None

Other Considerations: There are reportedly 36 registered wells within a one mile radius, 12 private drinking water wells within a two mile radius, and three public drinking water sources within a five mile radius of the site.

Resolution: LDEQ required (in December 2008) complete assessment monitoring onsite. In February 2010, LDEQ allowed a return to detection monitoring. According to EIP (2010a), Rodemacher Station submitted a request for a major permit modification of the coal ash management area to construct a Type I landfill, which included a request for a 60-foot height increase in the existing CCR disposal unit, use of coal ash as protective cover, and use of an alternate liner (three composite liner options proposed). LDEQ deemed the request technically complete and publicly noticed the modification in February 2010.

USWAG claims that this Site does not meet the criteria for a damage case.[397]

[395] Heavy metals are not normally sampled in groundwater monitoring at the Rodemacher Station; however, some metals were tested as part of Initial Sampling Events (ISEs) in September and November 2009 after issuance of a new landfill permit and the installation of new wells. Cleco Corporation, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0278, rebuts that the semiannual groundwater reports to LA DEQ show sampling and analyses for cadmium, copper, lead, nickel, selenium, thallium vanadium and zinc as well as numerous other parameters.
[396] ICF (2010a).
[397] Comment to the 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "Louisiana DEQ required assessment monitoring in 2008 for groundwater constituent concentrations that may have been affected by CCW ponds. LDEQ allowed a return to detection monitoring in February 2010. This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. Allegations in the Reference Document [i.e., EIP (2010a)] also claim Damage to Lake Rodemacher, Bayou de Jean, and the Red River but provide no surface water sampling or scientific studies of these water bodies to support the claim."

ICF (2010a) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary EPA MCLs have been found onsite. There has not been any assessment of groundwater or surface water offsite and there are no other impact or damage claims. Onsite monitoring was required by LDEQ; however, there are no other regulatory corrective actions, administrative rulings, or court decisions associated with the landfill, ash ponds, or coal pile.>

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PTb22. Brandywine Coal Ash Landfill, Mirant Mid-Atlantic, LLC,[398] Brandywine,[399] Prince George's County, Maryland

Type: Landfill, Leachate- and Waste Water Ponds.

Background and Description: The Brandywine Coal Ash Landfill site is an active coal ash landfill operated by Mirant Maryland Ash Management that has been receiving fly- and bottom ash since the

[398] On December 3, 2010, Mirant Mid-Atlantic merged with RRI Energy, Inc. The company resulting from the merger of Mirant and RRI Energy is known as GenOn Mid-Atlantic, Inc. In December 2012, GenOn was purchased, in turn, by NRG Energy.
[399] The Barndywine Landfill is located at11700 North Keys Road, Brandywine, MD.

early 1970s (8.5 million tons as of the end of 2009).[400] Most disposal pits are unlined,[401] some have leachate collection systems and one has a synthetic liner.[402] There is also wastewater treatment on the site consisting of four settling ponds that collect and treat the leachate, which is discharge from four outfalls into Mataponi Creek, a tributary of the Patuxent River and part of the Chesapeake Bay watershed.[403] Shallow groundwater on the site also discharges to Mataponi Creek.

An MDE report (August 12, 2008) identified, based on monitoring data from 2002 through 2008, exceedances of DWSs in groundwater and exceedances of WQCs for aquatic life in surface water, due to migration of pollutants to groundwater and surface water from leaks in multiple disposal pits and ponds, and direct pollutants' discharge to surface water from four outfalls.

Impact and Damage Claims: *Groundwater*: EIP (2010) indicates that there is contamination of onsite groundwater, including cadmium above its primary EPA Maximum Contaminant Level (MCL), as well as aluminum, chloride, iron, manganese, sulfates and total dissolved solids (TDS) above secondary MCLs.

Surface water: EIP (2010) also notes contamination of offsite surface water in Mataponi Creek with cadmium and lead above water quality criteria downstream of the site. Selenium levels in discharge from outfalls were noted to consistently exceed water quality criteria between 2006 and 2008.

Windblown ash from the landfill produces dense clouds of fugitive dust from large piles of uncovered ash. The landfill is located 250 yards from a children's playground, several hundred yards from a little league baseball field and a kid's soccer field, and within about half-mile from a dozen homes. No air monitoring or soil/dust sampling has been completed as of May 2011.[404]

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[400] The two main CCR feeders are Mirant-Mid Atlantic's Morgantown Generating Station at Newberg, MD, and the Chalk Point Generating Station, Aquasco, MD. For information on the Chalk Point Generation Station, including its application for the installation of wet FGD scrubbers, see the March 2008 Maryland Power Plant Research Program study at http://esm.versar.com/pprp/bibliography/PPSE-10-3/PPSE_10_3.pdf.
According to MDNER (2010), in 2009 the Brandywine landfill received 80,586 ton of fly ash and 14,185 ton of bottom ash from the Morgantown Generating Station; and 93,586 ton of fly ash and 11,608 ton of bottom ash from the Chalk Point Generating Station. According to CEIR (16), in the wake of Mirant Mid-Atlantic, LLC's 2010 application to the Maryland Public Service Commission to authorize the modification of the Morgantown Generating Station to install a fly ash beneficiation facility to thermally process fly ash into a low-carbon material suitable for beneficial reuse, much of the fly ash that was transported from Morgantown and Chalk Point plants to the Brandywine Landfill would be diverted for reuse as a Portland cement component. In December 2013, NRG Energy has announced plans for either switching from coal to oil or having the Chalk Point Plant retired (May 2017), which will bring about a significant reduction in the amount of CCRs disposed in the Brandywine Coal Ash Landfill: http://www.washingtonpost.com/local/nrg-energy-likely-to-stop-burning-coal-at-plants-in-montgomery-prince-georges/2013/12/15/bb90f268-60f9-11e3-bf45-61f69f54fc5f_story.html and https://content.sierraclub.org/press-releases/2013/12/chalk-point-and-dickerson-coal-plants-set-retire.

[401] Only one landfill pit, commissioned in 2007, is lined. The composite liner comprises a compacted clay sub-base, 60-mil PVC geomembrane liner, a 250-mil HDPE geonet, and 18 inches of bottom ash drainage layer.

[402] For additional information on the size, history and design of the disposal units at the site, see pp. 10-13 in State of Maryland v. GenOn Ash (2012).

[403] The Mataponi Creek is a fishing and bird watching destination (MyFishMaps.com and MyFishMaps.Com). Mataponi Creek flows through Merkle Wildlife Sanctuary, the only sanctuary operated by the Maryland Department of Natural Resources. It is the wintering ground for several thousand Canada geese, the largest concentration on the western shore of the Chesapeake Bay. Red fox, groundhogs and white-tailed deer, ospreys, herons, hummingbirds, and songbirds also inhabit the refuge: http://www.ens-newswire.com/ens/nov2009/2009-11-23-093.asp.

[404] An attachment to an e-mail from Lisa Evans, EearthJustice, to A. Livnat, EPA/OSWER, May 10, 2011. Prince George's Cable TV News (CTV) documented the issue in a news segment.

Resolution: In November 2009, citizens groups and the Maryland Department of the Environment (MDE) have each filed an intent-to-sue Mirant for violations of the Clean Water Act (CWA).[405] The organizations claim that Mirant is discharging pollutants into groundwater without a permit, as well as discharging contaminants to surface water via outfalls without proper permits.[406]

According to GeoOn (Quarterly 2011), in April 2010, MDE filed a complaint against Mirant in the United States District Court for the District of Maryland asserting violations of the Clean Water Act and Maryland's Water Pollution Control Law at Brandywine. MDE contends that the operation of Brandywine has resulted in discharges of pollutants that violate Maryland's water quality criteria.[407] According to GenOn (Quarterly 2011), in June 2011, MDE agreed to stay the litigation related to Faulkner and Brandywine while GenOn pursues settlement of allegations related to the three Maryland ash facilities (the third being Westland, Dickerson Station's landfill). As a condition to obtaining the stay, GenOn agreed in principle to pay a civil penalty of $1.9 million to the MDE if the Utility were to reach a comprehensive settlement regarding all of the allegations related to the three Maryland ash facilities.[408]

A coalition of citizens groups, which intervened in MDE's January 2011 lawsuit,[409] announced a settlement January 14, 2013.[410] In a joint motion filed January 2, 2013[411] the MDE and GenOn asked the court to enter the proposed consent decree. GenOn Energy Inc. would pay a civil penalty of $1.9 million and perform remedial actions to prevent future surface water and groundwater contamination from the Site's coal ash leachate ponds. Under the proposed consent decree filed December 21, 2012 in the U.S.

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[405] *Notice of Intent to File Citizen Suit for Violations of Clean Water Act at the Brandywine Fly Ash Landfill in Prince Geotge's County, Maryland* on behalf of Defenders of Wildlife, Sierra Club, Chesapeake Climate Action Network, and the Patuxent Riverkeeper; Jane F. Barrett, University of Maryland School of Law and Jennifer Peterson, EIP, Washington DC, Nov. 19, 2009. In April 2010, MDE filed suit in federal court maintaining that the disposal site was leaching pollutants in violation of the CWA and state law (*Maryland v. Mirant Maryland Ash Management LLC,* D. Md., No. 100-cv-826, April 2, 2010; http://www.mde.state.md.us/assets/document/Mirant_Complaint.pdf).

[406] On June 21, 2010, Mirant filed a motion to dismiss arguing: (1) that MDE cannot now hold Mirant in violation for discharged pollutants that are known to be constituent parts of a leachate waste stream when that waste stream has already been permitted by MDE under the CWA, even if those particular constituents were not detected when the application for permit was prepared; and (2) MDE did not provide sufficient notice as to "critical aspects" of its CWA claim against Mirant—though it was required to do so. On September 8, 2010, the court denied Mirant's motion without making any findings or providing explanation. Subsequently, Mirant filed its answers and then, filed a motion with the court to enter a case management schedule for discovery and trial based on a bifurcation of the case into separate liability and remedy phases (Fehrenbach et al., 2011).

[407] The complaint requests that the court, among other things, (a) enjoin further disposal of coal combustion waste at Brandywine, (b) require Mirant to close and cap the existing open disposal cells within one year, (c) impose civil penalties and (d) award them attorney's fees. Mirant dispute the allegations. In September 2010, four environmental advocacy groups became intervening parties in the proceeding.

[408] Accordingly, GenOn also developed a technical solution, which included installing synthetic caps on portions of each of the ash facilities. During the three months ended June 30, 2011, GenOn accrued $28 million for the estimated cost of the technical solution. In October 2011, the MDE informed GenOn that its proposed technical solution was not adequate.

[409] Defenders of Wildlife, the Sierra Club, the Patuxent Riverkeeper, and the Chesapeake Climate Action Network: http://op.bna.com/env.nsf/id/aada-93xsu7/$File/Entry%20Consent.pdf

[410] Maryland v. GenOn MD Ash Management, D. Md., No. 8:11-CV-01209, proposed consent decree filed December 21, 2012.

[411] State of Maryland v. GenOn Ash (2013).

District Court for the District of Maryland,[412] GenOn MD Ash Management would cap and seal all closed cells in the landfill and install liner systems in all leachate and stormwater collection ponds. GenOn MD Ash Management also would perform a study to characterize the levels of contamination at the Site. GenOn also would have to develop and implement a plan to control fugitive coal dust, which can be released from the ponds.

In June 2013, MDE has brought a water pollution lawsuit against the Chalk Point and Dickerson plants contending that wastewater released into the Patuxent and Potomac Rivers, respectively, contained illegal amounts of nitrogen and, in one instance, phosphorous.[413]

Evaluation against Proven Damage Criteria[414]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for cadmium. • Onsite groundwater data exceeded EPA SMCLs for iron, aluminum, manganese, sulfates, chlorides and TDS. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• Cadmium and lead were found offsite surface water in Mataponi Creek at levels above unspecified water quality criteria. • Selenium was above water quality criteria in outfall discharges from the site, though it does not appear to be monitored in other offsite surface water.
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• In late 2009 and early 2010, citizen groups and MDE sent notices of intent to sue Mirant MD Ash Management and Mirant Mid-Atlantic for violations of the CWA.

ICF (2010) Rationale: *Potential Damage.* <Groundwater exceedances of the primary EPA MCL for cadmium have been found on site. While offsite surface water and outfall discharges exceeded unspecified water quality criteria, there is no scientific study available that explicitly documents evidence

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[412] State of Maryland v. GenOn Ash (2012). The Consent Decree applies also to GenOn's Faulkner Ash Management Facility in Charles County and to the Westland Ash Management Facility, the Dickerson power plant in Montgomery County.
[413] *Maryland sues NRG Energy, alleging water pollution at two coal-fired generators*, The Washington Post, August 3, 2013: http://articles.washingtonpost.com/2013-08-03/local/41028727_1_nrg-energy-genon-energy-patuxent-riverkeeper.
[414] ICF (2010a).

of damage to human health or the environment. There are no administrative rulings or court decisions associated with the site, however, notices of intent to sue have been filed by citizen groups and MDE.>

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PTb23. Mirant[415] Dickerson's Generation Station's Westland Disposal Site, Montgomery County, Maryland

Type: Landfill and Leachate Treatment Ponds.

Brief Description: The Dickerson Generating Station is located on the Potomac River near Dickerson, south of the Monocacy River in upper Montgomery County, Maryland.[416, 417] The facility includes the Westland CCR monofill and ash settling and leachate treatment ponds.[418, 419] The permitted Disposal Site occupies about 288 acres, of which 180 acres are utilized for the actual disposal of CCR. More than 3.8 million cubic yards of CCR have been deposited at the Westland Disposal Site over the last 30-years.[420] The Disposal Site consists of three distinct areas - Mirant Ash Areas A, B, and C. Area C is the westernmost disposal site: it has been completely filled, capped, and vegetated. Area B is located immediately to the west of Area A and is currently the only active disposal site. Both Areas B and C comprised originally unlined cells. Area A, located in the easternmost portion of the property, will be utilized once Area B reaches capacity.[421]

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[415] Mirant acquired the electric generating station and approximately 800 acres of the Dickerson site from PEPCO in 2000. On December 3, 2010, Mirant merged with RRI Energy, Inc. The company resulting from the merger of Mirant and RRI Energy is known as GenOn Energy, Inc. In December 2012, in turn, GenOn was purchased by NRG Energy.

[416] The Station consists of three steam generation units, each rated at 191 MW (base load), in addition to two 147 MW gas and oil-fired simple cycle combustion turbines, and one 13 MW black-start and peaking turbine. The Station fires Appalachian and imported South-America bituminous coal. Coal is delivered to the units by a CSX Transportation Corporation (CSXT) rail spur off the main line. A wet FGD scrubber was installed and went online late in 2009.

[417] According to Maryland Department of Natural Resources (2007-03-19), the coal-fired generating Units 1, 2, and 3, were constructed in the late 1950s and began operation in 1959, 1960, and 1962, respectively. Condenser cooling is accomplished with once-through cooling water from the Potomac River. The once-through water circulation system discharges water back into the Potomac River at a rate of up to about 400 million gallons per day.

[418] Maryland Department of Natural Resources (2007-03-19).

[419] According to the Annual Generator Report (2008), in 2008, close to 200,000 tons of fly ash were generated, 93 percent of which was disposed of at the Westland Ash Site and 7percent was sold for beneficial use (concrete, concrete products, and grout). Of the 31,000 tons of bottom ash generated, 63 percent were disposed of at the Westland Ash Site, 15 percent were used/stored on site, and 22 percent were sold for snow- and ice control. According to the Annual Generator Report (2010), in 2010, 78,369 tons of fly ash were generated, the great majority of which was disposed of at the Westland Ash Site. All of the 12,758 tons of bottom ash generated were disposed of at the Westland Ash Site. Of the 89,780 tons of FGD gypsum generated, the great majority was transported to LaFarge in Buchannan, New York, for use in wallboard manufacturing.

[420] Cited quantities are applicable as of the filing of the Notice of Intent to Sue, at the outset of 2011. The total disposed of CCR amounts to about 5,827,600 tons: approximately150000 cubic yards of waste are placed at the Disposal Site every year.

[421] Maryland Department of the Environment (2011) and State of Maryland v. GenOn Ash (2012).

The Disposal Site plan provides for three settling ponds to collect groundwater and leachate from three disposal pits. Ponds 2 and 3 are in use but rarely discharge. Pond 2 is unlined and Pond 3 was not lined with a synthetic liner until 2010. Currently, since Area B is the only active disposal site, any leachate generated from Area B flows through unlined ditches into Pond 3. Wastewater in the ponds is aerated and treated with soda ash before it is discharged through Outfalls 002 and 003. Outfall 002 discharges stormwater runoff from Area B to an unnamed tributary leading to the Potomac River. Outfall 003 discharges storm water runoff from Areas B and C to an unnamed tributary leading to the Potomac River. This leachate collection and treatment system fails to prevent leachate from entering waters of the State.[422]

Ground water occurs under unconfined water table conditions in joints, fractures, and bedding planes of the shallow bedrock aquifer in the upland portion of the Dickerson site. The Disposal Site lies within the Triassic-Age New Oxford Formation,[423] comprised of weathered and unaltered sandstone and siltstone that is porous and highly water-conductive. The groundwater table lies at a depth of 10 to 20 feet below ground level. Flow generally mimics surface topography, with recharge occurring in the upland area and groundwater flowing eastward and westward toward discharge areas in the Little Monocacy River and Potomac River, respectively. Groundwater at the Disposal Site flows southeast to west following the contour of the land and the direction of the streambeds.[424] Water resources data collected in the mid-1980s indicate that the nearest groundwater users are located about one mile north of the Dickerson site, with the Little Monocacy River lying between the site and those users.

Impact: Because the disposal pits were inadequately lined and impermeable caps were not installed, rainwater and snow melt leach out pollutants from the CCR. Fractured rock exists northwest of Area B. Water flows into this area and then rapidly disappears, facilitating leachate contamination of groundwater, detrimentally affecting water quality beneath the fill areas, as shown by increased contaminant levels in monitoring wells. Groundwater monitoring confirms that pollutants present in the groundwater discharge to "Little Stream" and" Big Stream," which merge and discharge into the Potomac River.[425] The Potomac is an American Heritage River.

Monitoring results submitted by Mirant Ash and Mirant Mid-Atlantic from groundwater monitoring wells around the disposal pits demonstrate unauthorized discharges of sulfates, total dissolved Solids (TDS), manganese, iron, chlorides, and aluminum in concentrations that cause or contribute to violations of water quality standards.[426] Sampling of discharge from Outfalls 002 and 003 reveal concentrations of selenium, chloride, sulfates and hardness exceeding water quality standards. Samples collected on March 15, 2010 from Outfalls 002 and/or 003 revealed excessive amounts of arsenic, barium, chromium, cobalt, copper, iron, selenium, and zinc, which violate water quality standards.[427] Excessive amounts of arsenic, barium, copper, iron, selenium, and zinc were also found in monitoring wells.

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[422] On July 1, 1995, the DNR issued a National Pollutant Discharge Elimination System (NPDES) Permit No. MD-0057584 (State Discharge Permit No. 9l-DP-1680) to the Potomac Electric Power Company (PEPCO), the prior owner of the Disposal Site, authorizing the discharge of certain pollutants from Outfalls 001, 002, and 003. In December 2000, when Mirant Ash purchased the Disposal Site from PEPCO, the existing discharge permit was transferred from PEPCO to Mirant Ash.
[423] http://tin.er.usgs.gov/geology/state/sgmc-unit.php?unit=MDTRno%3B2
[424] Maryland Department of the Environment (2011).
[425] Ibid.
[426] MDE NOI (2011).
[427] Maryland Department of the Environment (2011). A sample from Outfall 002 revealed a total selenium concentration of 12.4ugf/L and a dissolved selenium concentration of 11.3 µg/L. Samples from a Pond near the overflow pipe at Outfall 003 revealed a total selenium concentration of 44.7µg/L and a dissolved selenium

Resolution: On January 3, 2011, MDE filed notices of intent to sue Mirant Mid-Atlantic LLC and its subsidiary, Mirant Maryland Ash Management, in federal court for alleged water pollution violations at two of the power generator's sites for disposal of CCR.[428] The notice alleges violations at Mirant's Westland disposal site in Montgomery County, Maryland, in and around two unnamed tributaries that drain into the Potomac River.[429] The notice alleges that all of the unauthorized discharges are continuing and have been occurring daily since at least December 1, 2005.

The state contends that the company continues to dump its CCR in unlined landfills, despite 2008 state regulations that require liners for ash disposal facilities. State officials said toxic substances in the ash are leaching into ground water and nearby surface waters, though they add that the levels of contamination so far seem to pose no health risk to nearby residents.[430]

In June 2011, the MDE agreed to stay the litigation related to Faulkner and Brandywine while GenOn pursue settlement of allegations related to the three Maryland ash facilities (Westland included). MDE also agreed not to pursue its tentative denial of GenOn's application to renew its water discharge permit at Brandywine and agreed not to act on the utility's renewal applications for Faulkner or Westland while GenOn is discussing settlement. As a condition to obtaining the stay, GenOn agreed in principle to pay a civil penalty of $1.9 million to the MDE if the parties reach a comprehensive settlement regarding all of the allegations related to the three Maryland ash facilities.[431]

A coalition of citizens groups, which intervened in MDE's January 2011 lawsuit,[432] announced a settlement on January 14, 2013. In a joint motion filed January 2, 2013 the MDE and GenOn asked the court to enter the proposed consent decree.[433] GenOn Energy Inc. would pay a civil penalty of $1.9 million and perform remedial actions to prevent future surface water and groundwater contamination from the Site's coal ash leachate ponds. Under the proposed consent decree filed December 21, 2012 in

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concentration of 42.6µg/L. Samples from Outfall 003 revealed a total selenium concentration of 79. 2 µg/L, and a dissolved selenium concentration of 71. 6 µg/L. All of those test results constitute exceedances of the Maryland Numerical Water Quality Criteria and the national recommended water quality criteria established by the EPA of 5.0 µg/L for selenium.

[428] MDE NOI (2011) and Gazette.Net (1/5/2011). The action comes after a federal lawsuit filed by the state in 2010 against Mirant over ash disposal at a third landfill in Brandywine in Prince George's County. The Agency also has a pending lawsuit in state court over the Faulkner ash landfill, but said in a news release it now plans to consolidate all the cases in federal court.

[429] The MDE contends that sampling results from groundwater monitoring wells, from Outfalls 0 02 and 003, and from "Little Stream" and" Big Stream," demonstrate that Mirant Ash and Mirant Mid-Atlantic are discharging and continue to discharge pollutants, including but not limited to, aluminum, arsenic, barium, beryllium, boron, cadmium, chlorides, chromium, cobalt, copper, cyanide, iron, lead, manganese, mercury, molybdenum, nickel, pH, selenium, silver, sulfates, TDS, tin, and zinc from the disposal pits, the treatment cells, the settling ponds, and through Outfalls 002 and 003 into "Little Stream" and" Big Stream" directly or through discharges to groundwater that is hydrogeologically connected to surface waters that are not authorized, or in amounts that are not authorized by the Discharge Permit. In addition, sample results of the leachate in the treatment ponds demonstrate the presence of unauthorized pollutants in a position likely to pollute" Little Stream" and" Big Stream", tributaries of the Potomac River, which constitutes a discharge under Maryland law.

[430] The Baltimore Sun (2011).

[431] GenOn (Annual 2012).

[432] Defenders of Wildlife, the Sierra Club, the Patuxent Riverkeeper, and the Chesapeake Climate Action Network. http://op.bna.com/env.nsf/id/aada-93xsu7/$File/Entry%20Consent.pdf

[433] State of Maryland v. GenOn Ash (2013).

the U.S. District Court for the District of Maryland,[434] GenOn MD Ash Management would cap and seal all closed cells in the landfill and install liner systems in all leachate and stormwater collection ponds. GenOn MD Ash Management also would perform a study to characterize the levels of contamination at the Site. GenOn also would have to develop and implement a plan to control fugitive coal dust, which can be released from the ponds.

In June 2013, MDE has brought a water pollution lawsuit against the Dickerson and Chalk Point plants contending that wastewater released into the Potomac and Patuxent Rivers, respectively, contained illegal amounts of nitrogen and, in one instance, phosphorous, and as of August 2013, the parties are trying to negotiate a settlement in the case.[435]

In December 2013, NRG Energy has announced plans for either switching from coal to oil or having the Dickerson and Chalk Point Plants retired (May 2017).[436]

Postscript: This case has come forth after EPA proposed (in June 2010) the *Hazardous and Solid Waste Management System: Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities* rule.[437] It comprises impacts to both surface water and groundwater involving primary and secondary MCLs. However, in the absence of site-specific information concerning off-site migration of the contaminants, and considering that MDE has not yet exercised its intent to sue, this case is tentatively rated as a Potential Damage Case.

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[434] State of Maryland v. GenOn Ash (2012). The Consent Order applies also to GenOn's Brandywine Ash Management Facility in Prince George's County and to the Faulkner Ash Management Facility in Charles County.

[435] *Maryland sues NRG Energy, alleging water pollution at two coal-fired generators*, The Washington Post, August 3, 2013: http://articles.washingtonpost.com/2013-08-03/local/41028727_1_nrg-energy-genon-energy-patuxent-riverkeeper. <According to Maryland's complaint, sulfur dioxide scrubbers and wastewater treatment systems were added at the two plants (Dickerson and Chalk Point) -in 2009 and 2010 to comply with the Maryland Healthy Air Act, enacted in 2006. The treatment systems included bacteria to remove pollutants from wastewater, but the organisms died soon after installation, the state contends. Citing monitoring data submitted by GenOn, the state contends that the Chalk Point plant discharged as much as 20 times its annual allotment of nitrogen into the Patuxent in some years. Nitrogen, like phosphorus, is a common component of fertilizer. Released into water, it can exacerbate algal blooms, which in turn create the oxygen-depleted dead zones that have plagued the Chesapeake Bay.> According to the September 3, 2013 Gazette.Net: http://www.gazette.net/article/20130903/NEWS/130909898/1124/state-attempts-to-settle-lawsuit-with-dickerson-coal-plant&template=gazette, an MDE spokesman indicated that the parties in the case asked the court to put the case on hold for 120 days as they attempt to settle. On August 28, 2013, Judge Marvin J. Garbis ordered a stay in the case. In January 2013, Food & Water Watch, Potomac Riverkeeper and Patuxent Riverkeeper — represented by Public Justice and the Columbia University School of Law Environmental Law Clinic — filed an intent to sue NRG Energy Inc. for federal Clean Water Act violations at the Dickerson and Chalk Point plants as well as a plant in Charles County.

[436] http://www.washingtonpost.com/local/nrg-energy-likely-to-stop-burning-coal-at-plants-in-montgomery-prince-georges/2013/12/15/bb90f268-60f9-11e3-bf45-61f69f54fc5f_story.html and https://content.sierraclub.org/press-releases/2013/12/chalk-point-and-dickerson-coal-plants-set-retire.

[437] Docket document # EPA-HQ-RCRA-2009-0640-0352.

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PTb24. Karn/Weadock Generating Facility,[438] Consumer Energy, Saginaw, Bay County, Hampton Charter Township, Michigan

Type: Surface Impoundments (Regulated as Landfills).

Background and Description: The Karn and Weadock landfills are two large, unlined surface impoundments located near the Saginaw River and Saginaw Bay of Lake Huron (about 21 miles north of Saginaw), that were built in phases at Consumer Energy's Karn/Weadock Generating Facility in 1959 and 1961.[439] Ash from the Karn/Weadock power plant was previously sluiced into the impoundments,[440] while the surface water discharges were regulated by NPDES discharge permits: for many decades, there was not much regulation of groundwater discharge quality, just some monitoring. The Karn and Weadock impoundments became regulated as landfills in 1986 and 1992, respectively, and both landfills have by now transitioned to dry ash systems.[441] They are presently permitted as Type III Low Hazard Industrial

[438] According to SourceWatch, (http://www.sourcewatch.org/index.php/Karn/Weadock_Generating_Complex_Expansion) and to Consumers Energy (http://www.consumersenergy.com/content.aspx?id=1335), the Karn/Weadock generating complex is Consumers Energy's largest power production site. It consists of three separate plants: the 310-megawatt (MW) coal-fueled Weadock plant; the 511-MW coal-fueled Karn 1 and 2 plant; and the 1,276-MW natural gas- and oil-fueled Karn 3 and 4 plant. Together, the six Karn/Weadock units can generate up to 2,101 MW. Weadock coal-fueled unit 1 began operating in 1940, and Weadock units 7 and 8 began operating in 1955 and 1958, respectively. Karn coal-fueled units 1 and 2 began operating in 1959 and 1961, respectively. Karn units 3 and 4 began operating in 1975 and 1977, respectively. In 1980, Weadock's Units 1-6 retired. The coal-fired, base load plant uses annually 3 million tons of a blend of western and eastern coal, which it receives by ship and rail. The two oil and gas units are used as peak demand units. The plant uses annually 1.6 billion cubic feet of natural gas and 23 million gallons of fuel oil.

Early in December 2011, Consumers Energy announced that in response to existing and pending federal and state environmental regulations and ongoing market conditions, the company decided to suspend in 2015 the of operation of the two coal-fueled units at the 2,101 MW Karn/Weadock Generating Complex, in addition to suspending five additional smaller units elsewhere in Michigan (a total capacity of 950 MW; Power Engineering, 2011). Then, in late September, 2013, Consumers Energy received approval to delay the retirement of the two coal-fueled units at Karn/Weadock Generating Complex because of increased power demand in the state and concerns about power supply reliability. The approval gives Consumers the option of continuing operation at the Karn/Weadock Plant until April 2016 (Power Engineering, 2013). In October 2013, Consumers Energy announced plans to demolish the Weadock plant in April 2016 pending bond approval from the Michigan Public Service Commission and approval from the company's Board of Directors (Mlive, 2013).

[439] EIP (2010); however, according to *Michigan DEQ Info Sharing* (2009), these impoundments were built in stages in the 1940s and 1970s.

[440] Together, they cover 174 acres and have a capacity of 4,175,000 cubic yards. According to Sierra Club (2010), Consumers Energy has two landfills on Saginaw Bay: the 292-acre Weadock site and the 172-acre Karn site (171-acres according to DEQ's 2009 Operating Permit).

[441] Industrial waste in Michigan is regulated under the provisions of Part 115, Solid Waste Management, of Michigan's Natural Resources Environmental Protection Act (NREPA), Public Act 451 of 1994, as amended. Coal

Landfills.[442] Wastewater discharged from the Site, including from the Karn and Weadock Disposal Areas, is regulated under the same National Pollution Discharge Elimination System (NPDES) permit. Each discharge location has its own set of discharge requirements.

Fly ash has not been placed in the Karn Disposal Area since February 2009. Currently, fly ash from the Karn facility is pumped in a dry condition to the Weadock Disposal Area by the dry fly ash handling system. Bottom ash slurry is sluiced from the Karn plant into the Karn Disposal Area via four above ground steel pipelines. The bottom ash slurry flows through a series of channels and ponds designed to promote settlement of the bottom ash prior to discharging at the NPDES outfall into the Karn plant Discharge Canal. The Karn Disposal Area is authorized to discharge a maximum of 21.753 million gallons per day (MGD) of fly ash and bottom ash transport water, chemical metal cleaning wastes, coal pile runoff, miscellaneous low volume wastes and stormwater runoff. Water is discharged from Pond F to the Discharge Canal, which discharges into Saginaw Bay.[443]

Prior to 2009, fly ash from the Weadock plant was hydraulically discharged to the ash disposal area, where the ash was allowed to settle by travelling through a series of channels. Bottom ash was hydraulically discharged to the bottom ash pond, as it does today, where it is allowed to settle and sluice water is conveyed to the NPDES discharge structure though channels and culverts.[444]

The original impoundments are located on reclaimed state bottomlands (marshes filled with dredge deposits), 'known areas of environmental impact from various sources.'[445] Inorganic forms of several heavy metals, detectable in surrounding monitoring wells, are naturally occurring in the soils and geologic substrata in the area. The area in Saginaw Bay where the river enters has been designated an Area of Concern (AOC) by the U.S./Canada Joint International Commission for shared water resources for

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ash impoundments in Michigan are exempt from regulation under the Michigan Dam Safety Rules, Part 315 of the NREPA, because they contain Type III wastes. The Karn Disposal Area operates under MDEQ Solid Waste Disposal Operating License No. 9234 (Operating License), which must be renewed every five years. The current Operating License expires on October 15, 2014.

For plans to move away from coal as the only fuel, see: *Consumers Energy cancels Karn/Weadock expansion and announces retirement of two units at Karn/Weadock complex*: http://www.sourcewatch.org/index.php?title=Weadock_Generating_Plant; and *Consumers Energy drops plans for coal-fired plant:* http://www.msnbc.msn.com/id/45530279/ns/us_news-environment/t/consumers-energy-drops-plans-coal-fired-plant/, 12/2/2011.

442 The *D E Karn 1 and 2 Solid Waste Disposal Area Operating License* (2009) and The *JC Weadock Solid Waste Disposal Area Operating License* (2009). The Karn Landfill's permitted area contains Areas A, B1, B2, C, D1, D2, E and F, including ash settling basins, clarification ponds, and ash transport ditches. These ponds were created between 1965 and 1977 by constructing interior divider dikes within the Karn Disposal Area. Ponds A, B, and C were intended for storage of dry compacted ash. Ponds D, E, and F were used as settling and clarifying ponds for the coal ash slurry water prior to discharge. In addition to the original pond areas A, B, C, D, E, and F, the Weadock's Landfill permitted area (Permit # 9233) contains ash settling basins and ash transport ditch. The total ash disposed annually, including ash produced at Karn, is about 228,000 cubic yards.

Both permits include a tentative groundwater compliance Groundwater/Surface water Interface (GSI) monitoring program, financial assurance, a requirement for a revised closure plan, and a requirement for submitting for review a structural analysis of the dike stability for the landfill's external dikes. In addition, the *Karn 1 and 2 Permit* includes also a requirement for a slurry wall and hydraulic gradient control system plan (with construction to begin on or before June 30, 2012 and be completed on or before October 15, 2014), whereas the *Weadock Permit* also includes a requirement for a soil-bentonite cutoff-wall construction plans and construction certification for same.

443 GZA GeoEnvironmental (2011).

444 Dewberry & Davis (2011).

445 EIP (2010) and reference therein.

reasons including potential damage to fish or wildlife populations and/or drinking water restrictions. The AOC designation is a result of multiple sources of contamination.[446] However, EIP (2010) also notes a 2005 Michigan Department of Environmental Quality (DEQ) report that determines the Karn and Weadock landfills are major contributors to arsenic contamination in the AOC.

In 1982, some problems with groundwater under the landfills were noticed by Consumer Energy and discussed with the DNR (now the DEQ). In 1986, Michigan's Water Resources Commission authorized discharges from these ash lagoons to groundwater as not usable aquifers, because it had little data quantifying any concerns for pollutants.[447, 448] The DNR embarked upon licensing the Karn and Weadock impoundments as solid waste landfills in order to apply additional state groundwater monitoring outside the landfills: Variances (approximately 14-16) were necessary to capture the impoundments under the solid waste law for landfills, as not typical landfills.

Seventeen monitoring wells are present at the Karn Disposal Area. Water sampling is conducted in accordance with a MDEQ-approved Hydrogeological Monitoring Plan approved on March 1, 2010. Annual collection of unfiltered leachate samples is performed at two monitoring wells located within the Karn Disposal Area, LH-101 and LH-102. Quarterly collection of water samples is performed at a minimum 15 monitoring wells surrounding the Karn Disposal Area.[449]

The Karn and Weadock plants are located approximately 30 miles east of the center of the Michigan Basin, a broad structural and depositional basin formed during the Paleozoic time. The site is underlain by about 14,000 feet of Paleozoic sediments deposited on Precambrian basement rock. The formations generally dip toward the northwest into the center of the basin. The Karn/Weadock Disposal Area is sited on native alluvium and lacustrine soils that are underlain by consolidated glacial till.[450] Lacustrine clays and silts are typically found chiefly underlying extensive, flat, low lying areas formerly inundated by glacial Great Lakes. The glacial till layer generally exists at a depth of 25 to 75 feet below the natural ground surface. Bedrock (the Saginaw Formation) generally exists at 90 feet below the natural ground surface.[451] This formation, which consists of early Pennsylvanian-age deposits, is comprised of gray and black shales, interbedded with sandstones, calcareous sandstones, siltstones and occasional limestone lenses.

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[446] EPRI's comment (EPA-HQ-RCRA-2009-0640-9765) claims that the AOC is a very large area (1,143 square miles) of contaminated sediments, including a wide range of metals and organic compounds; PCBs are reportedly the most significant sediment contaminants (US EPA, 2010; Public Sector Consultants, Inc., 2000). EPRI describes the sources of metal contamination, including metal casting industries and forge operators, as being upriver from the Karn/ Weadock facilities.
[447] Michigan DEQ (2009a): Part 115, Rule 309(4) for industrial waste impoundments allows free liquids to be discharged in accordance with a permit which is issued under part 31 of the Act and which considers the effect of the discharge on surface and groundwater.
[448] Michigan DEQ comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0191.
[449] Namely, MW-31, OW-32, MW-32, MW-33, OW-34, MW-35, OW-35, MW-36, MW-37, OW-37, MW-38, MW-39, OW-40, MW-10R, and MW-11.
[450] The glacial deposits are of two types: outwash which is sorted and stratified sand deposited from glacial melt waters and till which is an unsorted, non-stratified mixture of clay interspersed with varying amounts of silt, sand and gravel deposited directly from glacial ice. The lacustrine deposits are organic clays, silts and sands that were deposited in or on the shores of glacial lakes formed during interglacial and postglacial times. The alluvial deposits consist of sands that were deposited by the adjacent Saginaw River (Dewberry and Davis, 2011 and a reference therein; for a map of Quaternary deposits, see virtual page 365).
[451] GZA GeoEnvironmental (2011).

Impact and Damage Claims: EIP (2010) indicates that there is contamination of onsite groundwater with arsenic above the primary MCL and high levels of boron. Monitoring at the Groundwater/Surface water Interface (GSI) encountered boron up to 19.4 mg/L and arsenic up to 1.4 mg/L[452] (the corresponding mixing zone criteria are 21 mg/L for boron and 0.540 mg/L for arsenic). EIP (2010) also notes arsenic was found above the primary EPA MCL in a well in Lake Huron (outside of the power plant's property). This well monitors the quality of groundwater discharging into the lake. Exceedance of Michigan's health-based standard for lithium in discharge water is also documented.[453]

The Utility claims that:[454] (i) Average arsenic levels in sediment in the vicinity of the landfills are significantly lower (10mg/kg) than the corresponding levels in background samples in the Saginaw Bay (16.6mg/kg); (ii) the groundwater determination cited in EIP (2010) is at variance with the DEQ 2009 findings, whereby some of the pollutants were heading towards Saginaw Bay, but no transect data found any reaching it above WQSs; (iii) the surface water determination is not supported: the 2005 Natural Resource Tehnology (NRT) Phase II Final Report notes that high arsenic levels in the sediment do not lead to concentrations of concern in surface water. Natural attenuation (e.g., arsenic precipitating with sulfides and co-precipitating with iron oxides) occurs as the reduced groundwater approaches the oxic surficial sediment zone, removing the arsenic from the venting water; and finally, (iv) MCLs should not be applied to the arsenic levels in this designated non-usable aquifer.

Evaluation against Proven Damage Criteria[455]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded primary EPA MCLs for arsenic. • Offsite groundwater data at one well located in Lake Huron had arsenic above the primary EPA MCL, but did not clearly implicate CCRs from the landfills as the source.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• DEQ and Consumers Energy negotiated a consent decree requiring slurry walls to be built to stop landfill leakage. The project is already underway – one slurry wall has been completed and the other is under construction.

***Resolution*:** As discharges to the Great Lakes became more tightly regulated subject to EPA's National Toxics Rule in the late 1990s, in 2004 DEQ developed tighter leachate and groundwater venting standards for surface waters at the GSI. Also, with the advent of better low-concentration test methods for mercury

[452] For arsenic, this and similar values were measured in leaching wells inside the Karn Landfill.
[453] According to information accessed through a FOIA request and summarized in Sierra Club documents (Sierra Club, Undated, and Sierra Club, 2010) and in EIP (2010), <The site sits at the mouth of the Saginaw River which flows into Saginaw Bay; the source of 34,000 Bay City residents' drinking water. Along with arsenic and boron, these landfills have been known to be discharging lithium and sulfate into Saginaw Bay since 2002.>
[454] Consumers Energy comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0212.
[455] ICF (2010).

and other constituents, concerns grew for persistent toxics and heavy metals in the Saginaw River and Bay systems. In February 2002, the recognition of increased concentrations of some contaminant plumes outside the landfills triggered a DEQ request for more studies to better define their extent.

In 2004, DEQ required extensive monitoring studies and that if needed, Consumers Energy proceed with corrective actions. The 2004-2007 studies showed that some of the pollutants were heading toward the Saginaw Bay, but no transect data found any reaching Bay above water quality criteria. Evaluations of data were complicated by the natural background concentrations of many parameters (e.g., arsenic, mercury), likely low-level contamination coming from the dredge spoils piles, and potential influences of groundwater from the Saginaw River itself.

To protect the Saginaw Bay as a drinking water supply, in 2007 DEQ Water Bureau calculated venting (GSI mixing zone) criteria for all parameters of concern: inorganic arsenic (organic forms of arsenic bioaccumulate in biota), boron, phosphorous, and mercury. Once it was realized that venting may exceed the 2007 calculated criteria in some spotty locations, Consumers Energy was required to design a slurry wall for the Weadock facility (a landfill with much remaining capacity). In December 2008, Consumers Energy completed the construction of Weadock slurry wall.[456] This slurry wall reduces the flux of pollutants to single digit percentage points of the pre-wall venting flux.

In August 2009, DEQ revised/corrected the GSI criteria for the quality of groundwater that can vent to the River and Bay while still protecting for human health and the environment. In September 2009, DEQ issued a Consent Decree requiring slurry walls to be built to stop leakage also at the Karn (a low-remaining capacity landfill). Requirements for further investigation and definition of the site's hydraulic conditions and the GSI characteristics were included in the operating licenses issued for these facilities in October 2009, which include the installation of 49 monitoring wells.[457]

DEQ concedes that whereas as of late in 2009 there were no known violations, there was also a lack of a certain proof of compliance for some parameters. Therefore, confirmation monitoring is taking place and would proceed for 30 years after the landfills are closed[458] to prove compliance with water quality standards and to prove the containment systems work hydraulically, as intended.

Michigan DEQ states[459] that Consumers Energy continues to study the groundwater arsenic issue and has their authorization to vent groundwater to Saginaw River/Bay. Based on continued quarterly sampling, both landfills are in compliance with the arsenic site-specific GSI criterion of 540 µg/L. The high arsenic

[456] The east portion of the containment area was expanded in 1971 and the perimeter dikes were raised to elevation 590 feet IGLD85 (International Great Lakes Datum 1985). The purpose of raising the perimeter dike was to construct a clay perimeter dike-that is keyed into the hydraulic confining glacial clay till layer located approximately 20 to 25 feet below the current ground surface. This clay dike was designed to prevent any potentially contaminated groundwater from seeping through the dike into Saginaw Bay from the disposal facility. However, Consumers Energy later determined that this clay dike was not effectively keyed into a confining layer. In 2008, a soil-bentonite slurry wall was installed within the clay dike and keyed into the hydraulically confining glacial clay till layer. The liner's permeability is 1×10^{-6} cm/sec for the clay, and 1×10^{-8} cm/sec for the bentonite. A portion of the perimeter dike, upstream of the fish barrier and NPDES monitoring point, did not have a slurry wall installed to provide a vent for water from the site to discharge (Dewberry and Davis, 2011; for a map of the slurry wall, see virtual page 359).
[457] Michigan DEQ (2009a). However, the slurry wall to be installed at the Karn impoundment is no longer proposed due to slope instability of the site.
[458] This includes monitoring of ash and leachate quality in the landfills; groundwater quality immediately under and outside the dike walls; hydrostatic levels to determine the future rates of leakage, to calculate flux; and groundwater quality where venting might reach surface water at the River and Bay.
[459] Michigan DEQ comment to the 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0191.

level (997 µg/L) detected at Transect 5 during the Phase II study in 2005 has not been repeated since. Due to the ongoing site investigation, and the determination that the water under the impoundments is designated as *groundwater not in an aquifer*, the Michigan DNR has not listed this site as a proven damage case.[460]

Consumer Energy claims[461] that both impoundments converted to dry-handling in 2009, and will be dewatered and ultimately closed as landfills. The Karn landfill is completing design fill elevations on the structural fill portion of the landfill prior to closure; the Weadock landfill will continue operating for some years. As a result of the conversion to dry handling and the dewatering of the impoundments, the area of contamination influence as mapped in the NRT 2005 study has significantly decreased (reduced head and dissipation of the groundwater mounds).

Michigan DNR has recently claimed[462] that under the revised "mixing zone" standards, and State revisions for boron and arsenic standards 'based on new science', the Karn/Weadock landfills are not discharging levels of contaminants that are above criteria meant to protect public health and aquatic life.

***ICF (2010) Rationale*:** *Potential Damage*. <There are no administrative rulings or court decisions associated with the site; however MDEQ and Consumer Energy are negotiating a consent decree to address landfill leakage. Groundwater exceedances of the primary EPA MCL for arsenic have been found on site. Arsenic was also found exceeding the primary EPA MCL in an offsite well in Lake Huron, however the State ruled that the exceedance did not clearly implicate the Karn and Weadock landfills or the CCR at the site as the source.>

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PTb25. Marquette Board of Light & Power Pine Hill Landfill, Negaunee Township, Michigan

Type: Type III Sanitary Landfill Receiving Fly Ash.

Background and Description: The Marquette Board of Light and Power's Pine Hill Type III (Low-Hazard) sanitary landfill site,[463] located in Negaunee Township, Michigan, was used for the disposal of fly ash resulting from the burning of coal for the operation of the Shiras Steam Plant.[464] Located in a valley with shallow groundwater, the landfill received ash from 1985-1995. Morgan Creek and wetlands were located in the landfill's immediate vicinity. This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[465]

Impact: On-site groundwater exceedances of State health-based standards for boron and lithium, and high sodium levels. Also, groundwater discharges to Morgan Creek but there is no surface water impact associated with any constituent exceedances.[466]

Resolution: The Marquette Board of Light and Power was notified by the Michigan Department of Natural Resources (DENR) that the cell used at the landfill had resulted in degradations of the groundwater located under the landfill. The Michigan Department of Environmental Quality (DEQ) approved the Board's feasibility study for the landfill. The Board subsequently submitted a Remedial Action Plan (RAP) for the site that was approved by the DEQ in February 1998.[467]

RAP (1998) restrictive covenant blocking new water wells or use of drinking water within aquifer or any aquifer within 0.5 miles of the site; landfill closed and covered in 1993-95. Post-closure monitoring was required for ten years.[468]

Basis for Consideration as a Potential Damage Case: On-site groundwater exceedances of State Health-Based standards for boron and lithium.

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[463] Permit No. 52-000031 (Michigan DEQ, 2000).
[464] The Shiras Steam Plant is located at 400 East Hampton Lake St., Marquette, MI 49855. According to Marquette Board of Light and Power (2012), the Shiras Steam Plant Has 92 MW of electric generating capacity including coal-fired steam generation from three units: Unit 1: 28 MW (commissioned 1956), Unit 2: 20 MW (1971), and Unit 3: 44 MW (1981). Boilers 1 and 2 are spreader stoker coal fired boilers, whereas Boiler 3 is a pulverized coal fired boiler. Annually the utility requires approximately 200,000 tons of coal for generation purposes which is received at the utility's unloading dock in Marquette's Lower Harbor. The Marquette Board of Light and Power is a municipal electric utility serving approximately 17,000 customers in the city of Marquette and all or parts of nine townships in Marquette County: Marquette, Negaunee, Ishpeming, West Branch, Richmond, Chocolay, Skandia, Sands and Forsyth. According to Michigan DEQ Air Quality Division (2013), Boilers #1 and #2 were upgraded in 1979 with the addition of individual baghouse dust collectors under Air Use Permit #345-78, and Boiler #3 is controlled by a lime slurry scrubber for flue gas desulfurization followed by a baghouse dust collector.
[465] Michigan DNRE (2010).
[466] Michigan DNRE (ibid).
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PTb26. We Energies[469] Presque Isle Power Plant Landfill, Marquette, Michigan

Type: Type III (Low-Hazard) Offsite Industrial Landfill.

Background and Description: This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[470] This Type III Industrial Waste Landfill, owned by WEPCO, served the Presque Isle Power

[469] We Energies is the mother company of Wisconsin Electric Power Company (WEPCO).
[470] Michigan DNRE (2010).

Plant.[471] The landfill is located in Marquette Township, about one mile west of Partridge Bay and the shore of Lake Superior, 3.5 miles of the power plant, and about 2,500 feet north of the Lake Superior & Ishpeming railroad tracks. The surrounding properties are undeveloped forested areas. It consists of two closed units with a combined area of 52.7 acres,[472] and an active, 26.9-acre area.[473] Only the active (LF #3) and the more recent of the two retired landfills (LF #2) are lined and have a leachate collection system: LF #2 has a compacted clay, whereas LF #3 has a double composite liner.[474] The older, closed landfill (LF #1), which operated between 1979 and 1993 and is implicated in the impact to groundwater, had no liner nor a leachate collection system. There are 32 monitoring wells serving both the open and closed landfills.[475] Groundwater quality has been monitored at the site since 1983.[476] Long-term data are available for the period before the onset of groundwater impacts, as well as during and after groundwater remediation. There is also one unlined leachate collection pond.

As of 2003, some of the ash from units 1 through 6 was landfilled, while all of the ash from units 7 through 9 was being sold for producing concrete. Bottom ash was sold for use as road-subgrade and building floor slab materials. Some fly ash from units 1 through 6 was being used as feedstock for Portland cement kiln. At that time, the landfill (LF #2) used to receive unmarketable ash from units 1 through 6 and CCR from the City of Marquette power plant.[477]

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[471] The Presque Isle Power Plant, located at 2701 Lakeshore Blvd., Marquette, Michigan 49855, has a Nameplate Capacity of 625 MW. It comprises nine generation units (with year of commissioning in parenthesis): 25 MW (1955), 38 MW (1962), 54 MW (1964), 58 MW (1966), 90 MW (1974), 90 MW (1975), 90 MW (1978), 90 MW (1978), and 90 MW (1979). The Plant, owned by WEPCO since 1988, was originally developed by the Upper Peninsula Power Company, initially to primarily meet the needs of the Cleveland-Cliffs Iron Company. According to DOE/NETL (2003), the iron company used to require about 240 MW of electricity 24 hours per day to operate its iron ore mines about 12 miles west of Marquette in the Ishpeming-Negaunee area.

Units 1 through 6 burn a mixture of approximately 90 percent bituminous Colorado coal blended with about 10 percent petroleum coke, while units 7 through 9 burn low-sulfur, subbituminous Powder River Basin coal. About 747,600 tons of bituminous coal are used annually, while about 988,100 tons of subbituminous coal are consumed per year. In 2003, the plant generated about 25,700 tons per year of bottom ash and 113,000 tons per year of fly ash.

In January 2003, the Plant was selected for a 39-months commercial-scale testing of the TOXECON, mercury-capture system, utilizing injection of activated carbon into the flue gas of generation units 7, 8, and 9. The total flow of once-through, noncontact cooling water required to operate all nine units of the power plant at full load is 156,000 gpm on average. This water is drawn from Lake Superior and returned to the Lake after passing through condensers. A minor source of water supply for the power plant is leachate collected from the ash landfill (LF #2, about 8 gpm). The ash landfill leachate is collected in underground storage tanks and trucked to the power plant for use in the closed cycle ash system. Water in the ash system is used to transport bottom ash to the ash handling facilities at the plant and also is mixed with both bottom and fly ash prior to disposal. Excess water from the closed cycle ash system is directed to the power plant's wastewater treatment facility along with other plant wastewater.

[472] LF#1 (cells A, B, and C) – closure certified Nov. 22, 1994; and LF#2 (cells 1-5) – started operating in 1994, and closure was certified Jan. 12, 2007.

[473] LF #3, Cells 1-4, occupying a total of 26.9 acres, has a total capacity of 2,460,000 yd^3 and an 18-year lifetime since coming online. Cells 1-2 (12.2 acre), were authorized for use by a previous license, issued May 2008; and Cells 3-4 (14.7 acre), are authorized for use both by the previous license (Facility # 397349, License #9353, issued April 2013), and by the current license (# 9380, issued April 3, 2014). For a map of the closed and active units, see page 6 in Michigan DEQ (2014).

[474] DOE/NETL (ibid) and EPRI (2002).

[475] Monitoring wells: LF #1 (cells A, B, C): 7; LF #2: 13; LF #3, cells 1-2 (active): 8; and LF #3, cells 3-4 (under initial development): 4.

[476] See Fig. 2-6 in EPRI (2002) for monitoring well locations.

[477] DOE/NETL (ibid).

Coarse crystalline metamorphic rocks of granitic composition underlie both the power plant and the ash landfill (Morey et al, in DOE/NETL, ibid). The surface material under much of the power plant's landfill site is glacial outwash sand and gravel. In other parts of the landfill site a thin layer of glacial till mantles the bedrock. Portions of landfill units 2 (LF #2) and 3 (LF #3) have been constructed by blasting into bedrock. [478] Soils formed in the glacial materials are generally highly permeable.

Groundwater is present at very shallow depths in the unconsolidated glacial deposits at the landfill site. Groundwater is also assumed to be present in interconnected fractures in the bedrock. However, because the rock matrix is essentially impermeable, the bedrock surface can be considered to form the base of the shallow groundwater system. Fracture flow is limited, as suggested by 1 to 12 gpm (5 to 65 m^3/d) yields for residential water supply wells finished in the bedrock, compared to yields of greater than 100 gpm (550 m^3/d) in wells finished in the unlithified sand and gravel. The vast majority of local groundwater flow occurs in the unlithified sands and gravels. This is a permeable formation with hydraulic conductivity values as high as 7.7×10^{-1} cm/s.[479] Landfill #1 is situated over a local groundwater divide, and as a result groundwater within the sand and gravel flows northeast and southeast from the landfill in a pattern dictated by the geometry of the bedrock. [480] Groundwater elevation data collected during the late 1980s and early 1990s, prior to installation of the HDPE cap, from an observation well2 situated between Cell B and Cell C indicated that the water table elevation beneath the current landfill footprint was between 798 and 800 feet (243 and 244 m) AMSL. These elevations are well below the base of ash, which is about 840 feet (256 m) AMSL beneath Cell C, and 840 to 820 feet (250 m) AMSL beneath Cells A and B, indicating that all ash lies above the water table.[481]

Groundwater probably discharges to surface water in Compeau Creek to the north and Dead River to the south. The local groundwater resembles the local surface water in its natural chemical characteristics, with low concentrations of dissolved solids. The well nearest the landfill site is about 0.5 mile to the east.[482]

Impact: Testing in 1989 indicated groundwater contamination associated with the landfill (LF #1). According to EPRI (2002), groundwater monitoring down-gradient from LF #1 detected levels of boron, chromium, molybdenum, selenium, sodium, and sulfate; except for chromium, concentration of all the constituents ultimately peaked to exceed state groundwater criteria[483] before an engineering cap was placed over the landfill in the early 1990s.[484] According to Michigan DNRE (2010), on-site groundwater exceedances of State health-based standards for boron and lithium, and high sodium levels.[485]

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[478] See Fig. 2-1 in EPRI (2002) for rock outcrops and layout of LFs #1 and #2. According to Bedrock Geology Map, Marquette Co. (No date), the landfill is sited in an 'Archean Volcanics and Sedimentary' Rocks area (no coverage of the Jacksonville Sandstone in this area).
[479] EPRI (ibid).
[480] See Fig. 2-10 in EPRI (ibid).
[481] See Figures 2-7 through 2-9 in EPRI (ibid).
[482] EPRI (2002) and DOE/NETL (2003).
[483] sulfate concentration prior to remediation - a maximum of 690 mg/L in MW24 and MW25, exceeded the state criterion of 250 mg/L; boron concentrations - a maximum of 2.40 mg/L in MW13A, were greater than the state cleanup criteria of 0.5 mg/L; molybdenum concentrations - highest median of 0.62 mg/L in MW24, exceeded state industrial cleanup criteria of 0.1 mg/L; and selenium concentrations - a maximum of 0.057 mg/L in well MW13A exceeded the state criterion of 0.05 mg/L (EPRI, ibid, Tables A-1 through A-5). See Figs. 3-3 through 3-5 for contaminant level time series plots.
[484] Final closure of LF #1was certified by Michigan DEQ on November 22, 1994.
[485] However, according to Table 3-1 in EPRI (ibid), lithium was first sampled only in August 1996.

Resolution: A Perpetual Care Fund Agreement (escrow account) with WEPCO was executed by MDEQ on March 31, 2008.[486] In addition to studies (EA, hydrogeological, hydrogeological monitoring, and engineering), the following *Consent Orders* were issued: # 641-01-245-02-93, entered on March 5, 1993, and # 641-01-245-02-93-95A, entered on July 26, 1995.

LF #1 was capped in 1993 and 1994 and subsequent testing has shown an improvement in groundwater quality: eight years after installing the HDPE cap, concentrations of boron, chromium, molybdenum, selenium, and sulfate have either decreased or are decreasing to levels lower than state cleanup criteria.[487] In most cases, concentrations are at or near background levels. No additional monitoring wells have been impacted by the site since the HDPE cap was installed, suggesting that the plume is dissipating as it migrates and groundwater controls are not necessary. The cap was highly effective because of the landfill's position well above the water table and the relatively high flow rates in the sand and gravel.[488]

The 1998 Remediation Action Plan (RAP) for landfill #1 also has surface water management systems in place. Restrictive covenant in place to restrict installation of water supply wells. The RAP monitoring was suspended in 2009 but some water testing occurs for the open, regulated landfill #3.

After having lost more than 85% of its total energy demand in Michigan when Cliffs Resources Inc., the operator of two iron ore mines and other customers have switched to another electric power provider, We Energies had planned to cut operations at the Presque Isle Power Plant starting in February 2014. But the transmission organization Midcontinent Independent System Operator (MISO), which oversees the area's power grid denied the utility's request to suspend operations at the plant, saying the plant was needed in order to ensure grid reliability. We Energy requested MISO "to compensate the company for that continued operation." MISO will report the amount of money to be paid to We Energies -- and how much must be picked up by ratepayers -- in a filing with the Federal Energy Regulatory Commission (Milwaukee Wisconsin Journal Sentinel, 2013; 2013a; and Leader Telegram, 2013).

Basis for Consideration as a Potential Damage Case: On-site groundwater exceedances of State health-based standards for boron, lithium, molybdenum, selenium, and sulfate, and high sodium levels.

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[486] According to Michigan DEQ (2014), the post-closure period for WEPCO LF#1 and LF#2 will not begin until LF#3 is certified closed, as long as the financial assurance for the three landfill units is combined.
[487] See Figs. 3-6 through 3-9 in EPRI (ibid) for the spatial distribution of contaminant levels before and after installation of the HDPE cap.
[488] EPRI (2002). The cap consisted of 6 inches of topsoil, 12 inches of a vegetative growth layer, 12 inches of a drainage layer, and a 60-mil HDPE (high-density polyethylene) barrier layer.

QjCNGMT24VQfVXyHgjGynI2r5aEzS8ZA&sig2=rpTatRhIFvDLiBzcCx_sYA&bvm=bv.73231344,d.cWc

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PTb27. Muskegon County Offsite Fly Ash Monofill, Moorland Township, Michigan

Type: Type III Monofill Receiving Fly Ash.

Background and Description: This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[489] The Muskegon County Type III fly ash monofill is one of five Type III coal ash sites in

[489] Michigan DNRE (2010).

Michigan that were formerly licensed to accept solid waste but are now closed. All of these sites are known to be contaminated by the State.[490] This unlined, 57 acres Monofill[491] received ash primarily from the B.C. Cobb plant in Muskegon[492] between 1980 and 2001. In 1998, its capacity was 2,664,000 cubic yards, and it received 90,000 cubic yard of fly ash per year.[493]

In the western part of Muskegon County the glacial till attains a thickness of over 200 feet; it is underlain by a lateral transition between the Mississippian Marshall Sandstone and the overlying Michigan Formation. The Michigan Formation is an interbedded sequence of shale, limestone, dolomite, gypsum or anhydrite, and discontinuous beds of siltstone and sandstone, forming a hydrologically confining lithologic unit. The composite thickness of permeable sandstones that form the Marshall aquifer typically ranges from 75 to 175 feet. The Marshall aquifer is freshwater bearing in areas where it is in direct hydraulic connection to Pleistocene glacial deposits.[494]

Muskegon County disposes of waste water by spray irrigating corn farmland on its waste-disposal site.[495] The monofill's area is confined by large irrigation circles deploying this irrigation method. A study conducted on irrigation Circle 26, about 3 miles NNE of the Muskegon County's monofill site indicates that Circle 26[496] is underlain by glacial lake and outwash deposits. The lake and outwash deposits consist of an upper layer of highly permeable fine to medium sand that is 5-6 m thick and a lower layer of silty sand interbedded with silty clay that is 10 m thick. Underlying the lower layer is silty clay till.[497] Based on the statement that 'The site is located on a soil and clay bottom,' it is plausible that the Muskegon County's Monofill is underlain by the cited silty clay till.

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490 Michigan DNRE (2010).

491 The monofill is located at 9366 Apple Avenue, Ravenna, Michigan, between Hall Drain (treated wastewater storage lagoon) to the north, Route 46 to the south, and South Swanson Road to the east. It borders on a Type II (Muskegon Waste Facility) landfill which is still active: http://www.trails.com/usgs-topo-hall-drain-canal-topographic-map-627642.html

492 According to Consumers Energy (2014), Consumer Energy's B.C. Cobb Plant is a baseload facility with 320 MW in generating capacity. It is located just over a mile from Lake Michigan on the shores of Muskegon Lake, where its waters meet the Muskegon River. The two coal units burn an 80 percent blend of low-sulfur western coal (from Wyoming and Montana) and 20 percent eastern coal. The plant consumes about 1 million tons of coal per year, about 640,000 tons of which are shipped annually to the plant via the Muskegon Lake port. Units 4 and 5 (160 MW each) burn coal and began operating in 1956 and 1957, respectively. Units 1 and 2 (60 MW each) were first commissioned to burn coal in 1948, and Unit 3 (60 MW) - in 1950. All three units were retired in 1990 and then repowered to burn natural gas in 1999-2000. Currently, the three units are in layup until economic conditions warrant their utilization, which depends on the fluctuating price of natural gas.

According to Grains Detroit Business (2014), Consumers Energy earlier announced plans to close and demolish the B.C. Cobb plant as well as coal-fired units at its J.R. Whiting facility near Luna Pier in Monroe County and the Karn/Weadock complex near Bay City on the Saginaw Bay. Consumers Energy plans to shut the units by April 2016. The ages of the plants, along with U.S. EPA requirements for additional pollution control equipment, prompted the decision to close these old facilities. In February 2014, Consumers Energy selected AMEC, with Michigan offices in Novi and Traverse City, to represent the company as the owner's engineer for the decommissioning program for the planned retirement of the B.C. Cobb plant as well as the other operating units at the utility's J.R. Whiting facility and the Karn/Weadock complex (Consumers Energy, 2014a).

493 Muskegon County (2000), virtual page 21 (volume based on assumption of 1 ton fly ash = 1 cubic yard). In the last year of the facility's operation, 27,590 cubic yards of fly ash were landfilled (Michigan DEQ, 2002).

494 USGS (1996), narrative and Figures 2, 3, and A2.

495 http://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryID=34639

496 See Fig. 1 in USGS (1981). The Muskegon County Monofill occupies the strip confined by Irrigation Circle 42 to the south and the Storage Lagoons (the Hall Drain) to the north.

497 USGS (1981).

The site is underlain by a complex dynamics of the groundwater system because of adjacent Type II landfill (permitted for the disposal of residential-, commercial-, industrial-, and C & D waste, as well as contaminated soils)[498] also adds to inability to determine groundwater impact from coal ash landfill.

Impact: On-site groundwater exceedances of State Health Standards for boron and manganese,[499] as well as for lithium, sulfate, selenium, potassium and total dissolved solids (TDS). However, no drinking-water was impacted.

Resolution: Feasibility Study and Remediation Action Plan (RAP) since 1998 required groundwater interceptor trench, rapid infiltration and treatment. Leachate discharges into the Hall Drain, a treated wastewater storage lagoon, the water of which is used to spray-irrigate fields. The Black River, designated as a cold water stream, is not affected by the discharge from the Hall Drain.[500]

The landfill was closed and capped as part of a settlement to a class action suit brought by neighbors to the east on Moorland Road. The Landfill was certified closed in November 2001, and as a result there is a decline in the parameters of concern. DEQ Continues to monitor site groundwater and maintain the integrity of the capping geosynthetics and soil cover; continues to utilize natural attenuation of the impacted groundwater; and keeps monitoring the site and keeps up maintenance of the cover to prevent percolation of precipitation through the monofill and into the groundwater.[501]

Basis for Consideration as a Potential Damage Case: On-site groundwater exceedances of State Health standards for boron and manganese, as well as lithium, sulfate, selenium, potassium and total dissolved solids (TDS.)

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PTb28. John Warden Ash Site, L'Anse, Baraga County, Michigan

Type: Ash Landfill (Mixed with Municipal Solid Waste or On Top of a MSW Landfill)

Brief Description: This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[502] According to Michigan DNRE (2010), this unlined, Type III industrial (Low Hazard) landfill, formerly owned by Upper Peninsula Power Co. (UPPCO),[503] **r**eceived ash from the John H. Warden Generating Station

[502] Michigan DNRE (2010).
[503] Facility ID: 07-000002: Michigan DEQ (2000). The site is apparently located at the distal section and south of Old Dump Road, south of the town of L'Anse.

between 1974 and 1993.[504] It is one of five Type III sites in Michigan[505] that were formerly licensed to accept solid waste but are now closed. Located three-quarters of a mile from Keweenaw Bay on Lake Superior, the site is adjacent to Falls River, a stream that discharges directly into Keweenaw Bay. The 18.4 acres site has wet municipal solid waste underneath the ash.[506]

According to Michigan DNR (1973), the landfill is located on the Keweenaw Moraine, which was deposited as a part of the terminal margin of the Keweenaw Bay Lobe and roughly follows the outline of Keweenaw Bay. Much of the northwestern part of the moraine, especially southwest of L'Anse, is water-washed. Some of the till in this area could be classified as ground moraine.

The metamorphic rocks of the Marquette Range Supergroup yield water to a few wells near L'Anse. Water is apparently obtained from openings along fractures near the top of the bedrock. Reported yields of wells in these rocks will yield smaller amounts. Water from most wells in the Marquette Range Supergroup is moderately hard to very hard but is generally suitable for domestic use. Whereas the Village of L'Anse obtains its water supply from Lake Superior, about 3 miles south of L'Anse a resort complex consisting of a store, service station, 15 cabins, and the owner's residence obtains water from a well 45 feet deep in bedrock.

Impact: Stormwater discharge into streams and leachate percolation has caused plume of contamination in local groundwater, a source for the Falls River. The constituents of concern were boron and lithium, both with on-site exceedances. Surface water was also impacted, but not drinking water.

Resolution: A consent order was issued in 1993: remediation investigation suggested no active groundwater extraction. Ash redistribution and removal, grading, and capping w/ synthetic membrane, surface water drainage, and remedial leachate collection.

The closure of the ash disposal site at the John H. Warden Station was completed in 1994. A Closure Certification Report was submitted to the Michigan Department of Natural Resources (MDNR) and was approved in January, 1995. The Closure Certification includes an agreement with the MDNR for the

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504 The Warden Plant is now owned by L'Anse Warden Electric Company, LLC (LWEC), located in L'Anse, Michigan, a subsidiary of Traxys North America, LLC biomass-fueled electric plant, which went into commercial operation in late 2009. Upper Peninsula Power Company (UPPCO) is a subsidiary of Upper Peninsula Energy Corporation (UPEN). It was incorporated in 1947 under the laws of the State of Michigan as an electric utility engaged in the generation, purchase, transmission, distribution and sale of electric energy in the Upper Peninsula of Michigan. UPPCO was the original owner of the John H. Warden Generating Station, which has been in operation since 1959. During 1993 the Warden Station was upgraded to have natural gas burning capability in addition to coal. Effective January 1, 1994, the station was taken out of service and placed in service lay-up status (mothballed): http://google.brand.edgar-online.com/EFX_dll/EDGARpro.dll?FetchFilingHtmlSection1?SectionID=245507-8687-50845&SessionID=47tTFCxxrrzsN27. In 2010, the Station was granted $11.69 Million to replace the original 60 MW plant by a 20 MW (17.7 MW net) boiler (#1) fueled by biomass or fossil-fuel: *Biomass Accountability Project (2011)*. In addition to providing renewable energy for Michigan's economy, the biomass plant utilized paper mill waste from a nearby mill as part of its fuel input (*Traxys, no date*).

505 The others are B.C. Cobb, Muskegon; Muskegon County Landfill, Muskegon; North Lansing Landfill, Lansing; and Pine Hill Landfill, Marquette.

506 Note that co-disposal of municipal-, industrial-, and special waste is rather common in Michigan. For instance, according to Michigan DEQ (2002), Baraga County has requested Michigan DEQ to export its solid waste to the Wood Island Landfill in Wetmore, Ontonagon County. This Type II Sanitary Landfill was licensed to accept residential, commercial, industrial, and construction & demolition waste, as well as contaminated soils and special waste. The latter included foundry sands, fly ash and auto shredded fluff.

Company to monitor groundwater surrounding the ash disposal site for a 30-year period. In December, 1994, an estimated liability and regulatory asset of $841,000 was recorded for such future costs.

The Michigan Department of Environmental Quality (MDEQ - Formally included in the MDNR) also advised UPPCO in early 1995 that recent water samples from the site indicated elevated levels of boron and lithium. The MDEQ determined that UPPCO's Feasibility Study submitted in 1993 did not address the recent issues and was rejected. Supplemental Remedial Investigations were performed in 1995 and the results were submitted to the MDEQ in February 1996. UPPCO also requested and was granted an amendment to the Consent Order to allow for modification of the Feasibility Study and redefining a new timetable for submission of the Remedial Action Plan. An amended Remedial Action Plan was submitted to the MDEQ in July, 1997. As of December 31, 1997 the MDEQ had not completed their review of the plan.[507]

Basis for Consideration as a Potential Damage Case: On-site exceedance of State health standards for boron and lithium.

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PTb29. Consumer Energy B.C. Cobb Landfill, Muskegon County, Michigan

Type: Ash Surface Impoundment

Brief Description: This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[508] According to Michigan DNRE (2010), this unlined, Type III industrial (Low Hazard) landfill **r**eceived ash from the B.C. Cobb Plant in a surface impoundment from 1970-1982. The site is one of five Type III sites in Michigan[509] that were formerly licensed to accept solid waste but are now closed.[510] There are three monitoring wells at the site.

The B.C. Cobb Plant[511] is located in the southwest portion of the 68 acres site (area 4 and 4A) beyond the right of way of Highway M-l20, which borders the site on the west. Directly east of the site are the CSX Railroad right of way and the now closed City of Muskegon Landfill. The landfill has a dyke of bottom ash built along the channel of the river and nearby marshes. The site is directly south of the North Branch of the Muskegon River, adjacent to marshes and a Veterans Memorial Park Pond.

Impact: According to Michigan DNRE (2010), on-site exceedances in groundwater for boron and lithium (drinking water not affected).[512] However, the Remedial Action Plan (RAP) cites also manganese, sulfate, and ammonia as exceeding drinking water criteria.

A "split sample" taken by Michigan's Department of Environmental Quality for two new parameters of interest, boron and lithium, indicated that both parameters exceeded the Final Acute Value (FAV) for the protection of aquatic life in effect at the time. These criteria were conservative due to the lack of data on

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[508] Michigan DNRE (2010).
[509] The others are John Warden Ash Site, L'Anse, Baraga County**;** Muskegon County Landfill, Muskegon; North Lansing Landfill, Lansing; and Pine Hill Landfill, Marquette.
[510] Whereas the B.C. Cobb plant's Regulated Type III landfill was closed, the site still accepts waste in their ten unregulated "contained waste" storage ponds.
[511] For information on Consumer's Energy-owned B. C. Cobb generating plant in Muskegon, see footnote in the module titled *Muskegon County Offsite Fly Ash Monofill, Moorland Township, Michigan.*
Early in December 2011, Consumers Energy announced that in response to existing and pending federal and state environmental regulations and ongoing market conditions, the company decided to suspend in 2015 the of operation of the two coal-fueled units at the 320 MW B.C. Cobb Generating Plant, in addition to suspending five additional smaller units elsewhere in Michigan (a total capacity of 950 MW; Power Engineering, 2011). Then, in late September, 2013, Consumers Energy received approval to delay the retirement of the two coal-fueled units at B.C. Cobb Generating Plant because of increased power demand in the state and concerns about power supply reliability. The approval gives Consumers the option of continuing operation at the B.C. Cobb Generating Plant until April 2016 (Power Engineering, 2013).
[512] Boron and/or lithium have been found also in surface water, but road and dyke built from coal ash could be the source of the surface water contamination.

aquatic toxicity for these parameters at the time, and the highest concentrations of boron and lithium monitored are well-below today's FAVs. Nevertheless, at the time, these concentrations in the venting groundwater required response and remedial action.

Resolution: Proposed Consent Order, Remedial Investigation and Feasibility Study were followed by a Remedial Action Plan (RAP). According to Consumer's Energy,[513] the remedial action consisted of:
• The construction (2001) of a bentonite slurry wall around the entire 63 acre surface impoundment, keying to the clay below up to a depth of approximately 90 feet
• The use of water-conditioned, self-cementing western low sulfur fly ash compacted to a structural specification to create a low permeability cap over the landfill. This cap also created the minimal landfill slopes specified for closure and formed the select layer for the placement of a standard final cover consisting of a flexible membrane liner (FML) and 30 inches of soil and topsoil constructed and placed according to a QA/QC program.
• The final closure of 63 acres, which was accomplished in six phases over six years (2001 through 2007).
• Post-closure care for thirty years once final closure was accepted by the MDEQ (February 27, 2008) monitored through an ongoing groundwater monitoring program.[514] Operational monitoring and post closure monitoring indicated compliance with monitoring parameters, including ten "metals" associated with CCRs, such as arsenic and selenium prior to venting to surface water in the adjacent Muskegon River. There are restriction on new drinking water wells.

After the site was closed by the state in 1984 with the standard earthen final cover required at the time, it was covered with sand, vegetated and is now a wildlife area. Consumers Energy is seeking to turn it into a soccer field and recreation area.

Basis for Consideration as a Potential Damage Case: On-site exceedance of State health standards for boron and lithium.

References

Michigan DNRE (2010): Michigan Department of Natural Resources and Environment (DNRE) comment to the proposed CCR Rule docket: EPA-HQ-RCRA-2009-0640-6815, Attachment 5: Table of Michigan's Proven Damage Cases. Accessed Online August 2014. http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2009-0640-6815

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Power Engineering (2013): Consumers Energy receives approval to delay retiring coal fired units, Power Engineering, September 25, 2013. Accessed Online August 2014. http://www.power-eng.com/articles/2013/09/consumers-energy-receives-approval-to-delay-retiring-coal-fired-units.html

[513] Consumer Energy Company comment to the August 2013 NODA docket: EPA-HQ-RCRA-2012-0028-0068, and Attachment 2: Guidelines for Area 4 and 4A Inspection, Operation and Monitoring. Consumer Energy Corporation, B.C. Cobb Generating Facility, Muskegon, Michigan, May 2005 (Rev 1). Prepared by STS Consultants, Ltd.: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2012-0028-0068.
[514] Comprising six wells (MH-1 through MH-6) and 14 perimeter piezometers.

PTb30. Consumers Energy J.H. Campbell, West Olive, Port Sheldon Township, Ottawa County, Michigan

Type: Ash Surface Impoundment

Brief Description: This site was submitted by the Michigan Department of Natural Resources and Environment (DNRE), together with seven other sites, to the CCR Proposed Rule docket.[515] According to Michigan DNRE (2010), this unlined, 138 acre, Type III 'landfills' received ash from the Campbell Plant[516] in a surface impoundment from 1962-1998. The site is one of five Type III sites in Michigan[517] that were formerly licensed to accept solid waste but are now closed.[518] There are forty monitoring wells at the nearby Campbell plant.

Fly ash disposal ponds are located adjacent to the lower reach of the Pigeon River, and the effluent from the ash ponds is discharged into the eastern end of Pigeon Lake. Pigeon River forms Pigeon Lake, a small estuary, where it enters Lake Michigan.

Impact: *Groundwater:* On-site exceedances in groundwater for antimony, boron, lithium, and selenium. Surface water also impacted (release into Pigeon River), but not drinking water. According to EarthJustice (2012?), groundwater monitoring data obtained through a Freedom of Information Act request show a history of exceedances of state and/or federal standards for pH, antimony, boron, cadmium, chromium, iron, lead, selenium, vanadium, aluminum, nickel, thallium, manganese, and zinc.

Surface water:[519] The concentrations of aqueous selenium in the effluent from the Campbell Plant ash pond to Pigeon River, and selenium concentrations in springs and seeps near the ash ponds, exceed the water quality criterion for protection of aquatic life. Selenium concentrations in fish from the lower Pigeon River and Pigeon Lake, in the vicinity of the fly ash disposal ponds, were significantly greater than selenium concentrations at the up-stream Pigeon River site and were greater than published background selenium concentrations in fish in the Great Lakes region. Selenium concentrations in fish in the lower Pigeon River and Pigeon Lake do not exceed concentrations associated with toxic effects on sensitive fishes in controlled field and laboratory studies.

Selenium concentration in some species of fish from the lower Pigeon River and Pigeon Lake exceed dietary lowest observable adverse effect concentrations (LOAECs) associated with toxic effects in

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[515] Michigan DNRE (2010).
[516] According to Consumer Energy (2014), the Consumer Energy Campbell Station (17000 Croswell St., West Olive, Michigan 49460) has a generating capacity of 1,450 MW. It is located on a 2,000-acre site along the Lake Michigan shoreline next to Pigeon Lake along the Lake Michigan shoreline, about 10 miles south of the city of Grand Haven. Units 1 (260 MW) and 2 (360 MW) began operating in 1962 and 1967, respectively, and Unit 3 (830 MW) - in 1980. Campbell Units 1 and 3 burn 100 percent western coal. Campbell Unit 2 burns a blend of eastern and low-sulfur western coal. Western coal makes its way from Wyoming and Montana, while eastern coal arrives from a variety of states. The complex consumes about 6 million tons of coal per year, and the plant produces about 208,000 tons ash/year.
[517] The others are John Warden Ash Site, L'Anse, Baraga County; Muskegon County Landfill, Muskegon; North Lansing Landfill, Lansing; and Pine Hill Landfill, Marquette.
[518] According to Clear Water Fund (2013), this site consists of several "cells" the last of which were closed in 2012. Currently, the site comprises five ponds (one of which is retired) and seven landfills. The current, active landfill has a double, synthetic liner and a leachate collection system.
[519] Besser et al., (1996).

wildlife and laboratory animals. However, human consumption of moderate quantities of fish from Pigeon River and Pigeon Lake should not result in excessive selenium intake.

Resolution: There is no consent order. RAP (Cells 1-7); RAP (Cells A-K impoundment, south of cells 1-7): restrictive deed covenant. Groundwater extraction (can be suspended if criteria are met), mixing zone criteria: boron, lithium, selenium.[520]

According to Michigan DEQ (2013), the following cells: A, B, D, E, F, G-1, G-2, H, J, and K have final closure certified pursuant to the Consumer's Energy RAP presented on August 9, 1999, and last revised on January 31, 2008. The closed units encompass 142 acres of the site's total 410 acres.[521]

Basis for Consideration as a Potential Damage Case: On-site groundwater exceedance of State health standards for boron, lithium, antimony, and selenium and release of same to surface water.

References

Michigan DNRE (2010): Michigan Department of Natural Resources and Environment (DNRE) comment to the proposed CCR Rule docket: EPA-HQ-RCRA-2009-0640-6815, Attachment 5: Table of Michigan's Proven Damage Cases. Accessed Online August 2014.
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Besser et al., (1996): Selenium Accumulation and Hazards in a Fish Community Affected by Coal Fly Ash Effluent. Besser J. M., J. P. Giesy, R. W. Brown, J. M. Buell, and G. A. Dawson, Ecotoxicology & Environmental Safety 35, 7-15 (1996). Accessed Online August 2014.
Selenium Bioaccumulation and Hazards in a Fish

EarthJustice (2012?): Fact Sheet: Coal Ash in Michigan. Earthjustice/Clean Water Action, 2012 (?). Accessed Online August 2014.
http://earthjustice.org/sites/default/files/mi-coal-ash-factsheet-0812.pdf

Michigan DEQ (2013): Solid Waste Disposal Area Operating License, Michigan DEQ Office of Waste Management and Radiological Protection, JH Campbell LF, Type III Solid Waste Disposal Area, August 26, 2010. Accessed Online August 2014.
http://www.michigan.gov/documents/deq/DNRE-ERMD-SW-JH_CAMPBELL_OpLICENSE_329950_7.pdf

Consumer Energy (2014): J.H. Campbell Generating Complex. Accessed Online August 2014.
http://www.consumersenergy.com/content.aspx?id=1332

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[520] Other issues include 'leaking leachate collection; tear in liner; coal ash stockpiled outside of ponds for future reuse; overspray of leachate for dust suppression; brine that is high in boron and selenium is still applied to road; Sluice water was thought to be source of contamination and coal ash still disposed in an area that has a double synthetic liner.'
[521] For a December 2002 site map, see Attachment A in Michigan DEQ (2013).

PTb31. Sheldon Station, Nebraska Public Power District, Hallam, Lancaster County, Nebraska

Type: Landfill.

Background and Description: Sheldon Station,[522] located 17 miles south and five miles west of Lincoln and one mile north of Hallam, Southeast Nebraska, has been a disposal site of coal combustion residual (CCR) from the Nebraska Public Power District (NPPD)[523] since the early 1990s. After nine years of disposal, the landfill was closed in 1999 and is now in a post-closure groundwater monitoring phase. There are other active landfills onsite; however, these were not assessed in EIP (2010a).[524] The landfill -- Ash Pit #3 -- is underlain by clay (but has no engineered clay liner)[525] and has a total capacity of 350,000 cubic yards. There is no mention of surface water nearby. Groundwater has been evaluated onsite since 1999; however, no offsite assessment or monitoring has been required.

Coal Ash Pit #3 sits in glacial drift hills in the Salt Creek drainage basin which flows to the Platte River. The upper 100 to 150 feet of the glacial till sediments are designated as a glacial till aquifer and are comprised of a mixture of sand, silt, and clay. Perched water has been encountered on the plant property at depths of 8 to 24 feet below ground surface in the till. The upper portions of the glacial till aquifer are directly beneath the base of the landfill, with the distance from the base of the ash to the ground water table being less than 25 feet throughout most of the landfill area. The regional (Dakota) aquifer[526] underlies the shallow, glacial till aquifer, and is located between 100 and 150 feet below the ground surface at the site. For preliminary results of the hydraulic properties of the till sediments and their perched groundwater around the entombed nuclear reactor based on groundwater investigation and two-years of monitoring (1996-1997), see DOE (1998).

Impact and Damage Claims: EIP (2010a) indicates that levels of selenium exceeded the primary EPA Maximum Contaminant Level (MCL) in onsite groundwater. Additionally, sulfate exceeded the

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[522] Sheldon Station, with generation capacity of 225 MW, comprises two units that came on line in 1961 and 1965. It uses low-sulfur sub-bituminous coal from the Powder River Basin. The plant's water supply comes from its own deep wells. Construction of Sheldon Station began in 1958--first as a combined nuclear and conventional facility. It was the pioneer sodium graphite nuclear power plant in the nation and an experimental nuclear power plant for the Atomic Energy Commission. The nuclear portion of the plant became operative in 1963. The 84-MW reactor was shut down in 1964 following the discovery of a design flaw. Those portions of the nuclear plant's equipment that could not be shipped to other nuclear plants for reuse were buried within mammoth "burial vaults" of concrete and then the "leftovers," including the reactor core, were sealed underground, in an institutionally-protected and groundwater monitored area next to the current power plant. Semi-annual surveillance and monitoring by the federal Energy Department under an agreement with the Nebraska Department of Health will continue until 2090, including monitoring wells around the entombed reactor for groundwater conditions and radiological contaminants: http://www.nppd.com/assets/sheldon_brochure.pdf, http://www.neo.ne.gov/winter97/win97_12.htm, and http://journalstar.com/news/local/article_9b9c7795-0561-5731-84f2-5dcce9153a18.html.

[523] NPPD is a public corporation and political subdivision of the state of Nebraska.

[524] Ash Pit #4, the monitoring data of which was not reviewed by EIP (2010a), has a compacted clay liner and a leachate collection system.

[525] Nebraska Department of Environmental Quality Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0217. NDEQ states that this site was constructed in 1989, prior to promulgation of the regulations that now apply to coal ash landfills. The substantial new requirements for fossil fuel combustion ash (FCCA) landfills, including liner requirement, were adopted in 1993. For instance, the currently operating landfill, Ash Pit #4, was designed to the newer regulatory standards, with a compacted clay liner, a leachate collection system, and an evaporation pond.

[526] Gosselin et al., (2001) and Gosselin et al., (2003).

secondary EPA MCL (SMCL) in onsite groundwater. From 2002 onward, the two down-gradient monitoring wells for Ash Pit #3 have detected steadily rising levels of selenium (up to 0.073 mg/L) and sulfate (over 350 mg/L). The full extent of the contamination is unknown because these are the only two down-gradient wells for the coal ash landfill.

According to EIP (2010a), both down-gradient monitoring wells have shown increases over time of typical CCR contaminants, such as selenium in MW-3 and sulfates in MW-4. In MW-3, selenium concentrations have followed a steadily increasing trend from 2002 to 2009. Selenium concentrations in MW-3 have increased from concentrations as low as 0.014 mg/L in 2001 to as high as 0.0728 mg/L in 2006, exceeding the MCL of 0.050 mg/L. Sulfate levels in MW-4 have steadily increased over time, rising from 50 mg/L in 2001 to a high of 381 mg/L in 2007, surpassing the Secondary MCL (SMCL) of 250 mg/L. According to EIP (2010a), NPPD argues that the selenium levels are from naturally occurring sources since the selenium levels in laboratory coal ash leachate tests were an order of magnitude less than those found in onsite groundwater.

EIP (2010a) claims that water quality in “up-gradient” well MW-1 also appears to be heavily influenced with both chloride and sulfate levels showing steadily increasing patterns in the wells. NPPD blames this increase on cooling water discharge to a wetlands area up-gradient of the well. However, the closeness of MW-1 to the edge of the landfill where elevated groundwater levels beneath the landfill, as a result of mounding, result in a localized flow of groundwater toward the well is a more likely source of the chloride and sulfate.

Nebraska Department of Environmental Quality (NDEQ)[527] concurs that the information in EIP (2010a) regarding the fact that selenium and sulfate have been detected at levels exceeding MCLs in some of the monitoring wells at the site is accurate. However, NDEQ states that it is not conclusive that the landfill is the source of those elevated levels. Selenium and sulfate exist as naturally occurring minerals throughout the region: both have been detected in wells down- and up-gradient of Ash Pit #3, as well as in down- and up-gradient at the currently operating landfill, Ash Pit #4. In December 2010, additional wells were installed in the down-gradient direction from the landfill.[528] The facility will conduct six semi-annual sampling events of all groundwater monitoring wells around the facility and perform statistical analysis of these results. In evaluation of the site, the natural occurrence of both substances is being considered, as well as the possibility of a localized discharge of cooling tower water used for fire suppression or similar activity involving power plant operations.

Concerning the EIP (2010a)-identified irrigation-well within one mile of the landfill, NDEQ claims[529] that that irrigation well draws water from the deeper regional (‘Dakota’) aquifer, with the upper and lower aquifers being separated by a 50- to 100 feet thick, low permeability clay layer. Ash Pit #3 was constructed above a shallow, glacial till aquifer. The till is underlain by a high-density clay layer that acts as a protective barrier above the lower regional aquifer which is the zone used for water wells. The elevated groundwater monitoring results are from the low-yield uppermost aquifer zone and since it is not a source of drinking or irrigation water, it is currently not a public health threat.

Finally, NDEQ states that NPPD is voluntarily conducting additional groundwater investigation under NDEQ’s guidance. The highest levels of selenium and sulfate at Ash Pit #3 were 0.073 mg/L (MCL: 0.05) and 381.0 mg/L (SMCL: 250), respectively. NDEQ contends that unless those levels increase

527 EPA-HQ-RCRA-2009-0640-7533.
528 Nebraska Department of Environmental Quality Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0217.
529 EPA-HQ-RCRA-2009-0640-7533.

dramatically, the likely remedial action for this site would be continued groundwater monitoring and/or restricted groundwater use.

Evaluation against Proven Damage Criteria[530]

Criteria	Evaluation
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater exceeded the primary EPA MCL for selenium. • Onsite groundwater exceeded the EPA SMCL for sulfate. • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to human health or the environment (e.g., ecological damage)*	• None
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• NDEQ has required NPPD to install additional wells and extended the post-closure groundwater monitoring period from 10 years to 15 years due to evidence of contamination.

Resolution: After closure of the landfill in 1999, NDEQ required groundwater monitoring for ten years. In 2009, NDEQ extended the post-closure groundwater monitoring period through 2014 due to evidence of contamination and requested that additional wells be installed to further delineate the plume.

NDEQ claims[531] that the information obtained to date suggests that additional investigation is warranted at Ash Pit #3. In December 2010, additional wells were installed in the down gradient direction from the landfill. The facility will conduct six semi-annual sampling events of all groundwater monitoring wells around the facility and perform statistical analysis of these results.

USWAG claims that this Site does not meet the criteria for a damage case.[532]

ICF (2010a) Rationale: *Potential Damage.* <Groundwater exceedances of primary and secondary MCLs have been found onsite. There has not been any assessment of groundwater offsite and there are no other impact or damage claims. Additional well installation and post-closure groundwater monitoring was extended by five additional years by NDEQ due to evidence of contamination; however, there are no other regulatory corrective actions, administrative rulings, or court decisions associated with the landfill.>

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[530] ICF (2010a).
[531] Comment to the October 2011 NODA docket: EPA-HQ-RCRA-2011-0392-0217.
[532] Comment to the October 2011 NODA docket (EPA-HQ-RCRA-2011-0392-0211): "The Nebraska DEQ (2009) extended the post closure groundwater monitoring period by 5 years and requested that additional monitoring wells be installed. This case does not meet the criteria for a damage case because the allegations do not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria. The ash pond in question was removed from service in 1999 and is currently in post-closure monitoring phase. The only alleged off-site receptor of groundwater is one irrigation-well identified in the Reference Document as being located within one mile of the site. No well location or other identifying information was provided, nor could a determination be made as to whether the well location is up-gradient or down-gradient from the site with respect to groundwater flow direction."

References
EIP (2010a): In Harm's Way: Lack Of Federal Coal Ash Regulations Endangers Americans and Their Environment, Thirty-Nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste, Case #21, Environmental Integrity Project, EarthJustice and Sierra Club, August 26, 2010.
http://www.environmentalintegrity.org/news_reports/08_26_10.php

ICF (2010a): Assessment of Previously Identified Proven Damage and Recently Alleged Damage Cases, Appendix C, Case #21. ICF, 10/2010.

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DOE (1998): Environmental Monitoring Summary, Entombed Hallam Nuclear Power Facility, James D. Paulson, Project Manager, U.S. Department of Energy, Chicago Operations Office, Environmental Programs Group, March 11, 1998. Accessed Online December 2012.
www.lm.doe.gov/Hallam/LTSM00002733.pdf

PTb32. Asheville Steam Electric Plant, Duke Energy (formerly: Progress Energy),[533] Arden, Buncombe County, North Carolina

Type: Surface Impoundments.

Background and Description: The Asheville Steam Electric Plant,[534] located south of Skyland, North Carolina, and immediately east of the French Broad River, has two unlined[535] coal ash impoundments that accept CCR from the Asheville Plant. One (so called *the 1982 ash pond*) is actively being used for wet

[533] Progress Energy and Duke Energy merged into one corporation in July 2012.
[534] The Asheville Electric Plant is the largest electric generating facility in Western North Carolina. Located near Skyland, N.C., the plant consists of two coal-fired units (376 MW steam capacity) and two combustion turbine units (324 MW-capacity). The Asheville Plant began commercial operation in 1964, with additions in 1971, 1999 and 2000: https://www.progress-energy.com/assets/www/docs/company/plantbrochure.pdf
[535] However, the appendices to the Dewberry & Davis, Inc. for Lockheed Martin (2009) Final Report indicate that a geomembrane was installed in the *1964 pond* during the construction (2005) of the artificial wetland inside this Pond.

storage of CCR[536] and has a capacity of 1,400 acre-feet. The other (so called *the 1964 pond*) has a capacity of 1,380 acre-feet. Removed from service in 1982 and drained, the *1964 pond* is being used to dry-store material dredged from the wet pond and does not maintain a normal pool.[537] In 2006, a constructed wetland was located within the *1964 Pond*, to treat FGD blowdown and remove selenium and mercury.[538] The impoundments lie less than 250 feet from the Plant's property line. A residential subsection is located about 250 feet south from the Plant's *1982 pond.*

The Asheville Plant holds NPDES Permit No. NC0000396.[539] The Permit authorizes discharges from Outfall 001 to the French Broad River (effluent from the Ash Pond Treatment System, including an ash pond constructed in 1982); from Outfall 002, which discharges to Lake Julian,[540] a once-through, non-contact cooling water; from stormwater Outfalls SW-1, SW-2, SW-3, SW-4, and SW-6, which discharge to Lake Julian, and from Outfall SW-5, which discharges to an unnamed tributary of Powell Creek in the French Broad River Basin.[541]

The ash ponds are located near the border of the Inner Piedmont Belt within the Blue Ridge Geologic Province/Southern Blue Ridge Physiographic Province of the Appalachian Mountain system. The Blue Ridge is a mountainous region consisting of highly deformed igneous, sedimentary, and metamorphic rocks from over one billion to approximately one-half billion years old.[542]

In 2006, the PZ- groundwater monitoring series wells (18 wells) were installed as part of an ash monofill siting Study. Additional monitoring wells (five GW-series wells) were installed in 2007 as part of USWAG's voluntary monitoring effort.[543] The GW-series wells and wells PZ-19 and PZ-22 have been

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[536] Fly ash, bottom ash and boiler slag, as well as ash sluice water, categorical low volume wastewater, coal pile storm water, and runoff and other storm water. However, according to *Fig. 1: Asheville Ash Ponds Water Level* Map – *November 13, 2012*, prepared by Synterra for Progress Energy, the *1982 pond* has become a dry CCR stacking unit: http://portal.ncdenr.org/web/wq/hot-topics/coalashregulation/gwatermonitoring, Map.

[537] Dewberry & Davis, Inc. for Lockheed Martin (2009).

[538] The constructed wetlands treatment system is a continuous flow-through, with 750,000 ft^3 capacity. It consists of equalization basins, a bulrush area, a rock filter, and a cattail area.

[539] NC vs. Duke Energy (2013).

[540] The 320-acre Lake Julian, a site of recreational fishing and other leisure activities, was built in 1963; it doubles also as the Plant's cooling reservoir. http://www.citizen-times.com/article/20110715/HOMEGARDEN/307160011/South-Asheville-s-Lake-Julian-an-urban-respite

[541] The Asheville Plant's wastewater treatment system also includes components that discharge only to other parts of the system, including: (i) an ash pond constructed in 1964, which can discharge to Outfall 001; (ii) a Chemical Metal Cleaning Treatment System, which can discharge through internal Outfall 004 and flow to Outfall 001; and (iii) a FGDS wet scrubber wastewater treatment system, which discharges through internal Outfall 005 and flows to Outfall 001.

[542] According to Soil Survey of Buncombe County, North Carolina (2009), and Dewberry & Davis, Inc. for Lockheed Martin (2009), the rock within the impoundment areas is located within the Ashe Metamorphic Suite and Tallulah Falls Formation, a muscovite-biotite gneiss rock (locally sulfidic, inter-layered and gradational with mica schist, minor amphibolites, and hornblende gneiss). It is inferred that the upper section of these rocks is deeply weathered, forming a substantial horizon of saprolite.

[543] For the distribution of the groundwater monitoring wells and the groundwater contours of the saprolite groundwater table, see http://portal.ncdenr.org/web/wq/hot-topics/coalashregulation/gwatermonitoring, Map, and Attachment A (*Asheville Progress Energy Water Level Map*), for the November 13, 2012 and March 11, 2009 mounded configuration of the water table around the 1982 ("New") Ash Pond, respectively, as drawn by SynTerra. Appalachian Voices and Clean Water for North Carolina comment to the Steam Electric Industry/CCR Rule joint docket: EPA-HQ-RCRA-2013-0209-0037. This mounding is confirmed also by the similarity of constituent levels in a 'background' compliance boundary wells (CB-1) to that of contaminant levels in down-gradient CB wells (e.g., in CB-1, pH ranged in the sampling period between Nov. 2010 and April 2014 from 4.4 to 5.4, which, with the

sampled on a semi-annual basis since installation.[544] Since no offsite monitoring data is available, Progress Energy is in the process of siting background wells and wells located at the Compliance Boundary to determine if a statistically significant release has occurred.[545]

Impact and Damage Claims*: Groundwater:* EIP (2010) indicates that onsite groundwater monitoring data exceeded North Carolina Code 2L Groundwater Standards[546] and/or secondary EPA Maximum Contaminant Levels (MCLs) for boron, chromium, iron, and manganese.[547] As of May 2010, groundwater quality results from the monitoring system (GW-1 to GW-5; PZ-19 and PZ-22) around both the active and inactive ponds show persistent, elevated levels of iron, manganese and boron, and low pH; other wells show occasional MCL exceedances of arsenic, antimony, lead, and TDS. However, all results are from inside the Compliance Boundary as defined by the North Carolina 2L groundwater standards.[548]

Groundwater monitoring in 2007 found exceedances of state groundwater standards at down-gradient monitoring points. Boron exceedances ranged from 0.322 - 1.32 mg/L, over 4 times the state groundwater standard of 0.315 mg/L. Chromium exceedances ranged from 0.0817 - 0.0822 mg/L, over 1.6 times the state groundwater standard of 0.05 mg/L. Iron exceedances ranged from 0.319 - 46.2 mg/L, over 154 times the state groundwater standard of 0.3 mg/L. Manganese exceedances ranged from 0.0608 - 2.04 mg/L, up to 40 times the groundwater standard for manganese of 0.05 mg/L. The full extent of the plume is unknown.

USWAG claims[549] that this case does not meet the criteria for a damage case because the allegations are only for on-site groundwater and surface water.

Tests in a home located between the French Broad River and an ash disposal pond at the Asheville power plant showed that its private well contains unsafe levels of contamination, according to the NC DENR. On October 23, 2013, state environmental officials said they would make Duke Energy provide residents of the home with alternative drinking water by November 15.[550] In July 2014, NC DENR has ordered Duke Energy to install monitoring wells in a residential neighborhood outside Asheville to determine

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exception of well CB-4B, where pH values of 6.2-7.6 have been recorded, are essentially in the same range as in the 'down-gradient' monitoring wells).

544 Response to EPA CWA 308 and RCRA 3007 Information Request, August 2010 (A CD provided by EPA/OECA).

545 According to NC DENR Division of Water Quality (DWQ) feedback in response to EPA's Region 4 inquiry following stakeholders' complaints in the 2010 Knoxville and Charlotte Public Hearings (a January 3, 2012 email from L. DiGaetano to A. Livnat, EPA/OSWER), additional groundwater monitoring wells were installed at the Compliance Boundary in February 2011.

546 NC Admin. Code title 15A, Subchapter 2L, herein: '2L Rules'.

547 Progress Energy's, in its comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0272, claims that "iron and manganese… are common natural components of groundwater in North Carolina. When background concentrations exceed the published standard, background becomes the standard. Until a complete assessment is done (required by NC rules) of groundwater movement, all sources of contamination, and geochemical processes at work, any determination of damages and appropriate corrective actions are premature and likely inaccurate."

548 Appendix L, pp. 1032-1046, and Figs. 1-3; Response to EPA CWA 308 and RCRA 3007 Information Request, August 2010 (A CD provided by EPA/OECA). Also, Progress Energy's comment to the October 2011 NODA's docket: EPA-HQ-RCRA-2011-0392-0272.

549 Comment to the 2001 NODA docket (EPA-HQ-RCRA- 2011-0392-0211): "The information provided for the Site does not contain any documented evidence of off-site groundwater monitoring data or off-site groundwater monitoring data showing exceedances of specified health-based criteria."

550 Winston-Salem Journal (2013).

whether toxic chemicals from the Asheville plant's coal ash ponds, nearly a quarter mile away, are contaminating homeowners' drinking water. During tests at five homes in the fall of 2013, traces of thallium - below state or federal drinking water standards - were detected in one of the drinking wells. The state has been concerned about the contamination since 2012, but says more study is needed to confirm whether Duke's nearby impoundments are the source term. In the meantime, Duke has been delivering bottled water to two homes with drinking wells that tests show contain chemicals – among them thallium - associated with coal ash.[551]

Surface water: Ruhl et al., (2012), following their summer 2011 sampling of Asheville's station ash pond outfall effluents and comparing them to those of the French River's upstream and downstream samples, demonstrated selenium and cadmium exceedances of the CCC, and antimony, arsenic and thallium exceedances of their respective EPA's MCLs.[552]

Evaluation against Proven Damage Criteria[553]

Criteria	**Evaluation**
Criterion 1: *Documented exceedances of primary maximum contaminant levels (MCLs) or other health-based standards measured in groundwater at sufficient distance from the waste management unit to indicate that hazardous constituents have migrated to the extent that they could cause human health concerns*	• Onsite groundwater data exceeded North Carolina 2L Groundwater Standards (boron, chromium, iron, and manganese) and EPA SMCLs (iron and manganese). • No offsite groundwater data are available.
Criterion 2: *Where a scientific study provides documented evidence of another type of damage to*	• None

[551] Winston-Salem Journal (2014).
[552] The summer sampling event at the at the NPDES outfall for the Asheville Plant revealed selenium concentrations over 17 times the CCC (87.2 µg/L), antimony above the EPA's MCL (6 µg/L) at 10.9 µg/L, cadmium exceeded the fresh water aquatic life (EPA CCC) standard (0.25 µg/L) at 0.8 µg/L, thallium concentrations were greater than the 2 µg/L EPA MCL at 2.9 µg/L, and arsenic concentrations were greater than the 10 µg/L EPA MCL at 44.5 µg/L.

Based on this study, apparently the amount of pollutants discharged to the French Broad River significantly increased after the SOx scrubbers were installed on the Plant's two generation units in 2005 and 2006. Ruhl et al., (2012) reported that samples collected during the summer of 2011 from mingled scrubber and coal ash waste flowing to the French Broad River contained arsenic at levels four times higher than the EPA drinking water standard, and selenium levels 17 times higher the agency's standard for aquatic life.

The study demonstrated that the outfall on the French Broad River from the Asheville power plant had effluents with high contaminant concentrations, but because of high river discharge flow, the downstream water was significantly diluted (although still detectable). A mass-balance calculation, using boron as a conservative tracer in surface water, shows a contribution of 4.5 percent of CCR effluent into the downstream river with boron concentrations of 115 µg/L. However, the French Broad River's flow can be greatly affected by droughts (e.g., during the severe drought of 2007−2008 in North Carolina, the discharge of the river decreased drastically to just over 5 $^{m3/Sec}$, approximately five times lower than the river flow rate of 25 $^{m3/sec}$ during the time of the summer of 2011 sampling. Using mass balance calculation for conservative constituents, a five-fold reduction in water flow would increase the CCR contribution up to 22 percent and would significantly increase the concentrations of such contaminants in the downstream river (e.g., boron up to 530 µg/L).
[553] ICF (2010a).

human health or the environment (e.g., ecological damage)	
Criterion 3: *Where there has been an administrative ruling or court decision with an explicit finding of specific damage to human health or the environment*	• North Carolina Department of Environment and Natural Resources (DENR) has not required any corrective action and has no plans to take any regulatory action until groundwater contamination reaches the compliance boundary.

Resolution: According to NC vs. Duke Energy (2013), since 2006, Duke Energy Progress has taken the following actions to maintain and upgrade the ash ponds and associated components of its wastewater treatment system at the Asheville Plant: (i) dewatering and removal of ash from the 1982 pond to increase storage capacity; (ii) structural improvements to the 1964 pond dam; (iii) installation of a drainage system to ensure stability of the 1964 pond; (iv) dewatering of and sediment removal from a stormwater pond to prepare for its eventual use as a settling basin; and (v) construction of a lined stilling basin.

In addition, from 2006 to 2010, Duke Energy Progress engaged in voluntary groundwater monitoring at the Asheville Plant and submitted the results to DWQ.[554, 555] Following a 2009 letter DWQ sent to Progress Energy, directing them to place wells at their Compliance Boundaries (CBs) to help DENR determine if further action will be required, in 2010, Duke Energy Progress installed additional groundwater monitoring wells and began submitting mandatory groundwater monitoring data to DWQ.[556]

As of late in 2010, the NC DENR has not required a corrective action plan to restore contaminated groundwater at the Asheville plant to the level of the standards because the data reported was from wells located inside the State Compliance Boundary, and that data did not indicate the contamination is approaching the facility's property lines. Following the installation of new monitoring wells at the Compliance Boundary,[557] DWQ evaluated the groundwater monitoring data to determine if any additional action was required under State Rules 15A NCAC 2L.01006(d).

Since 2011, DWQ has worked with Duke Energy Progress to implement DWQ's June 17, 2011 Policy for Compliance Evaluation of Long-Term Permitted Facilities with No Prior Groundwater Monitoring Requirements. Finally, in 2013, Duke Energy Progress retained SynTerra Corporation to evaluate groundwater data and prepare a site conceptual model in response to the March 29, 2012 DWQ correspondence requesting assessment activities. The site conceptual model report was submitted to DWQ on April 22, 2013.

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[554] NC DENR's comment to the proposed CCR rule docket: EPA-HQ-RCRA-2009-0640-9282.

[555] According to Response to EPA CWA 308 and RCRA 3007 Information Request, August 2010 (A CD provided by EPA/OECA), in 2006 the PZ- groundwater monitoring series wells were installed as part of an ash Monofill-siting Study. Additional monitoring wells (GW-series) were installed in 2007 as part of USWAG's voluntary monitoring effort. The GW-series wells and wells PZ-19 and PZ-22 have been sampled on a semi-annual basis since installation. The Compliance Boundary wells installed in 2010/2011 are sampled on a quaternary basis.

[556] CB monitoring wells comprise the following eight down-gradient wells: GW-1, CB-3R, CB-4, CB-4B, CB-6, CB-7, and CB-8; and three background wells: CB-1, CB-5 (anthropomorphic floodplain well), and CB-9. For locations and a potentiometric map, see: http://portal.ncdenr.org/web/wq/hot-topics/coalashregulation/gwatermonitoring, Map.

[557] According to NC DENR Division of Water Quality's (DWQ) feedback in response to EPA's Region 4 inquiry following stakeholders' complaints in the 2010 Knoxville and Charlotte Public Hearings (a January 3, 2012 email from L. DiGaetano to A. Livnat, EPA/OSWER), additional groundwater monitoring wells were installed at the Compliance Boundary in February 2011.

Based on monitoring data from this site[558] showing some constituents exceeded state water standards,[559] on October 10, 2012, the Southern Environmental Law Center filed a complaint on behalf of several citizens' groups with the North Carolina Environmental Management Commission (EMC) requesting the following rulings:

> a) Operators of coal ash lagoons with NPDES permits first issued on or before December 30, 1983, must take corrective action pursuant to 15A N.C. Admin. Code 2L .0106(c) when their activity results in an increase in the concentration of a substance in excess of groundwater quality standards, whether or not groundwater quality standards have been exceeded at or beyond a compliance boundary around the CCR ponds;
> b) Operators of CCR ponds with NPDES permits first issued on or before December 30, 1983, must take immediate action to eliminate sources of contamination that cause a concentration of a substance in excess of groundwater quality standards, in advance of their separate obligation to propose and implement a corrective action plan for the restoration of groundwater quality contaminated by those sources; and
> c) Operators of closed and inactive CCR ponds must implement corrective action as unpermitted activities pursuant to 15A N.C. Admin. Code 2L .0106(c)

On December 3, 2012, the North Carolina EMC upheld state regulators' interpretation of groundwater protection requirements for coal ash lagoons: in taking that action, the commission rejected a request by environmental groups for an order that would require the cleanup of groundwater at 14 coal-fired facilities in North Carolina. The commission found the Division of Water Quality correctly interpreted state law and regulations and that pre-1984 lagoons at issue had compliance boundaries even though, for corrective action purposes, they were deemed "non-permitted."[560]

In response to EMC's decision, on January 8, 2013, The Southern Environmental Law Center filed the complaint in Wake County Superior Court on behalf of several conservation groups[561] 'to protect North Carolina communities and groundwater from toxic coal ash contamination at 14 coal-fired power plants across the state.' The lawsuit requires cleanup of groundwater contamination around unlined coal ash ponds, including those of Progress Energy's Asheville Plant.[562]

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[558] For the period January 2010 to July 2012.
[559] Cape Fear River Watch and Others (2012). NC DENR has documentation of exceedances of groundwater standards inside the compliance boundaries of fourteen coal-fired power plants in North Carolina with CCR ponds permitted prior to 1984, without modern construction techniques and permitting standards. Similarly to the other 13 facilities, groundwater inside the Compliance Boundary of the Asheville Steam Electric Plant exceeds standards for multiple contaminants. In particular, thallium exceeds groundwater standards at monitoring well CB-3 (in all samplings, between Nov. 2010 and July 2012) which was, until recently, located on the Compliance Boundary for the facility. NC DENR has not required corrective action, however, because Progress Energy purchased (on December 10, 2010) neighboring property, which relocated the Compliance Boundary such that well CB-3 is now inside the Boundary. According to NC DENR v. Progress Energy (2013), well CB-3 was replaced late in 2012 by well CB-3R, located on the new compliance boundary. Indeed, the only two monitoring wells with exceedances of thallium (CB-3: 0.48 µg/L, and CB-3R: 0.32 µg/L) are located as close as 500 feet from the residential subdivision impacted by thallium.
[560] https://essential.bna.com/login/signin?msg=deny&url=http%3A%2F%2Fnews.bna.com%2Fdeln%2Fdisplay%2Flink_res.adp%3Ffedfid%3D28835414%26fname%3Da0d4y8f2r4%26vname%3Ddennotallissues&authenDec=-203
[561] The Cape Fear River Watch, Sierra Club, Waterkeeper Alliance, and Western North Carolina Alliance.
[562] Southern Environmental Law Center Press Release, January 8, 2013: http://www.southernenvironment.org/newsroom/press_releases/groups_in_court_to_stop_groundwater_contamination_from_toxic_coal_ash_waste/

On March 22, 2013, The North Carolina DENR filed a lawsuit seeking to require Progress Energy to address groundwater contamination at its coal-fired plant in Asheville asking the state court to order the utility to abate groundwater contamination and conduct further evaluation of the source and extent of contamination found around the facility.[563] NC DENR claims that monitoring at the Asheville Steam Station has shown violations of groundwater standards for thallium,[564] boron,[565] chloride, selenium, sulfate, iron, and manganese, at the facility's compliance boundary, 500 feet from the permitted waste disposal area.[566] In addition, although cadmium levels were measured "well below" the water quality standard, the chemical recently was detected. State water quality inspectors also observed liquid seeping from the facility's two coal ash ponds and other locations into the French Broad River, in violation of state and federal water quality laws.[567] No drinking water violations at nearby wells have been found. NC DENR asked the court to order Progress Energy to stop the unlawful discharges and assess the cause, significance, and extent of the thallium and seepage violations. The agency also requested that the utility conduct additional sampling and more thoroughly evaluate groundwater quality. A Progress Energy representative said the company is evaluating the matter but denied violating its permit conditions.

On May 20, 2013, NC DENR filed a complaint amending its March 2013 filing against Duke Energy over leaks and contamination at its Asheville Plant, adding similar issues found at the Riverbend Plant[568] to the State's lawsuit. According to Bloomberg BNA (July 2013), Duke Energy and NC DENR have tentatively reached a settlement, a proposed consent order has been filed in two state superior courts[569] and public comments are being sought.[570] Under the terms of the proposed agreement, the utility would be required to take steps to protect water quality at the two power plants and pay a fine of $99,112. Duke Energy also faces monetary penalties if it fails to meet the deadlines for any of the 33 specific compliance actions in

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[563] NC DENR v. Progress Energy (2013).

[564] On October 1, 2010, the NC DNER DWQ Director established interim maximum concentration (IMAC) values for parameters for which a standard had not been established under the 2L Rules. The IMAC for thallium is 0.2 μg/L. Groundwater samples collected from the Plant's Ash Treatment System monitoring wells between November 2010 and November 2012 show exceedances of the IMAC for thallium (CB-2: 0.21 μg/L in November 2012; CB-3, in six out of six sampling events; and in the recently installed CB-3R: one-time).

[565] Boron 2L standard of 0.7 mg/L was exceeded in compliance wells CB-6 and CB-8 in seven out of seven sampling events from November 2010 to November 2012 (maximum: 0.985 and 1.36 mg/L, respectively), and in compliance well CB-3 prior to its discontinuation as a monitoring well (maximum: 0.895 mg/L, July 2012). In addition, compliance well CB-3R contained boron concentration of 1.29 mg/L during the November 2012 sampling event.

[566] For chloride (CB-8), selenium (CB-8), and sulfate (CB-6), exceedances occurred in the quarterly sampling events between November 2010 and November 2011 but not since, rendering the compliance status of these wells for these particular constituents unclear. Iron was noted to exceed the 2L standard in four wells and manganese - in six monitoring wells in all or most of the sampling events in these wells from November 2010 to November 2012.

The full quarterly sampling record of the CB wells (between Nov. 2010 and April 2014) shows the following exceedances (in parentheses: number of wells and extreme recorded value): pH (in all but one well, 4.3); nitrate (10 wells, 19.7 μg/L); chloride (one well, 319 mg/L); sulfate (one well, 715 mg/L); iron (all 11 wells, 37.6 mg/l); manganese (all 11 wells, 7,080 μg/L); thallium (2 wells, 0.48 μg/L), and TDS (two wells, 1,070 mg/L). See: http://portal.ncdenr.org/web/wq/hot-topics/coalashregulation/gwatermonitoring, Data.

[567] The facility is operating under an NPDES permit that was first issued on June 30, 1981, and reissued in 2005.

[568] The 454 MW Riverbend Steam Station, established in 1929, is a four-unit coal-fired generating facility located in Gaston County, N.C. on the Catawba River. The Riverbend Plant ceased operating in October 2012 (Duke Energy's Riverbend website: http://www.duke-energy.com/power-plants/coal-fired/riverbend.asp, accessed August 21, 2013). According to Bloomberg BNA, the Riverbend Plant ceased operating on April 1, 2013.

[569] NC vs. Duke Energy (2013).

[570] http://portal.ncdenr.org/c/document_library/get_file?uuid=0777b84e-8bca-40de-873d-33f46ebaa7d3&groupId=38364

the proposed consent decree (e.g., assessing contaminants and determining their naturally occurring levels, mitigating “imminent hazards”, and certain monitoring and reporting activities.) Following the February 2, 2014 spill into the Dan River, NC DENR rescinded the proposed CO.[571]

Following the January 2014 ash spill from a Dan River Plant’s inactive ash pond, in a March 12, 2014 letter to North Carolina’s Governor and the State’s Secretary of DENR, Duke Energy committed to continue the clean-closing of the Asheville plant’s inactive ash pond and either convert the two existing generating units to dry disposal or retire the units. If conversion were to be selected, it would be completed within 30-36 months of receiving the required permits.[572]

ICF (2010) Rationale: *Potential Damage.* <There are no exceedances of primary EPA MCLs in onsite or offsite groundwater; however there are onsite exceedances of North Carolina 2L Groundwater Standards and/or EPA SMCLs. There are no administrative rulings or court decisions associated with the site.>

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[571] http://abcnews.go.com/US/wireStory/apnewsbreak-nc-delays-coal-ash-deal-duke-22455403
[572] Attachment to an April 30, 2014 email from Frank Ney, EPA Region 4, to Alexander Livnat, EPA/OSWER, and Duke Energy (2014).

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The following are attachments to the Environmental Groups' Final Comments

ATTACHMENT 4

KPRG

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG and Associates, Inc.

CCR COMPLIANCE ANNUAL GROUNDWATER MONITORING and CORRECTIVE ACTION REPORT – 2019 ASH BY-PASS BASIN AND ASH SURGE BASIN

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January 31, 2020

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A – Analytical Data Packages from 2019 Assessment Monitoring
B – Alternate Source Demonstration March 25, 2019

1.0 INTRODUCTION

Based on the results of the statistical evaluation summary completed in December 2018, an Alternate Source Demonstration (ASD) was performed for Ash Surge Basin (ASB) and Ash By-pass Basin (ABB) detected Appendix IV parameters that exceeded established Groundwater Protection Standards (GWPSs). The ASD was completed on March 25, 2019, in accordance with 40 CFR 257.95(g)(3)(ii) and concluded that noted parameters above the GWPS are associated with other potential alternate sources and not a release from the regulated units.

The Assessment Monitoring requirements in accordance with the Federal Register, Environmental Protection Agency, 40 CFR Parts 257.95, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule dated April 17, 2015 (CCR Rule) have been completed for the ash pond monitoring wells located at the Midwest Generation, LLC (Midwest Generation) Powerton Generating Station. The wells sampled were selected to meet the monitoring requirements of the CCR Rule for the ASB and the ABB. The monitoring well network around these ponds consists of monitoring wells (MW-01 [upgradient], MW-08, MW-09 [upgradient], MW-11, MW-12, MW-15, MW-17, MW-18 and MW-19 [upgradient]) as shown on Figure 1.

With the vacating of Section 257.100(b) through (d) in October 2016, the inactive Former Ash Basin (FAB), which is being planned for closure, was added to the CCR units that would require monitoring under the CCR Rule. Wells MW-02 through MW-05 and MW-10 were added to the CCR sampling program specifically for the FAB and are not part of the monitoring program for the Ash Surge Basin and Ash By-pass Basin. The FAB monitoring results are discussed under separate cover.

This annual report covers the work performed relative to CCR groundwater monitoring for the 2019 calendar year for the ASB and ABB. It does not duplicate information or activities previously reported for 2018. It is prepared in accordance with Section 257.90(e)(1-5) and summarizes the sampling procedures used, provides an evaluation of groundwater flow conditions, summarizes the analytical data generated, and summarizes the results of an alternate source demonstration completed at the site.

2.0 FIELD PROCEDURES AND GROUNDWATER FLOW EVALUATION

2.1 Field Procedures

As previously noted, the CCR groundwater monitoring network around the ASB and ABB consists of monitoring wells (MW-01 [upgradient], MW-08, MW-09 [upgradient], MW-11, MW-12, MW-15, MW-17, MW-18 and MW-19 [upgradient]) as shown on Figure 1. As part of sampling procedures, the integrity of all monitoring wells was inspected and water levels obtained using an electronic water level meter (see summary of water level discussion below). All wells were found in generally good condition.

All groundwater samples were collected using the low-flow sampling technique from dedicated pumps. The samples were not filtered prior to analysis to provide for total metals concentrations as opposed to dissolved metals concentrations. One duplicate sample was collected from a randomly selected monitoring well per sampling event for quality assurance purposes.

2.2 Groundwater Flow Evaluation

Water level data measurements were obtained from monitoring wells during each round of groundwater sampling. A complete round of water levels was collected prior to initiating sampling, and the water level data are summarized in Table 1. It is noted that water levels were also concurrently measured at other monitoring well locations in the area that are not part of the CCR monitoring network for the ASB and ABB. The full set of water levels were used to generate a groundwater flow map for each sampling event. It is also noted that CCR monitoring wells MW-08, MW-12, MW-15 and MW-17 are screened within a shallow, localized, saturated clay/silt unit which is underlain by a more extensive sand unit. The remaining monitoring wells, have deeper screens, within the more extensive sand unit. The water levels from wells screened in the clay/silt unit and the water levels from monitoring wells screened within the sand unit were evaluated separately and used to generate groundwater flow maps for each unit. These maps are provided on Figures 2 through 5.

In accordance with general groundwater sampling requirements under Section 257.93(c), Table 2 provides a summary of the flow direction and an estimated rate of groundwater flow for each sampling event. The flow rate was calculated using the following equation:

$$V_s = \frac{K\,dh}{n_e\,dl}\text{, where}$$

V_s is seepage velocity (distance/time)
K is hydraulic conductivity (distance/time)
dh/dl is hydraulic gradient (unitless)
n_e is effective porosity (unitless)

The average hydraulic conductivities of 3.28 x 10^{-7} ft/sec (silt/clay unit) in Table 2 was estimated from literature (Freeze and Cherry, 1979). The hydraulic conductivity of 3.81 x 10^{-3} (sandy unit) used in Table 2 was obtained from the Hydrogeologic Assessment Report dated February 2011 and prepared by Patrick Engineering. The estimated effective porosities of the silt/clay materials (0.40) and of the sandy materials (0.35) were obtained from literature (Applied Hydrogeology, Fetter, 1980). The second 2019 semi-annual sampling event showed a decrease in gradient for the sand unit when compared to previous sampling events.

3.0 ANALYTICAL DATA AND STATUS OF EVALUATIONS

3.1 Sampling Summary

The groundwater sampling summary from 2019 is provided in Table 3, in accordance with 257.90 (e)(3).

3.2 Data Summary

In accordance with assessment monitoring requirements, a complete round of CCR well groundwater samples were collected in April/May and November 2019. Wells were analyzed for both Appendix III and previously detected Appendix IV parameters.

Confirmatory resampling events were limited to any potential statistically significant increases (SSI) for specific parameters at specific wells for parameters that were not covered in the ASD. The second 2019 semi-annual sampling data indicated Appendix IV parameters lead and cobalt above the established GWPSs at well location MW-01. Confirmatory resampling on December 26. 2019 showed both parameters below the established GWPSs, which is consistent with previous sampling events.

The analytical data from the ABB and ASB assessment monitoring groundwater sampling for Appendix III and IV parameters are provided in Tables 4 and 5, respectively. Table 4 includes Prediction Limits (PLs) for Appendix III parameters and Table 5 includes Groundwater Protection Standards (GWPS) for detected Appendix IV compounds. Both tables include the sample dates and whether the specific well is considered upgradient or downgradient relative to groundwater flow and the regulated unit(s). All duplicate values were within an acceptable range. The analytical data packages from these sampling events are provided in Appendix A.

3.3 Current Status

The ASB and ABB were transitioned from detection monitoring to assessment monitoring in April, 2018 and currently remain in assessment monitoring.

4.0 OTHER REQUIRED SUBMITTALS

4.1 Alternate Source Demonstration

An ASD for detected Appendix IV parameters above established GWPSs was completed on March 25, 2019 in accordance with Section 257.95(g)(3)(ii) for the Powerton Generating Station ASB and ABB. As required under section 257.95(g)(3)(ii) a full copy of the ASD is provided in Appendix B. Ash and water samples were collected from each of the two ponds (ASB and ABB) and analyzed using the Leaching Environmental Assessment Framework (LEAF) method to determine whether the noted detections above GWPSs may be associated with an actual release from the regulated unit(s) or if another potential historical source in the vicinity of the ash ponds may be affecting the local groundwater quality.

It was concluded that the ASB and ABB are not the source of downgradient monitoring well detections above established GWPSs and that there is an alternate source(s) of impacts.

5.0 SUMMARY/CONCLUSIONS AND RECOMMENDATIONS

The assessment monitoring requirements in accordance with the CCR rule are being successfully met. Groundwater monitoring wells that had analytical results showing parameter concentrations above established PLs or GWPSs were resampled to minimize potential for a false positive. An ASD for detected Appendix IV parameters above established GWPSs was completed and determined that the ASB and ABB are not the source of downgradient monitoring well detections above established GWPSs and that there is an alternate source(s) of impacts. The most recent semi-annual detection monitoring results for well MW-01 indicated a possible SSI for lead and cobalt. The confirmatory resample showed both parameters below the GWPSs. At this time it is recommended that the station remain in routine assessment monitoring.

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FIGURES

E N V I R O N M E N T A L C O N S U L T A T I O N & R E M E D I A T I O N

K P R G

KPRG and Associates, inc.

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CCR MONITORING WELL SITE MAP

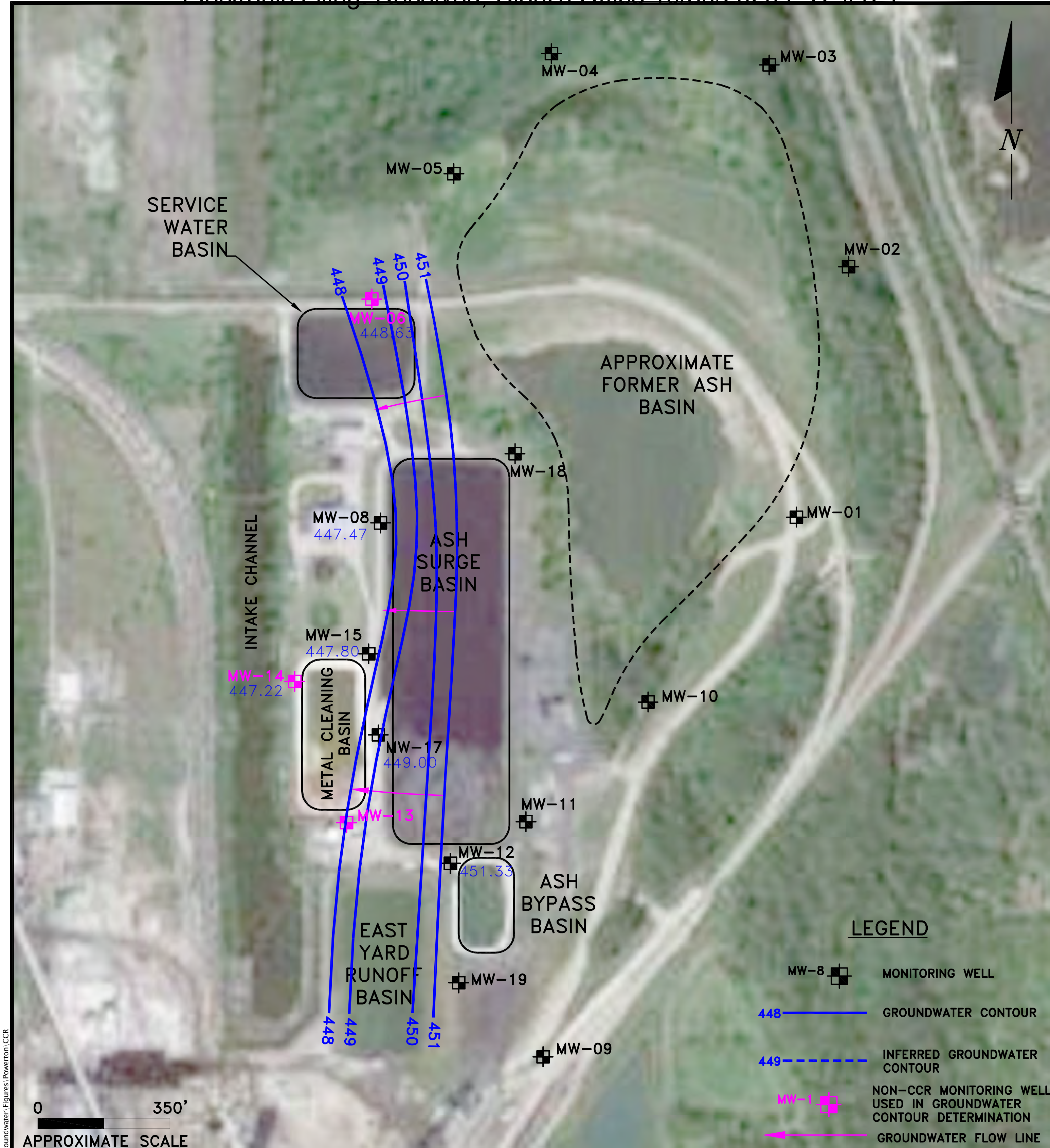
POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 350'

Date: December 19, 2018

KPRG Project No. 12313.1

FIGURE 1



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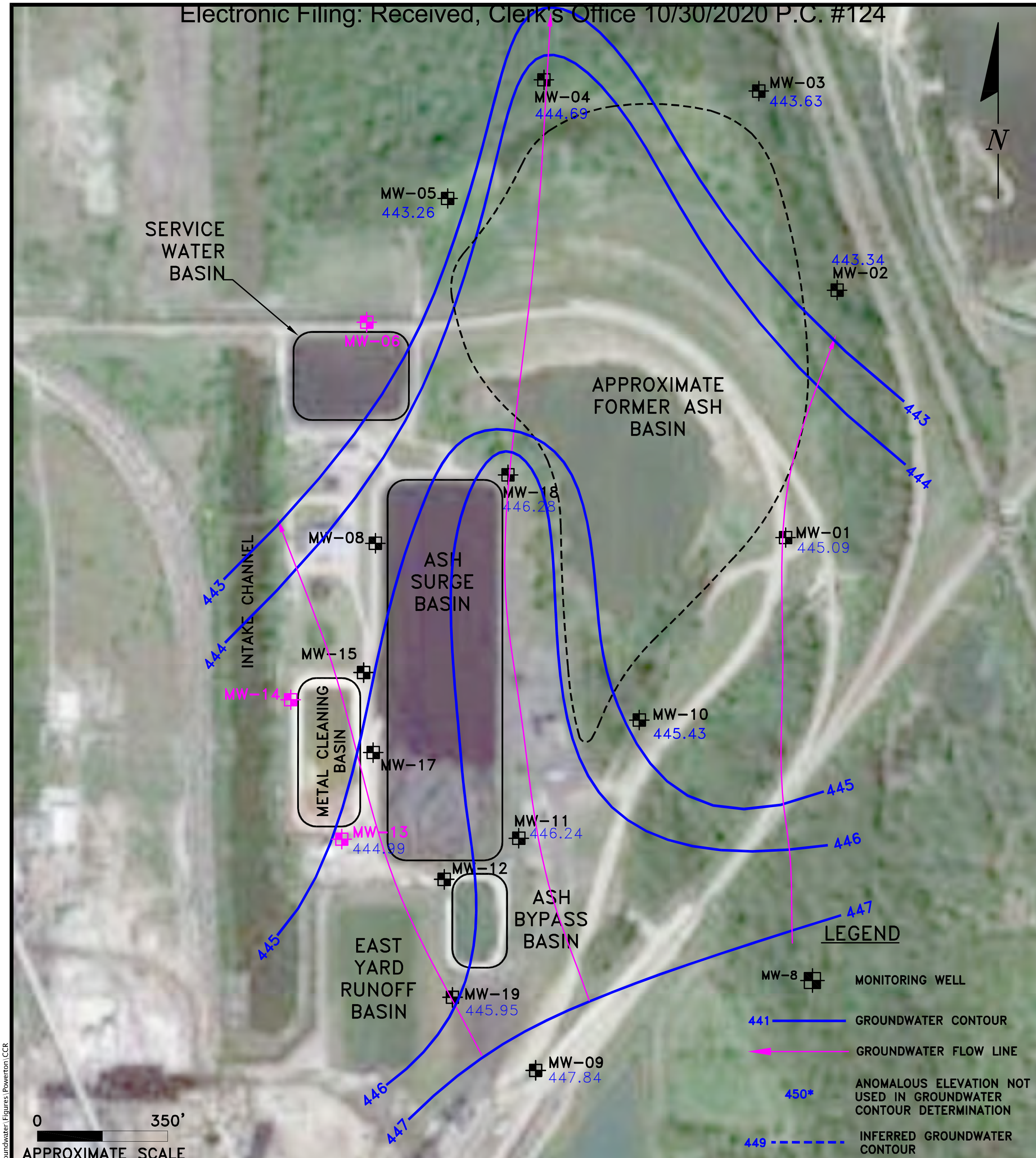
CCR GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 05/2019

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 350'	Date: June 28, 2019
KPRG Project No. 12313.1	FIGURE 2

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powerton\CCR



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CCR GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 05/2019

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 350'	Date: June 28, 2019
KPRG Project No. 12313.1	FIGURE 3

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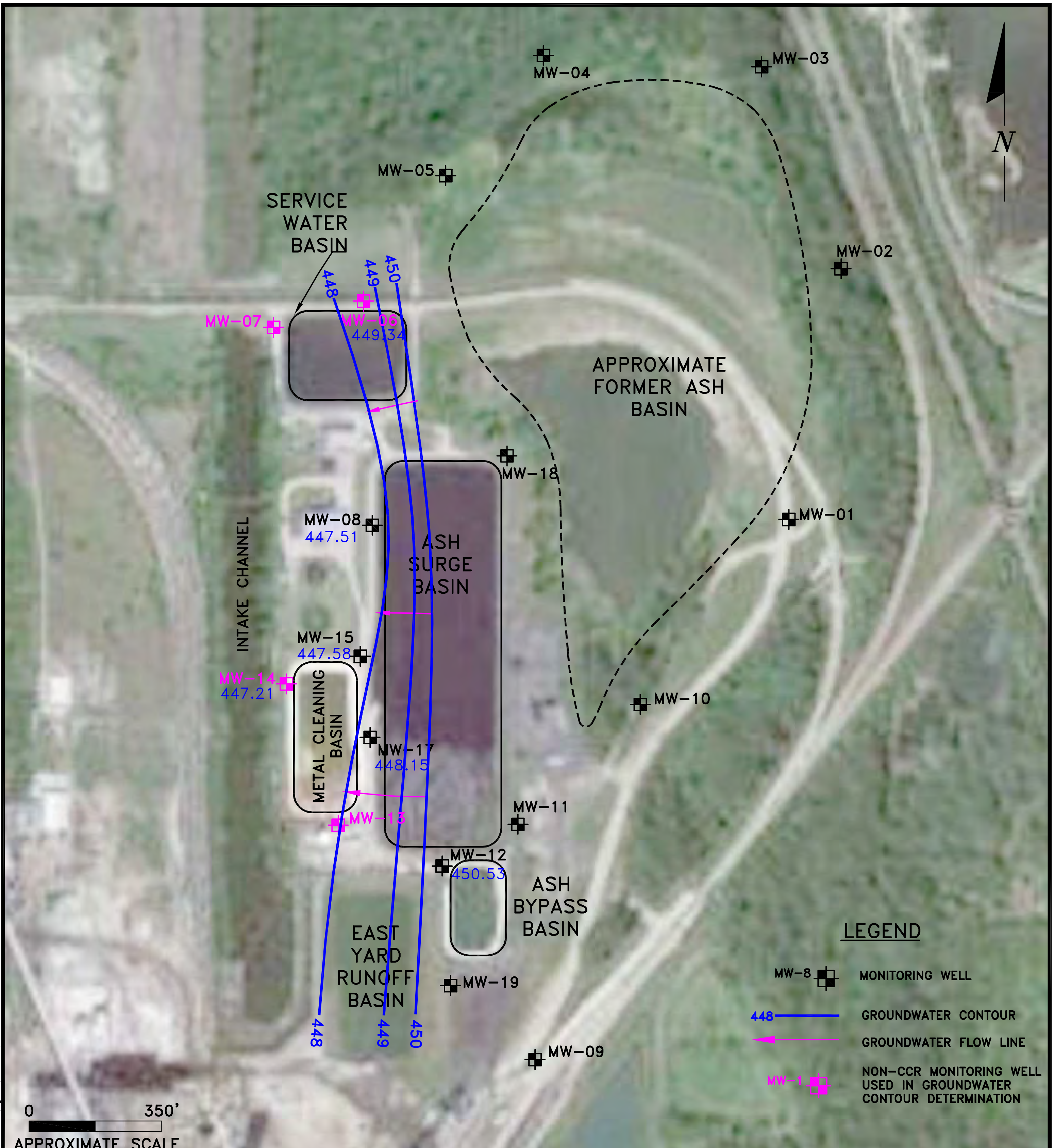

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CCR GROUNDWATER CONTOUR MAP FOR SILT/CLAY UNIT 11/2019	
POWERTON STATION PEKIN, ILLINOIS	
Scale: 1" = 350'	Date: December 19, 2019
KPRG Project No. 12313.1	FIGURE 4

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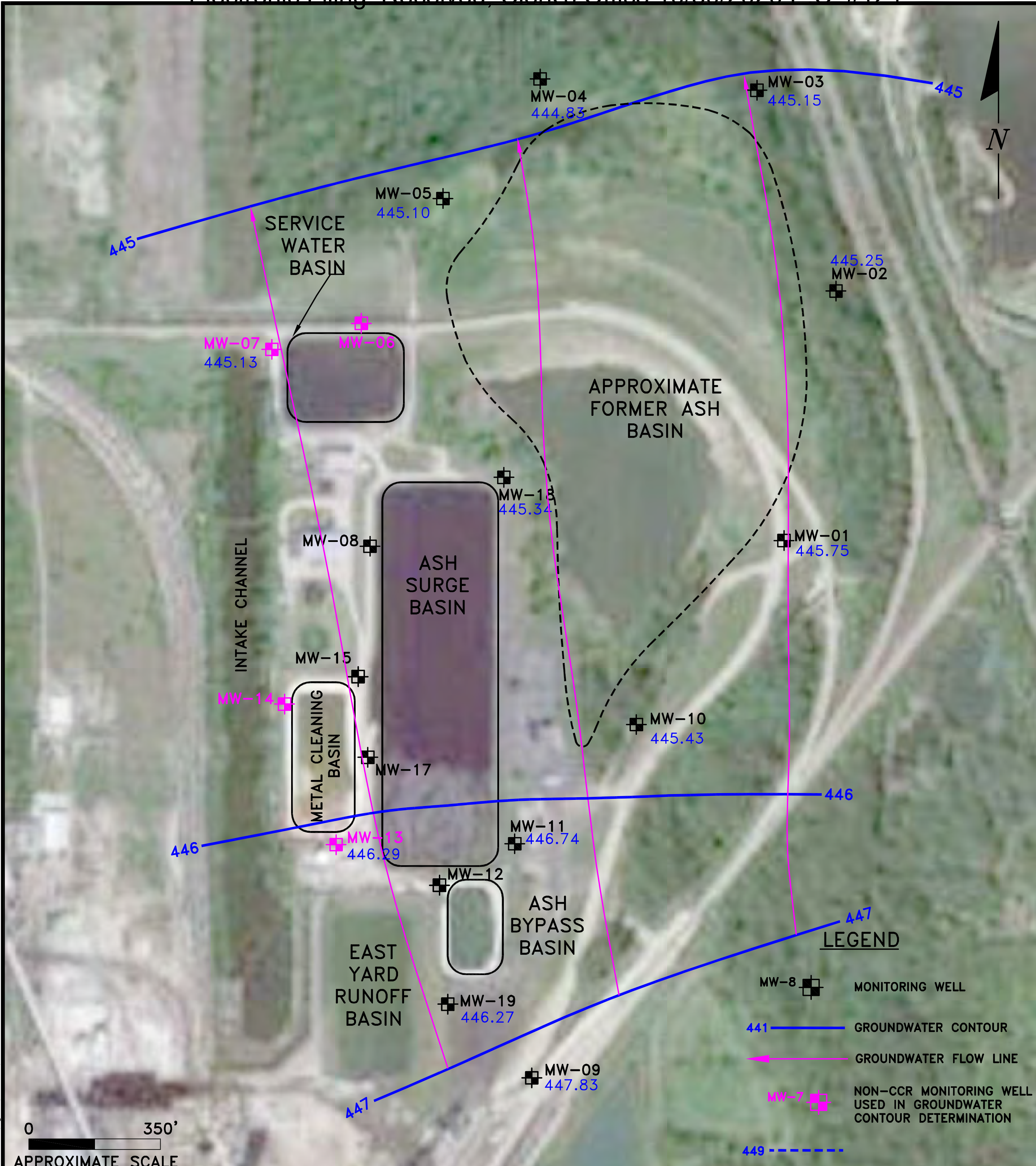

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CCR GROUNDWATER CONTOUR MAP FOR GRAVELLY SAND UNIT 11/2019

POWERTON STATION
PEKIN, ILLINOIS

Scale: 1" = 350'	Date: December 19, 2019
KPRG Project No. 12313.1	FIGURE 5

W:\Projects\Midwest Generation\12313 Ash Pond Groundwater\Figures\Powerton\CCR

TABLES

Table 1. Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-01	11/16/2015	465.24	26.04	439.20
	2/22/2016	465.24	21.90	443.34
	5/16/2016	465.24	21.83	443.41
	8/15/2016	465.24	23.89	441.35
	11/14/2016	465.24	23.38	441.86
	2/13/2017	465.24	21.71	443.53
	5/1/2017	465.24	18.87	446.37
	6/20/2017	465.24	21.54	443.70
	8/25/2017	465.24	24.70	440.54
	11/8/2017	465.24	24.92	440.32
	5/17/2018	465.24	22.66	442.58
	8/8/2018	465.24	26.05	439.19
	10/30/2018	465.24	24.69	440.55
	4/29/2019	465.24	20.15	445.09
	11/11/2019	465.24	19.49	445.75
MW-08	11/16/2015	471.75	26.06	445.69
	2/22/2016	471.75	23.99	447.76
	5/16/2016	471.75	25.48	446.27
	8/15/2016	471.75	23.61	448.14
	11/14/2016	471.75	24.31	447.44
	2/13/2017	471.75	23.97	447.78
	5/1/2017	471.75	23.28	448.47
	6/20/2017	471.75	23.31	448.44
	8/29/2017	471.75	24.52	447.23
	11/8/2017	471.75	25.27	446.48
	5/17/2018	471.75	24.36	447.39
	8/8/2018	471.75	24.04	447.71
	10/31/2018	471.75	24.92	446.83
	4/29/2019	471.75	24.28	447.47
	11/11/2019	471.75	24.24	447.51
MW-09	11/16/2015	469.14	26.07	443.07
	2/22/2016	469.14	22.83	446.31
	5/16/2016	469.14	23.06	446.08
	8/15/2016	469.14	24.50	444.64
	11/14/2016	469.14	24.33	444.81
	2/13/2017	469.14	23.43	445.71
	5/1/2017	469.14	20.77	448.37
	6/20/2017	469.14	22.15	446.99
	8/25/2017	469.14	24.79	444.35
	11/8/2017	469.14	25.74	443.40
	5/16/2018	469.14	23.89	445.25
	8/8/2018	469.14	25.49	443.65
	11/1/2018	469.14	26.02	443.12
	4/29/2019	469.14	21.30	447.84
	11/11/2019	469.14	21.31	447.83
MW-11	11/16/2015	471.62	31.67	439.95
	2/22/2016	471.62	28.34	443.28
	5/16/2016	471.62	27.11	444.51
	8/15/2016	471.62	29.64	441.98
	11/14/2016	471.62	29.19	442.43
	2/13/2017	471.62	27.49	444.13
	5/1/2017	471.62	24.34	447.28
	6/20/2017	471.62	26.94	444.68
	8/29/2017	471.62	30.42	441.20
	11/9/2017	471.62	30.27	441.35
	5/16/2018	471.62	28.58	443.04
	8/9/2018	471.62	31.04	440.58
	11/1/2018	471.62	30.82	440.80
	4/29/2019	471.62	25.38	446.24
	11/11/2019	471.62	24.88	446.74

Table 1. Groundwater Elevations - Midwest Generation, LLC, Powerton Station, Pekin, IL

Well ID	Date	Top of Casing Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft above MSL)
MW-12	11/16/2015	473.38	24.48	448.90
	2/22/2016	473.38	21.41	451.97
	5/16/2016	473.38	22.94	450.44
	8/15/2016	473.38	23.85	449.53
	11/14/2016	473.38	23.89	449.49
	2/13/2017	473.38	21.93	451.45
	5/1/2017	473.38	22.26	451.12
	6/20/2017	473.38	22.76	450.62
	8/26/2017	473.38	23.92	449.46
	11/10/2017	473.38	24.29	449.09
	5/16/2018	473.38	22.46	450.92
	8/9/2018	473.38	23.78	449.60
	11/1/2018	473.38	23.74	449.64
	4/29/2019	473.38	22.05	451.33
	11/11/2019	473.38	22.85	450.53
MW-15	11/16/2015	471.37	25.33	446.04
	2/22/2016	471.37	22.91	448.46
	5/16/2016	471.37	24.71	446.66
	8/15/2016	471.37	23.45	447.92
	11/14/2016	471.37	23.94	447.43
	2/13/2017	471.37	23.73	447.64
	5/1/2017	471.37	23.27	448.10
	6/20/2017	471.37	22.86	448.51
	8/29/2017	471.37	23.13	448.24
	11/10/2017	471.37	25.13	446.24
	5/17/2018	471.37	23.85	447.52
	8/9/2018	471.37	23.96	447.41
	10/31/2018	471.37	24.55	446.82
	4/29/2019	471.37	23.57	447.80
	11/11/2019	471.37	23.79	447.58
MW-17	11/16/2015	467.75	26.92	440.83
	2/22/2016	467.75	19.86	447.89
	5/16/2016	467.75	20.42	447.33
	8/15/2016	467.75	21.61	446.14
	11/14/2016	467.75	21.39	446.36
	2/13/2017	467.75	19.66	448.09
	5/1/2017	467.75	18.78	448.97
	6/20/2017	467.75	19.42	448.33
	8/29/2017	467.75	22.68	445.07
	11/6/2017	467.75	24.66	443.09
	5/14/2018	467.75	19.79	447.96
	8/6/2018	467.75	21.03	446.72
	10/29/2018	467.75	21.98	445.77
	4/29/2019	467.75	18.75	449.00
	11/11/2019	467.75	19.60	448.15
MW-18	11/16/2015	469.28	28.42	440.86
	2/22/2016	469.28	27.96	441.32
	5/16/2016	469.28	25.57	443.71
	8/15/2016	469.28	27.86	441.42
	11/14/2016	469.28	27.39	441.89
	2/13/2017	469.28	25.06	444.22
	5/1/2017	469.28	22.49	446.79
	6/20/2017	469.28	24.97	444.31
	8/28/2017	469.28	27.30	441.98
	11/6/2017	469.28	26.33	442.95
	5/14/2018	469.28	24.65	444.63
	8/6/2018	469.28	25.67	443.61
	10/29/2018	469.28	25.79	443.49
	4/29/2019	469.28	23.00	446.28
	11/11/2019	469.28	23.94	445.34
MW-19	11/14/2016	465.07	22.65	442.42
	2/13/2017	465.07	21.27	443.80
	5/1/2017	465.07	18.39	446.68
	6/20/2017	465.07	20.44	444.63
	8/28/2017	465.07	23.60	441.47
	11/9/2017	465.07	23.80	441.27
	5/14/2018	465.07	22.08	442.99
	8/6/2018	465.07	24.14	440.93
	10/29/2018	465.07	24.31	440.76
	4/29/2019	465.07	19.12	445.95
	11/11/2019	465.07	18.80	446.27

MSL - Mean Sea Level
TOC - Top of Casing

Table 2. Groundwater Flow Direction and Estimated Seepage Velocity/Flow Rate - Powerton Generation Station.

DATE	Screened Unit	Groundwater Flow Direction	K_{avg} (ft/sec)*	Average Hydraulic Gradient (ft/ft)	Porosity (unitless)**	Estimated Seepage Velocity (ft/day)
11/16/2015	Silt/clay	Westerly	3.280E-07	0.0093	0.4	0.001
11/16/2015	Sandy	North-Northwest	3.810E-03	0.0026	0.35	2.40
2/22/2016	Silt/clay	Westerly	3.280E-07	0.0098	0.4	0.001
2/22/2016	Sandy	North-Northwest	3.810E-03	0.0030	0.35	2.82
5/16/2016	Silt/clay	Westerly	3.280E-07	0.0124	0.4	0.001
5/16/2016	Sandy	North-Northwest	3.810E-03	0.0021	0.35	1.98
8/15/2016	Silt/clay	Westerly	3.280E-07	0.0093	0.4	0.001
8/15/2016	Sandy	North-Northwest	3.810E-03	0.0014	0.35	1.32
11/14/2016	Silt/clay	Westerly	3.280E-07	0.0083	0.4	0.001
11/14/2016	Sandy	North-Northwest	3.810E-03	0.0014	0.35	1.32
2/13/2017	Silt/clay	Westerly	3.280E-07	0.0091	0.4	0.001
2/13/2017	Sandy	Northeasterly - Northwesterly	3.810E-03	0.0049	0.35	4.61
5/1/2017	Silt/clay	Westerly	3.280E-07	0.0100	0.4	0.001
5/1/2017	Sandy	Northeasterly - Northwesterly	3.810E-03	0.0021	0.35	1.98
6/20/2017	Silt/clay	Westerly	3.280E-07	0.0088	0.4	0.001
6/20/2017	Sandy	Northeasterly - Northwesterly	3.810E-03	0.0057	0.35	5.36
8/25/2017	Silt/clay	Westerly	3.280E-07	0.0214	0.4	0.002
8/25/2017	Sandy	North-Northwest	3.810E-03	0.0174	0.35	16.37
11/8/2017	Silt/clay	Westerly	3.280E-07	0.0267	0.4	0.002
11/8/2017	Sandy	North-Northwest	3.810E-03	0.0157	0.35	14.77
5/17/2018	Silt/clay	Westerly	3.280E-07	0.0070	0.4	0.0005
5/17/2018	Sandy	North-Northwest	3.810E-03	0.0042	0.35	3.95
8/7/2018	Silt/clay	Westerly	3.280E-07	0.0263	0.4	0.002
8/7/2018	Sandy	North-Northwest	3.810E-03	0.0037	0.35	3.48
4/29/2019	Silt/clay	Westerly	3.280E-07	0.0129	0.4	0.0009
4/29/2019	Sandy	North-Northwest	3.810E-03	0.0022	0.35	2.07
11/11/2019	Silt/clay	Westerly	3.280E-07	0.0114	0.4	0.0008
11/11/2019	Sandy	North-Northwest	3.810E-03	0.0008	0.35	0.75

* K_{avg} - Average hydraulic conductivity for sandy unit (feet/second) from Hydrogeologic Assessment Report, Patrick Engineering, February 2011.
Average hydraulic conductivity for silt/clay unit (feet/second) from Groundwater, Freeze and Cherry, 1979.

** - Porosity estimates from Applied Hydrogeology, Fetter, 1980.

Table 3. CCR Groundwater Sample Collection Summary for 2019 - Powerton Generating Station Ash Bypass Basin & Ash Surge Basin

Well ID	Number of Groundwater Sampling Events	Dates of Groundwater Sampling Events	Detection Monitoring (D) versus Assessment Monitoring (A)
MW-01 (Upgradient)	2	4/30/2019	A
		11/13/2019	A
MW-09 (Upgradient)	2	5/1/2019	A
		11/14/2019	A
MW-19 (Upgradient)	2	5/2/2019	A
		11/13/2019	A
MW-08 (Downgradient)	2	5/1/2019	A
		11/13/2019	A
MW-11 (Downgradient)	2	5/1/2019	A
		11/14/2019	A
MW-12 (Downgradient)	2	5/1/2019	A
		11/14/2019	A
MW-15 (Downgradient)	2	5/2/2019	A
		11/14/2019	A
MW-17 (Downgradient)	2	4/29/2019	A
		11/13/2019	A
MW-18 (Downgradient)	2	4/29/2019	A
		11/13/2019	A

Table 4. ASB/ABB Assessment Monitoring - Appendix III Groundwater Analytical Results through 2019 - Midwest Generation, LLC, Powerton Station, Pekin, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
	11/16/2015	1.0	98	44	0.17	7.07	93	530
	2/25/2016	0.2	110	42	0.16	7.23	54	460
	5/20/2016	0.34	100	44	0.17	6.95	65	430
	8/17/2016	0.27	78	39	0.25	7.16	50	530
	11/16/2016	0.18	97	39	0.21	7.22	32	500
	2/14/2017	0.18	120	55	0.17	7.30	60	550
MW-01	5/3/2017	0.19	86	66	0.16	7.41	45	460
(S)	6/21/2017	0.18	85	58	0.18	7.60	47	540
up-gradient	**Pred. Limit***	**1.0**	**142**	**81**	**0.25**	**7.90-6.58**	**115**	**648**
	8/25/2017	0.56	86	41	0.18	7.41	63	490
	11/8/2017	0.57	130	38	0.12	6.69	61	640
	5/17/2018	0.15	88	50	0.12	6.7	48	540
	8/8/2018	0.14	86	48	0.13	6.8	43	430
	4/30/2019	0.07	78	54	0.17	7.2	27	450
	11/13/2019	0.52	95	47	0.18	7.51	41	390
	11/18/2015	2.0	63	H 31	H 0.19	7.15	H 110	H 440
	2/25/2016	2.3	77	36	0.19	7.34	120	500
	5/19/2016	2.0	73	38	0.17	7.30	100	520
	8/17/2016	2.7	74	39	0.15	7.32	120	750
	11/17/2016	4.5	85	38	0.13	7.37	110	630
	2/15/2017	4.1	84	38	0.13	6.94	160	620
MW-09	5/3/2017	3.5	85	38	0.17	7.48	170	680
(S)	6/21/2017	3.3	82	38	0.14	7.63	180	760
up-gradient	**Pred. Limit***	**6.19**	**103**	**39**	**0.24**	**7.99-6.64**	**236**	**1000**
	8/25/2017	3.8	85	36	0.14	7.30	150	630
	11/8/2017	4	89	37	0.13	6.92	190	650
	5/16/2018	4.1	89	36	0.15	7.83	180	550
	8/8/2018	4.3	86	39	0.14	7.31	180	690
	5/1/2019	4.6	79	37	0.17	7.11	170	640
	11/14/2019	2.5	85	36	0.18	7.49	82	500
	11/18/2016	3.8	89	38	0.13	7.34	120	670
	2/15/2017	4.7	88	37	0.13	7.50	180	630
	5/5/2017	3.3	88	38	0.14	7.51	160	640
	6/21/2017	2.3	110	35	0.12	7.30	170	690
MW-19	8/28/2017	3.5	97	36	0.16	7.20	160	700
(S)	11/6/2017	4.5	86	35	0.17	7.26	190	640
up-gradient	5/14/2018	4.1	96	35	0.16	7.92	180	820
	8/6/2018	3.8	100	37	0.13	7.57	170	720
	Pred. Limit*	**6.2**	**121**	**41**	**0.20**	**8.20-6.70**	**236**	**890**
	5/2/2019	3.7	100	39	0.13	6.86	160	700
	11/13/2019	2.5	130	**53**	0.15	7.51	140	740
	11/18/2015	1.5	160	H 170	H 0.44	7.61	H 470	H 1300
	2/25/2016	1.7	160	200	0.30	7.00	280	1100
	5/18/2016	1.7	160	140	0.34	7.67	300	1200
	8/17/2016	1.0	150	230	0.35	7.33	360	1400
	11/15/2016	1.2	140	290	0.33	6.90	230	1300
	2/16/2017	1.5	150	460	0.28	7.00	230	1500
MW-08	5/2/2017	0.55	140	300	0.33	7.30	320	1300
(CL)	6/21/2017	1.2	160	490	0.30	7.27	350	1700
down-gradient	**Pred. Limit**	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**1.2**	**150**	**360**	**0.47**	7.29	**300**	**1500**
	11/8/2017	0.68	130	**260**	**0.45**	7.27	**270**	**1200**
	5/17/2018	**1.2**	130	**200**	**0.37**	6.79	**170**	**1000**
	8/8/2018	**1.1**	140	**270**	**0.32**	6.93	**190**	**1200**
	5/1/2019	0.54	95	73	**0.35**	7.60	85	600
	11/13/2019	0.98	110	**92**	**0.33**	7.66	**110**	640

Notes: All units are in mg/l except pH is in standard units.
Pred. Limit - Prediction Limit
(S) - Sandy Unit
(CL) - Silty Clay Unit
* - Intrawell Prediction Limit. All others are interwell comparisons.
** - Based on pooled background from MW-01/MW-09. All others based on MW-01 as background.
Italics Date - Detection Monitoring and resample after statistical background establishment.

Bold - Potential statistically significant increase.
F1 - MS and/or MSD Recovery outside of limits.
H - Sample was prepped or analyzed beyond the specified holding time.
V- Serial dilution exceeds control limits.

Table 4. ASB/ABB Assessment Monitoring - Appendix III Groundwater Analytical Results through 2019 - Midwest Generation, LLC, Powerton Station, Pekin, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
MW-11 (S) down-gradient	11/18/2015	1.7	110	H 54	H 0.55	7.06	H 160	H 670
	2/26/2016	1.5	140	120	0.55	7.25	220	850
	5/20/2016	1.6	140	120	0.56	7.10	210	920
	8/17/2016	1.0	130	93	0.67	7.08	180	910
	11/17/2016	1.2	140	130	0.44	7.21	240	1100
	2/16/2017	1.6	140	110	0.40	6.62	260	910
	5/3/2017	1.3	160	160	0.42	7.36	440	1300
	6/22/2017	1.2	140	120	0.60	7.21	260	1000
	Pred. Limit	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**2.2**	130	**83**	**0.52**	7.23	**310**	**1100**
	11/9/2017	**1.5**	**140**	**100**	**0.59**	6.96	**230**	**970**
	5/16/2018	**2.0**	**140**	**88**	**0.61**	**7.89**	**270**	**1000**
	8/9/2018	**1.4**	**160**	**120**	**0.65**	7.24	**220**	**1000**
	5/1/2019	**2.3**	**110**	**60**	**0.62**	7.08	**200**	**730**
	11/14/2019	**1.8**	120	**83**	**0.55**	7.43	**150**	**890**
MW-12 (CL) down-gradient	11/19/2015	0.94	160	H 220	H 0.57	7.12	H 650	H 1400
	2/26/2016	0.42	130	200	0.40	7.96	530	1200
	5/20/2016	0.65	150	200	0.49	7.28	550	1400
	8/18/2016	0.69	170	200	0.49	7.06	620	1600
	11/18/2016	0.83	140	180	0.46	7.34	340	1300
	2/16/2017	0.48	140	190	0.37	7.54	630	1300
	5/3/2017	0.49	120	190	0.37	7.47	500	1200
	6/22/2017	0.50	130	190	0.48	7.36	580	1400
	Pred. Limit	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	0.78	**140**	**180**	**0.52**	7.34	**520**	**1400**
	11/10/2017	0.94	**130**	**170**	**0.48**	7.38	**370**	**1200**
	5/16/2018	0.46	**100**	**180**	**0.47**	**8.12**	**720**	**1500**
	8/9/2018	0.61	**120**	**190**	**0.44**	7.42	**480**	**1300**
	5/1/2019	0.4	**100**	**170**	**0.38**	7.68	**330**	**1000**
	11/14/2019	0.74	120	**160**	**0.45**	7.61	**280**	**1100**
MW-15 (CL) down-gradient	11/18/2015	1.5	270	H 210	H 0.53	6.55	H 1400	H 2400
	2/25/2016	2.0	240	110	0.61	6.84	640	1700
	5/19/2016	2.7	320	240	0.53	6.83	1200	2800
	8/18/2016	1.5	200	F1 170	0.54	6.96	660	1900
	11/17/2016	1.3	120	180	0.47	6.91	560	1900
	2/17/2017	1.9	200	190	0.43	7.24	670	1700
	5/4/2017	1.5	180	190	0.57	7.35	670	1700
	6/21/2017	1.6	180	200	0.56	7.30	530	1600
	Pred. Limit	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**2.2**	**190**	**200**	**0.53**	6.87	**540**	**1800**
	11/10/2017	**1.6**	**170**	**180**	**0.63**	7.09	**530**	**1500**
	5/17/2018	**2.3**	**200**	**160**	**0.5**	**6.75**	**680**	**1800**
	8/9/2018	**2.3**	**200**	**200**	**0.48**	7.06	**520**	**1700**
	5/2/2019	**1.5**	**180**	**200**	**0.52**	6.89	**420**	**1500**
	11/14/2019	**1.8**	**170**	**170**	**0.5**	7.24	**260**	**1300**
MW-17 (CL) down-gradient	11/19/2015	1.6	210	H 230	H 0.43	7.11	H 850	H 1800
	2/22/2016	1.8	290	280	0.55	7.19	960	2100
	5/18/2016	1.4	200	230	0.64	7.02	700	1800
	8/15/2016	1.1	220	220	0.60	7.08	860	2100
	11/14/2016	1.5	200	210	0.56	7.26	560	2000
	2/13/2017	1.6	190	230	0.56	6.84	770	1600
	5/4/2017	1.2	170	210	0.61	7.29	720	1500
	6/22/2017	0.95	150	230	0.72	7.38	580	1600
	Pred. Limit	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**1.4**	**190**	**230**	**0.64**	7.19	**640**	**1900**
	11/6/2017	**1.7**	**190**	**240**	**0.62**	7.27	**840**	**1800**
	5/14/2018	**1.6**	**170**	**220**	**0.6**	**7.79**	**800**	**1700**
	8/6/2018	**1.3**	**170**	**230**	**0.6**	7.12	**620**	**1600**
	4/29/2019	0.98	**150**	**190**	**0.66**	7.25	**660**	**1500**
	11/13/2019	1.9	**230**	**600**	**0.55**	7.16	**730**	**2300**
MW-18 (S) down-gradient	11/19/2015	0.80	140	H 220	H 0.66	7.62	H 310	H 1200
	2/22/2016	0.76	150	220	0.68	7.06	310	1200
	5/18/2016	0.72	120	230	0.71	7.68	230	1200
	8/15/2016	0.67	130	210	0.64	7.52	330	1300
	11/18/2016	0.94	130	200	0.58	7.69	250	1300
	2/15/2017	0.56	140	190	0.50	7.81	340	1200
	5/5/2017	0.46	130	180	0.52	8.12	360	1100
	6/21/2017	0.53	120	190	0.51	8.10	320	1200
	Pred. Limit	**1.00**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/28/2017	0.65	120	**200**	**0.53**	**7.81**	**310**	**1200**
	11/6/2017	0.67	120	**190**	**0.57**	**7.74**	**400**	**1200**
	5/14/2018	0.57	130	**180**	**0.59**	**8.27**	**440**	**1200**
	8/6/2018	0.58	120	**230**	**0.57**	**7.88**	**270**	**1100**
	4/29/2019	0.54	120	**180**	**0.61**	**7.77**	**170**	**1000**
	11/13/2019	0.79	130	**180**	**0.56**	**8.26**	**210**	**1100**

Notes: All units are in mg/l except pH is in standard units.
Pred. Limit - Prediction Limit
(S) - Sandy Unit
(CL) - Silty Clay Unit
* - Intrawell Prediction Limit. All others are interwell comparisons.
** - Based on pooled background from MW-01/MW-09. All others based on MW-01 as background.
Italics Date - Detection Monitoring and resample after statistical background establishment.

Bold - Potential statistically significant increase.
F1 - MS and/or MSD Recovery outside of limits.
H - Sample was prepped or analyzed beyond the specified holding time.
V- Serial dilution exceeds control limits.

Table 4. ASB/ABB Assessment Monitoring - Appendix III Groundwater Analytical Results through 2019 - Midwest Generation, LLC, Powerton Station, Pekin, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
MW-01 (S) up-gradient	11/16/2015	1.0	98	44	0.17	7.07	93	530
	2/25/2016	0.2	110	42	0.16	7.23	54	460
	5/20/2016	0.34	100	44	0.17	6.95	65	430
	8/17/2016	0.27	78	39	0.25	7.16	50	530
	11/16/2016	0.18	97	39	0.21	7.22	32	500
	2/14/2017	0.18	120	55	0.17	7.30	60	550
	5/3/2017	0.19	86	66	0.16	7.41	45	460
	6/21/2017	0.18	85	58	0.18	7.60	47	540
	Pred. Limit*	**1.0**	**142**	**81**	**0.25**	**7.90-6.58**	**115**	**648**
	8/25/2017	0.56	86	41	0.18	7.41	63	490
	11/8/2017	0.57	130	38	0.12	6.69	61	640
	5/17/2018	0.15	88	50	0.12	6.7	48	540
	8/8/2018	0.14	86	48	0.13	6.8	43	430
	4/30/2019	0.07	78	54	0.17	7.2	27	450
	11/13/2019	0.52	95	47	0.18	7.51	41	390
MW-09 (S) up-gradient	11/18/2015	2.0	63	H 31	H 0.19	7.15	H 110	H 440
	2/25/2016	2.3	77	36	0.19	7.34	120	500
	5/19/2016	2.0	73	38	0.17	7.30	100	520
	8/17/2016	2.7	74	39	0.15	7.32	120	750
	11/17/2016	4.5	85	38	0.13	7.37	110	630
	2/15/2017	4.1	84	38	0.13	6.94	160	620
	5/3/2017	3.5	85	38	0.17	7.48	170	680
	6/21/2017	3.3	82	38	0.14	7.63	180	760
	Pred. Limit*	**6.19**	**103**	**39**	**0.24**	**7.99-6.64**	**236**	**1000**
	8/25/2017	3.8	85	36	0.14	7.30	150	630
	11/8/2017	4	89	37	0.13	6.92	190	650
	5/16/2018	4.1	89	36	0.15	7.83	180	550
	8/8/2018	4.3	86	39	0.14	7.31	180	690
	5/1/2019	4.6	79	37	0.17	7.11	170	640
	11/14/2019	2.5	85	36	0.18	7.49	82	500
MW-19 (S) up-gradient	11/18/2016	3.8	89	38	0.13	7.34	120	670
	2/15/2017	4.7	88	37	0.13	7.50	180	630
	5/5/2017	3.3	88	38	0.14	7.51	160	640
	6/21/2017	2.3	110	35	0.12	7.30	170	690
	8/28/2017	3.5	97	36	0.16	7.20	160	700
	11/6/2017	4.5	86	35	0.17	7.26	190	640
	5/14/2018	4.1	96	35	0.16	7.92	180	820
	8/6/2018	3.8	100	37	0.13	7.57	170	720
	Pred. Limit*	**6.2**	**121**	**41**	**0.20**	**8.20-6.70**	**236**	**890**
	5/2/2019	3.7	100	39	0.13	6.86	160	700
	11/13/2019	2.5	130	**53**	0.15	7.51	140	740
MW-08 (CL) down-gradient	11/18/2015	1.5	160	H 170	H 0.44	7.61	H 470	H 1300
	2/25/2016	1.7	160	200	0.30	7.00	280	1100
	5/18/2016	1.7	160	140	0.34	7.67	300	1200
	8/17/2016	1.0	150	230	0.35	7.33	360	1400
	11/15/2016	1.2	140	290	0.33	6.90	230	1300
	2/16/2017	1.5	150	460	0.28	7.00	230	1500
	5/2/2017	0.55	140	300	0.33	7.30	320	1300
	6/21/2017	1.2	160	490	0.30	7.27	350	1700
	Pred. Limit	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**1.2**	**150**	**360**	**0.47**	7.29	**300**	**1500**
	11/8/2017	0.68	130	**260**	**0.45**	7.27	**270**	**1200**
	5/17/2018	**1.2**	130	**200**	**0.37**	6.79	**170**	**1000**
	8/8/2018	**1.1**	140	**270**	**0.32**	6.93	**190**	**1200**
	5/1/2019	0.54	95	73	**0.35**	7.60	85	600
	11/13/2019	0.98	110	**92**	**0.33**	7.66	**110**	640

Notes: All units are in mg/l except pH is in standard units.
Pred. Limit - Prediction Limit
(S) - Sandy Unit
(CL) - Silty Clay Unit
* - Intrawell Prediction Limit. All others are interwell comparisons.
** - Based on pooled background from MW-01/MW-09. All others based on MW-01 as background.
Italics Date - Detection Monitoring and resample after statistical background establishment.

Bold - Potential statistically significant increase.
F1 - MS and/or MSD Recovery outside of limits.
H - Sample was prepped or analyzed beyond the specified holding time.
V- Serial dilution exceeds control limits.

Table 4. ASB/ABB Assessment Monitoring - Appendix III Groundwater Analytical Results through 2019 - Midwest Generation, LLC, Powerton Station, Pekin, IL.

Well	Date	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	Total Dissolved Solids
	11/18/2015	1.7	110	H 54	H 0.55	7.06	H 160	H 670
	2/26/2016	1.5	140	120	0.55	7.25	220	850
	5/20/2016	1.6	140	120	0.56	7.10	210	920
	8/17/2016	1.0	130	93	0.67	7.08	180	910
	11/17/2016	1.2	140	130	0.44	7.21	240	1100
	2/16/2017	1.6	140	110	0.40	6.62	260	910
MW-11	5/3/2017	1.3	160	160	0.42	7.36	440	1300
(S)	6/22/2017	1.2	140	120	0.60	7.21	260	1000
down-gradient	**Pred. Limit**	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**2.2**	130	**83**	**0.52**	7.23	**310**	**1100**
	11/9/2017	**1.5**	**140**	**100**	**0.59**	6.96	**230**	**970**
	5/16/2018	**2.0**	**140**	**88**	**0.61**	**7.89**	**270**	**1000**
	8/9/2018	**1.4**	**160**	**120**	**0.65**	7.24	**220**	**1000**
	5/1/2019	**2.3**	**110**	**60**	**0.62**	7.08	**200**	**730**
	11/14/2019	**1.8**	120	**83**	**0.55**	7.43	**150**	**890**
	11/19/2015	0.94	160	H 220	H 0.57	7.12	H 650	H 1400
	2/26/2016	0.42	130	200	0.40	7.96	530	1200
	5/20/2016	0.65	150	200	0.49	7.28	550	1400
	8/18/2016	0.69	170	200	0.49	7.06	620	1600
	11/18/2016	0.83	140	180	0.46	7.34	340	1300
	2/16/2017	0.48	140	190	0.37	7.54	630	1300
MW-12	5/3/2017	0.49	120	190	0.37	7.47	500	1200
(CL)	6/22/2017	0.50	130	190	0.48	7.36	580	1400
down-gradient	**Pred. Limit**	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	0.78	**140**	**180**	**0.52**	7.34	**520**	**1400**
	11/10/2017	0.94	**130**	**170**	**0.48**	7.38	**370**	**1200**
	5/16/2018	0.46	**100**	**180**	**0.47**	**8.12**	**720**	**1500**
	8/9/2018	0.61	**120**	**190**	**0.44**	7.42	**480**	**1300**
	5/1/2019	0.4	**100**	**170**	**0.38**	7.68	**330**	**1000**
	11/14/2019	0.74	120	**160**	**0.45**	7.61	**280**	**1100**
	11/18/2015	1.5	270	H 210	H 0.53	6.55	H 1400	H 2400
	2/25/2016	2.0	240	110	0.61	6.84	640	1700
	5/19/2016	2.7	320	240	0.53	6.83	1200	2800
	8/18/2016	1.5	200	F1 170	0.54	6.96	660	1900
	11/17/2016	1.3	120	180	0.47	6.91	560	1900
	2/17/2017	1.9	200	190	0.43	7.24	670	1700
MW-15	5/4/2017	1.5	180	190	0.57	7.35	670	1700
(CL)	6/21/2017	1.6	180	200	0.56	7.30	530	1600
down-gradient	**Pred. Limit**	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**2.2**	**190**	**200**	**0.53**	6.87	**540**	**1800**
	11/10/2017	**1.6**	**170**	**180**	**0.63**	7.09	**530**	**1500**
	5/17/2018	**2.3**	**200**	**160**	**0.5**	**6.75**	**680**	**1800**
	8/9/2018	**2.3**	**200**	**200**	**0.48**	7.06	**520**	**1700**
	5/2/2019	**1.5**	**180**	**200**	**0.52**	6.89	**420**	**1500**
	11/14/2019	**1.8**	**170**	**170**	**0.5**	7.24	**260**	**1300**
	11/19/2015	1.6	210	H 230	H 0.43	7.11	H 850	H 1800
	2/22/2016	1.8	290	280	0.55	7.19	960	2100
	5/18/2016	1.4	200	230	0.64	7.02	700	1800
	8/15/2016	1.1	220	220	0.60	7.08	860	2100
	11/14/2016	1.5	200	210	0.56	7.26	560	2000
	2/13/2017	1.6	190	230	0.56	6.84	770	1600
MW-17	5/4/2017	1.2	170	210	0.61	7.29	720	1500
(CL)	6/22/2017	0.95	150	230	0.72	7.38	580	1600
down-gradient	**Pred. Limit**	**1.0**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/29/2017	**1.4**	**190**	**230**	**0.64**	7.19	**640**	**1900**
	11/6/2017	**1.7**	**190**	**240**	**0.62**	7.27	**840**	**1800**
	5/14/2018	**1.6**	**170**	**220**	**0.6**	**7.79**	**800**	**1700**
	8/6/2018	**1.3**	**170**	**230**	**0.6**	7.12	**620**	**1600**
	4/29/2019	0.98	**150**	**190**	**0.66**	7.25	**660**	**1500**
	11/13/2019	1.9	**230**	**600**	**0.55**	7.16	**730**	**2300**
	11/19/2015	0.80	140	H 220	H 0.66	7.62	H 310	H 1200
	2/22/2016	0.76	150	220	0.68	7.06	310	1200
	5/18/2016	0.72	120	230	0.71	7.68	230	1200
	8/15/2016	0.67	130	210	0.64	7.52	330	1300
	11/18/2016	0.94	130	200	0.58	7.69	250	1300
	2/15/2017	0.56	140	190	0.50	7.81	340	1200
MW-18	5/5/2017	0.46	130	180	0.52	8.12	360	1100
(S)	6/21/2017	0.53	120	190	0.51	8.10	320	1200
down-gradient	**Pred. Limit**	**1.00**	**136**	**77**	**0.24****	**7.73-6.83****	**107**	**788****
	8/28/2017	0.65	120	**200**	**0.53**	**7.81**	**310**	**1200**
	11/6/2017	0.67	120	**190**	**0.57**	**7.74**	**400**	**1200**
	5/14/2018	0.57	130	**180**	**0.59**	**8.27**	**440**	**1200**
	8/6/2018	0.58	120	**230**	**0.57**	**7.88**	**270**	**1100**
	4/29/2019	0.54	120	**180**	**0.61**	**7.77**	**170**	**1000**
	11/13/2019	0.79	130	**180**	**0.56**	**8.26**	**210**	**1100**

Notes: All units are in mg/l except pH is in standard units.
Pred. Limit - Prediction Limit
(S) - Sandy Unit
(CL) - Silty Clay Unit
* - Intrawell Prediction Limit. All others are interwell comparisons.
** - Based on pooled background from MW-01/MW-09. All others based on MW-01 as background.
Italics Date - Detection Monitoring and resample after statistical background establishment.

Bold - Potential statistically significant increase.
F1 - MS and/or MSD Recovery outside of limits.
H - Sample was prepped or analyzed beyond the specified holding time.
V- Serial dilution exceeds control limits.

Appendix A
Analytical Data Packages from 2019 Assessment Monitoring

eurofins | Environment Testing
TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-162824-1
Client Project/Site: Powerton CCR

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Authorized for release by:
5/22/2019 9:30:12 AM

Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Job ID: 500-162824-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-162824-1

Comments
No additional comments.

Receipt
The samples were received on 5/4/2019 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 2.3º C, 3.7º C, 4.7º C and 5.3º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
Method(s) 375.4, SM 4500 SO4 E: Due to the concentration of sulfates in the parent sample, the MS/MSD was diluted after the spike. The spike amount was adjusted by the dilution factor.

(500-162824-F-13 MS) and (500-162824-F-13 MSD)

Method(s) 375.4, SM 4500 SO4 E: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for analytical batch 400-440971 were outside control limits. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits.

Method(s) 375.4, SM 4500 SO4 E: The following samples were diluted to bring the concentration of target analytes within the calibration range: MW-03 (500-162824-3), MW-05 (500-162824-5), MW-09 (500-162824-7), MW-11 (500-162824-9), MW-12 (500-162824-10), MW-15 (500-162824-11), MW-17 (500-162824-12), MW-18 (500-162824-13), MW-19 (500-162824-14), Duplicate (500-162824-15), (500-162824-F-13 MS) and (500-162824-F-13 MSD). Elevated reporting limits (RLs) are provided.

Method(s) 375.4, SM 4500 SO4 E: The following sample was diluted to bring the concentration of target analytes within the calibration range: MW-08 (500-162824-6). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-01

Lab Sample ID: 500-162824-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0014		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.039		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.070		0.050		mg/L	1		6020A	Total Recoverable
Calcium	78		0.20		mg/L	1		6020A	Total Recoverable
Lead	0.0017		0.00050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	450		10		mg/L	1		SM 2540C	Total/NA
Chloride	54		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.17		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	27		5.0		mg/L	1		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-02

Lab Sample ID: 500-162824-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0013		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.048		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.12		0.050		mg/L	1		6020A	Total Recoverable
Calcium	79		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	440		10		mg/L	1		SM 2540C	Total/NA
Chloride	48		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.16		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	30		5.0		mg/L	1		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-03

Lab Sample ID: 500-162824-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.060		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.28		0.050		mg/L	1		6020A	Total Recoverable
Calcium	74		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	390		10		mg/L	1		SM 2540C	Total/NA
Chloride	49		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.22		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	38		10		mg/L	2		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-04

Lab Sample ID: 500-162824-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.026		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.36		0.050		mg/L	1		6020A	Total Recoverable
Calcium	74		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	380		10		mg/L	1		SM 2540C	Total/NA
Chloride	48		2.0		mg/L	1		SM 4500 Cl- E	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-04 (Continued)

Lab Sample ID: 500-162824-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.25		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	35		5.0		mg/L	1		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-05

Lab Sample ID: 500-162824-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.041		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.56		0.050		mg/L	1		6020A	Total Recoverable
Calcium	84		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.0061		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	590		10		mg/L	1		SM 2540C	Total/NA
Chloride	73		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.36		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	120		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-08

Lab Sample ID: 500-162824-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.021		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0018		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.068		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.54		0.050		mg/L	1		6020A	Total Recoverable
Calcium	95		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.0069		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	600		10		mg/L	1		SM 2540C	Total/NA
Chloride	73		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.35		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	85		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-09

Lab Sample ID: 500-162824-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.038		0.0025		mg/L	1		6020A	Total Recoverable
Boron	4.6		0.50		mg/L	10		6020A	Total Recoverable
Calcium	79		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.031		0.0050		mg/L	1		6020A	Total Recoverable
Selenium	0.0036		0.0025		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	640		10		mg/L	1		SM 2540C	Total/NA
Chloride	37		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.17		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	170		25		mg/L	5		SM 4500 SO4 E	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-10 Lab Sample ID: 500-162824-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0023		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.27		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.35		0.050		mg/L	1		6020A	Total Recoverable
Calcium	92		0.20		mg/L	1		6020A	Total Recoverable
Cobalt	0.011		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.0028		0.00050		mg/L	1		6020A	Total Recoverable
Selenium	0.0037		0.0025		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	470		10		mg/L	1		SM 2540C	Total/NA
Chloride	50		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.22		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	30		5.0		mg/L	1		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-11 Lab Sample ID: 500-162824-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.11		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.60		0.0025		mg/L	1		6020A	Total Recoverable
Boron	2.3		0.25		mg/L	5		6020A	Total Recoverable
Calcium	110		0.20		mg/L	1		6020A	Total Recoverable
Cobalt	0.0026		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.0011		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.014		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	730		10		mg/L	1		SM 2540C	Total/NA
Chloride	60		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.62		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	200		50		mg/L	10		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-12 Lab Sample ID: 500-162824-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.014		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.041		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.13		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.40		0.050		mg/L	1		6020A	Total Recoverable
Cadmium	0.00054		0.00050		mg/L	1		6020A	Total Recoverable
Calcium	100		0.20		mg/L	1		6020A	Total Recoverable

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-12 (Continued)

Lab Sample ID: 500-162824-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lead	0.0012		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.011		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1000		10		mg/L	1		SM 2540C	Total/NA
Chloride	170		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.38		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	330		50		mg/L	10		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-15

Lab Sample ID: 500-162824-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.027		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0045		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.052		0.0025		mg/L	1		6020A	Total Recoverable
Boron	1.5		0.25		mg/L	5		6020A	Total Recoverable
Calcium	180		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.023		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1500		10		mg/L	1		SM 2540C	Total/NA
Chloride	200		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.52		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	420		150		mg/L	30		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-17

Lab Sample ID: 500-162824-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.015		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.042		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.040		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.98		0.050		mg/L	1		6020A	Total Recoverable
Cadmium	0.00052		0.00050		mg/L	1		6020A	Total Recoverable
Calcium	150		0.20		mg/L	1		6020A	Total Recoverable
Lead	0.00069		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.060		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1500		10		mg/L	1		SM 2540C	Total/NA
Chloride	190		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.66		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	660		150		mg/L	30		SM 4500 SO4 E	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-18

Lab Sample ID: 500-162824-13

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.013		0.010		mg/L	1		6010C	Total Recoverable
Barium	0.12		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.54		0.050		mg/L	1		6020A	Total Recoverable
Calcium	120		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1000		10		mg/L	1		SM 2540C	Total/NA
Chloride	180		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.61		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	170		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-19

Lab Sample ID: 500-162824-14

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.076		0.0025		mg/L	1		6020A	Total Recoverable
Boron	3.7		0.50		mg/L	10		6020A	Total Recoverable
Calcium	100		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.031		0.0050		mg/L	1		6020A	Total Recoverable
Selenium	0.0035		0.0025		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	700		10		mg/L	1		SM 2540C	Total/NA
Chloride	39		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.13		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	160		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: Duplicate

Lab Sample ID: 500-162824-15

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.024		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0021		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.052		0.0025		mg/L	1		6020A	Total Recoverable
Boron	1.6		0.25		mg/L	5		6020A	Total Recoverable
Calcium	190		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.024		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1500		10		mg/L	1		SM 2540C	Total/NA
Chloride	200		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.53		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	470		100		mg/L	20		SM 4500 SO4 E	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
6020A	Metals (ICP/MS)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CHI
SM 4500 Cl- E	Chloride, Total	SM	TAL CHI
SM 4500 F C	Fluoride	SM	TAL CHI
SM 4500 SO4 E	Sulfate, Total	SM	TAL PEN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CHI
7470A	Preparation, Mercury	SW846	TAL CHI

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Assest ID
500-162824-1	MW-01	Water	04/30/19 13:25	05/04/19 09:30	
500-162824-2	MW-02	Water	04/30/19 09:45	05/04/19 09:30	
500-162824-3	MW-03	Water	04/30/19 10:50	05/04/19 09:30	
500-162824-4	MW-04	Water	04/30/19 11:40	05/04/19 09:30	
500-162824-5	MW-05	Water	04/30/19 12:30	05/04/19 09:30	
500-162824-6	MW-08	Water	05/01/19 15:35	05/04/19 09:30	
500-162824-7	MW-09	Water	05/01/19 13:15	05/04/19 09:30	
500-162824-8	MW-10	Water	05/01/19 09:30	05/04/19 09:30	
500-162824-9	MW-11	Water	05/01/19 10:25	05/04/19 09:30	
500-162824-10	MW-12	Water	05/01/19 11:55	05/04/19 09:30	
500-162824-11	MW-15	Water	05/02/19 12:15	05/04/19 09:30	
500-162824-12	MW-17	Water	04/29/19 15:20	05/04/19 09:30	
500-162824-13	MW-18	Water	04/29/19 14:25	05/04/19 09:30	
500-162824-14	MW-19	Water	05/02/19 10:30	05/04/19 09:30	
500-162824-15	Duplicate	Water	04/29/19 00:00	05/04/19 09:30	

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-01

Date Collected: 04/30/19 13:25
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-1
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 18:33	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 02:37	1
Arsenic	**0.0014**		0.0010		mg/L		05/07/19 08:14	05/10/19 02:37	1
Barium	**0.039**		0.0025		mg/L		05/07/19 08:14	05/10/19 02:37	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:00	1
Boron	**0.070**		0.050		mg/L		05/07/19 08:14	05/10/19 18:00	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 02:37	1
Calcium	**78**		0.20		mg/L		05/07/19 08:14	05/10/19 02:37	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 02:37	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 02:37	1
Lead	**0.0017**		0.00050		mg/L		05/07/19 08:14	05/10/19 18:00	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 02:37	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 02:37	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 02:37	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:22	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**450**		10		mg/L			05/06/19 02:06	1
Chloride	**54**		2.0		mg/L			05/11/19 09:12	1
Fluoride	**0.17**		0.10		mg/L			05/11/19 13:06	1
Sulfate	**27**		5.0		mg/L			05/14/19 12:33	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-02

Lab Sample ID: 500-162824-2

Date Collected: 04/30/19 09:45
Matrix: Water
Date Received: 05/04/19 09:30

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 18:53	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:06	1
Arsenic	**0.0013**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:06	1
Barium	**0.048**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:06	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:30	1
Boron	**0.12**		0.050		mg/L		05/07/19 08:14	05/10/19 18:30	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:06	1
Calcium	**79**		0.20		mg/L		05/07/19 08:14	05/10/19 03:06	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:06	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:06	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 18:30	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:06	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:06	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:06	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**440**		10		mg/L			05/06/19 02:12	1
Chloride	**48**		2.0		mg/L			05/11/19 09:12	1
Fluoride	**0.16**		0.10		mg/L			05/13/19 20:22	1
Sulfate	**30**		5.0		mg/L			05/14/19 12:33	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-03

Date Collected: 04/30/19 10:50
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-3
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 18:57	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:10	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:10	1
Barium	**0.060**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:10	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:34	1
Boron	**0.28**		0.050		mg/L		05/07/19 08:14	05/10/19 18:34	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:10	1
Calcium	**74**		0.20		mg/L		05/07/19 08:14	05/10/19 03:10	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:10	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:10	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 18:34	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:10	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:10	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:10	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:29	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**390**		10		mg/L			05/06/19 02:14	1
Chloride	**49**		2.0		mg/L			05/17/19 22:02	1
Fluoride	**0.22**		0.10		mg/L			05/13/19 20:25	1
Sulfate	**38**		10		mg/L			05/14/19 13:57	2

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-04
Date Collected: 04/30/19 11:40
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-4
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:01	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:14	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:14	1
Barium	**0.026**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:14	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:38	1
Boron	**0.36**		0.050		mg/L		05/07/19 08:14	05/10/19 18:38	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:14	1
Calcium	**74**		0.20		mg/L		05/07/19 08:14	05/10/19 03:14	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:14	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:14	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 18:38	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:14	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:14	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:14	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**380**		10		mg/L			05/06/19 02:17	1
Chloride	**48**		2.0		mg/L			05/17/19 22:03	1
Fluoride	**0.25**		0.10		mg/L			05/13/19 20:28	1
Sulfate	**35**		5.0		mg/L			05/14/19 12:40	1

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-05
Date Collected: 04/30/19 12:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-5
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:05	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:19	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:19	1
Barium	**0.041**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:19	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:42	1
Boron	**0.56**		0.050		mg/L		05/07/19 08:14	05/10/19 18:42	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:19	1
Calcium	**84**		0.20		mg/L		05/07/19 08:14	05/10/19 03:19	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:19	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:19	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 18:42	1
Molybdenum	**0.0061**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:19	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:19	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:19	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:32	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**590**		10		mg/L			05/06/19 02:19	1
Chloride	**73**		2.0		mg/L			05/17/19 22:06	1
Fluoride	**0.36**		0.10		mg/L			05/13/19 20:31	1
Sulfate	**120**		25		mg/L			05/14/19 13:57	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-08

Date Collected: 05/01/19 15:35
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-6
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.021**		0.010		mg/L		05/07/19 08:14	05/07/19 19:09	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:23	1
Arsenic	**0.0018**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:23	1
Barium	**0.068**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:23	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 18:45	1
Boron	**0.54**		0.050		mg/L		05/07/19 08:14	05/10/19 18:45	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:23	1
Calcium	**95**		0.20		mg/L		05/07/19 08:14	05/10/19 03:23	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:23	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:23	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 18:45	1
Molybdenum	**0.0069**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:23	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:23	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:23	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**600**		10		mg/L			05/06/19 02:22	1
Chloride	**73**		2.0		mg/L			05/17/19 22:06	1
Fluoride	**0.35**		0.10		mg/L			05/13/19 20:34	1
Sulfate	**85**		25		mg/L			05/16/19 11:37	5

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-09 Lab Sample ID: 500-162824-7
Date Collected: 05/01/19 13:15 **Matrix: Water**
Date Received: 05/04/19 09:30

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:21	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:27	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:27	1
Barium	**0.038**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:27	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:42	1
Boron	**4.6**		0.50		mg/L		05/07/19 08:14	05/10/19 18:49	10
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:27	1
Calcium	**79**		0.20		mg/L		05/07/19 08:14	05/10/19 03:27	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:27	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:27	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 19:42	1
Molybdenum	**0.031**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:27	1
Selenium	**0.0036**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:27	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:27	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:40	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**640**		10		mg/L			05/06/19 02:25	1
Chloride	**37**		2.0		mg/L			05/17/19 20:32	1
Fluoride	**0.17**		0.10		mg/L			05/13/19 20:38	1
Sulfate	**170**		25		mg/L			05/14/19 14:02	5

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: MW-10
Date Collected: 05/01/19 09:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-8
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:25	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:39	1
Arsenic	**0.0023**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:39	1
Barium	**0.27**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:39	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:00	1
Boron	**0.35**		0.050		mg/L		05/07/19 08:14	05/10/19 19:00	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:39	1
Calcium	**92**		0.20		mg/L		05/07/19 08:14	05/10/19 03:39	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:39	1
Cobalt	**0.011**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:39	1
Lead	**0.0028**		0.00050		mg/L		05/07/19 08:14	05/10/19 19:00	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:39	1
Selenium	**0.0037**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:39	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:39	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**470**		10		mg/L			05/06/19 02:27	1
Chloride	**50**		2.0		mg/L			05/17/19 20:32	1
Fluoride	**0.22**		0.10		mg/L			05/13/19 20:41	1
Sulfate	**30**		5.0		mg/L			05/14/19 12:40	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-11

Lab Sample ID: 500-162824-9

Date Collected: 05/01/19 10:25
Date Received: 05/04/19 09:30

Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:29	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:44	1
Arsenic	**0.11**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:44	1
Barium	**0.60**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:44	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:46	1
Boron	**2.3**		0.25		mg/L		05/07/19 08:14	05/10/19 19:04	5
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:44	1
Calcium	**110**		0.20		mg/L		05/07/19 08:14	05/10/19 03:44	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:44	1
Cobalt	**0.0026**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:44	1
Lead	**0.0011**		0.00050		mg/L		05/07/19 08:14	05/10/19 19:46	1
Molybdenum	**0.014**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:44	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:44	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:44	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**730**		10		mg/L			05/06/19 02:30	1
Chloride	**60**		2.0		mg/L			05/17/19 20:33	1
Fluoride	**0.62**		0.10		mg/L			05/13/19 20:45	1
Sulfate	**200**		50		mg/L			05/14/19 14:06	10

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-12
Date Collected: 05/01/19 11:55
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-10
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.014**		0.010		mg/L		05/07/19 08:14	05/07/19 19:33	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:48	1
Arsenic	**0.041**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:48	1
Barium	**0.13**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:48	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:08	1
Boron	**0.40**		0.050		mg/L		05/07/19 08:14	05/10/19 19:08	1
Cadmium	**0.00054**		0.00050		mg/L		05/07/19 08:14	05/10/19 03:48	1
Calcium	**100**		0.20		mg/L		05/07/19 08:14	05/10/19 03:48	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:48	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:48	1
Lead	**0.0012**		0.00050		mg/L		05/07/19 08:14	05/10/19 19:08	1
Molybdenum	**0.011**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:48	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:48	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:48	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1000**		10		mg/L			05/06/19 02:32	1
Chloride	**170**		10		mg/L			05/17/19 20:57	5
Fluoride	**0.38**		0.10		mg/L			05/13/19 20:57	1
Sulfate	**330**		50		mg/L			05/14/19 14:06	10

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-15
Date Collected: 05/02/19 12:15
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-11
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.027**		0.010		mg/L		05/07/19 08:14	05/07/19 19:37	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:52	1
Arsenic	**0.0045**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:52	1
Barium	**0.052**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:52	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:49	1
Boron	**1.5**		0.25		mg/L		05/07/19 08:14	05/10/19 19:12	5
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 03:52	1
Calcium	**180**		0.20		mg/L		05/07/19 08:14	05/10/19 03:52	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:52	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:52	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 19:49	1
Molybdenum	**0.023**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:52	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:52	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:52	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1500**		10		mg/L			05/06/19 02:35	1
Chloride	**200**		10		mg/L			05/17/19 22:57	5
Fluoride	**0.52**		0.10		mg/L			05/13/19 21:00	1
Sulfate	**420**		150		mg/L			05/14/19 17:14	30

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-17
Date Collected: 04/29/19 15:20
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-12
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.015**		0.010		mg/L		05/07/19 08:14	05/07/19 19:42	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 03:56	1
Arsenic	**0.042**		0.0010		mg/L		05/07/19 08:14	05/10/19 03:56	1
Barium	**0.040**		0.0025		mg/L		05/07/19 08:14	05/10/19 03:56	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:16	1
Boron	**0.98**		0.050		mg/L		05/07/19 08:14	05/10/19 19:16	1
Cadmium	**0.00052**		0.00050		mg/L		05/07/19 08:14	05/10/19 03:56	1
Calcium	**150**		0.20		mg/L		05/07/19 08:14	05/10/19 03:56	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 03:56	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 03:56	1
Lead	**0.00069**		0.00050		mg/L		05/07/19 08:14	05/10/19 19:16	1
Molybdenum	**0.060**		0.0050		mg/L		05/07/19 08:14	05/10/19 03:56	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 03:56	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 03:56	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:52	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1500**		10		mg/L			05/06/19 02:37	1
Chloride	**190**		10		mg/L			05/17/19 22:57	5
Fluoride	**0.66**		0.10		mg/L			05/13/19 21:04	1
Sulfate	**660**		150		mg/L			05/15/19 10:19	30

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-18 Lab Sample ID: 500-162824-13

Date Collected: 04/29/19 14:25 **Matrix: Water**
Date Received: 05/04/19 09:30

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.013**		0.010		mg/L		05/07/19 08:14	05/07/19 19:46	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 04:00	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 04:00	1
Barium	**0.12**		0.0025		mg/L		05/07/19 08:14	05/10/19 04:00	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:19	1
Boron	**0.54**		0.050		mg/L		05/07/19 08:14	05/10/19 19:19	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 04:00	1
Calcium	**120**		0.20		mg/L		05/07/19 08:14	05/10/19 04:00	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 04:00	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 04:00	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 19:19	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 04:00	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 04:00	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 04:00	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:54	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1000**		10		mg/L			05/06/19 02:40	1
Chloride	**180**		10		mg/L			05/17/19 20:56	5
Fluoride	**0.61**		0.10		mg/L			05/13/19 21:07	1
Sulfate	**170**		25		mg/L			05/14/19 14:02	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-19

Date Collected: 05/02/19 10:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-14
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 19:50	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 04:04	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 04:04	1
Barium	**0.076**		0.0025		mg/L		05/07/19 08:14	05/10/19 04:04	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:53	1
Boron	**3.7**		0.50		mg/L		05/07/19 08:14	05/10/19 19:23	10
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 04:04	1
Calcium	**100**		0.20		mg/L		05/07/19 08:14	05/10/19 04:04	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 04:04	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 04:04	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 19:53	1
Molybdenum	**0.031**		0.0050		mg/L		05/07/19 08:14	05/10/19 04:04	1
Selenium	**0.0035**		0.0025		mg/L		05/07/19 08:14	05/10/19 04:04	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 04:04	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**700**		10		mg/L			05/06/19 02:43	1
Chloride	**39**		2.0		mg/L			05/17/19 20:27	1
Fluoride	**0.13**		0.10		mg/L			05/13/19 21:10	1
Sulfate	**160**		25		mg/L			05/14/19 14:06	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: Duplicate
Date Collected: 04/29/19 00:00
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-15
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.024**		0.010		mg/L		05/07/19 08:14	05/07/19 19:54	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 04:08	1
Arsenic	**0.0021**		0.0010		mg/L		05/07/19 08:14	05/10/19 04:08	1
Barium	**0.052**		0.0025		mg/L		05/07/19 08:14	05/10/19 04:08	1
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 19:57	1
Boron	**1.6**		0.25		mg/L		05/07/19 08:14	05/10/19 19:27	5
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 04:08	1
Calcium	**190**		0.20		mg/L		05/07/19 08:14	05/10/19 04:08	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 04:08	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 04:08	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 19:57	1
Molybdenum	**0.024**		0.0050		mg/L		05/07/19 08:14	05/10/19 04:08	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 04:08	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 04:08	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:57	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1500**		10		mg/L			05/06/19 02:45	1
Chloride	**200**		10		mg/L			05/17/19 20:56	5
Fluoride	**0.53**		0.10		mg/L			05/13/19 21:12	1
Sulfate	**470**		100		mg/L			05/15/19 10:19	20

Definitions/Glossary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Qualifiers

Metals

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Metals

Prep Batch: 483975

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total Recoverable	Water	3005A	
500-162824-2	MW-02	Total Recoverable	Water	3005A	
500-162824-3	MW-03	Total Recoverable	Water	3005A	
500-162824-4	MW-04	Total Recoverable	Water	3005A	
500-162824-5	MW-05	Total Recoverable	Water	3005A	
500-162824-6	MW-08	Total Recoverable	Water	3005A	
500-162824-7	MW-09	Total Recoverable	Water	3005A	
500-162824-8	MW-10	Total Recoverable	Water	3005A	
500-162824-9	MW-11	Total Recoverable	Water	3005A	
500-162824-10	MW-12	Total Recoverable	Water	3005A	
500-162824-11	MW-15	Total Recoverable	Water	3005A	
500-162824-12	MW-17	Total Recoverable	Water	3005A	
500-162824-13	MW-18	Total Recoverable	Water	3005A	
500-162824-14	MW-19	Total Recoverable	Water	3005A	
500-162824-15	Duplicate	Total Recoverable	Water	3005A	
MB 500-483975/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-483975/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
500-162824-1 MS	MW-01	Total Recoverable	Water	3005A	
500-162824-1 MSD	MW-01	Total Recoverable	Water	3005A	
500-162824-1 DU	MW-01	Total Recoverable	Water	3005A	

Analysis Batch: 484171

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total Recoverable	Water	6010C	483975
500-162824-2	MW-02	Total Recoverable	Water	6010C	483975
500-162824-3	MW-03	Total Recoverable	Water	6010C	483975
500-162824-4	MW-04	Total Recoverable	Water	6010C	483975
500-162824-5	MW-05	Total Recoverable	Water	6010C	483975
500-162824-6	MW-08	Total Recoverable	Water	6010C	483975
500-162824-7	MW-09	Total Recoverable	Water	6010C	483975
500-162824-8	MW-10	Total Recoverable	Water	6010C	483975
500-162824-9	MW-11	Total Recoverable	Water	6010C	483975
500-162824-10	MW-12	Total Recoverable	Water	6010C	483975
500-162824-11	MW-15	Total Recoverable	Water	6010C	483975
500-162824-12	MW-17	Total Recoverable	Water	6010C	483975
500-162824-13	MW-18	Total Recoverable	Water	6010C	483975
500-162824-14	MW-19	Total Recoverable	Water	6010C	483975
500-162824-15	Duplicate	Total Recoverable	Water	6010C	483975
MB 500-483975/1-A	Method Blank	Total Recoverable	Water	6010C	483975
LCS 500-483975/2-A	Lab Control Sample	Total Recoverable	Water	6010C	483975
500-162824-1 MS	MW-01	Total Recoverable	Water	6010C	483975
500-162824-1 MSD	MW-01	Total Recoverable	Water	6010C	483975
500-162824-1 DU	MW-01	Total Recoverable	Water	6010C	483975

Analysis Batch: 484720

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total Recoverable	Water	6020A	483975
500-162824-2	MW-02	Total Recoverable	Water	6020A	483975
500-162824-3	MW-03	Total Recoverable	Water	6020A	483975
500-162824-4	MW-04	Total Recoverable	Water	6020A	483975
500-162824-5	MW-05	Total Recoverable	Water	6020A	483975

Metals (Continued)

Analysis Batch: 484720 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-6	MW-08	Total Recoverable	Water	6020A	483975
500-162824-7	MW-09	Total Recoverable	Water	6020A	483975
500-162824-8	MW-10	Total Recoverable	Water	6020A	483975
500-162824-9	MW-11	Total Recoverable	Water	6020A	483975
500-162824-10	MW-12	Total Recoverable	Water	6020A	483975
500-162824-11	MW-15	Total Recoverable	Water	6020A	483975
500-162824-12	MW-17	Total Recoverable	Water	6020A	483975
500-162824-13	MW-18	Total Recoverable	Water	6020A	483975
500-162824-14	MW-19	Total Recoverable	Water	6020A	483975
500-162824-15	Duplicate	Total Recoverable	Water	6020A	483975
MB 500-483975/1-A	Method Blank	Total Recoverable	Water	6020A	483975
LCS 500-483975/2-A	Lab Control Sample	Total Recoverable	Water	6020A	483975
500-162824-1 MS	MW-01	Total Recoverable	Water	6020A	483975
500-162824-1 MSD	MW-01	Total Recoverable	Water	6020A	483975
500-162824-1 DU	MW-01	Total Recoverable	Water	6020A	483975

Analysis Batch: 484965

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total Recoverable	Water	6020A	483975
500-162824-2	MW-02	Total Recoverable	Water	6020A	483975
500-162824-3	MW-03	Total Recoverable	Water	6020A	483975
500-162824-4	MW-04	Total Recoverable	Water	6020A	483975
500-162824-5	MW-05	Total Recoverable	Water	6020A	483975
500-162824-6	MW-08	Total Recoverable	Water	6020A	483975
500-162824-7	MW-09	Total Recoverable	Water	6020A	483975
500-162824-7	MW-09	Total Recoverable	Water	6020A	483975
500-162824-8	MW-10	Total Recoverable	Water	6020A	483975
500-162824-9	MW-11	Total Recoverable	Water	6020A	483975
500-162824-9	MW-11	Total Recoverable	Water	6020A	483975
500-162824-10	MW-12	Total Recoverable	Water	6020A	483975
500-162824-11	MW-15	Total Recoverable	Water	6020A	483975
500-162824-11	MW-15	Total Recoverable	Water	6020A	483975
500-162824-12	MW-17	Total Recoverable	Water	6020A	483975
500-162824-13	MW-18	Total Recoverable	Water	6020A	483975
500-162824-14	MW-19	Total Recoverable	Water	6020A	483975
500-162824-14	MW-19	Total Recoverable	Water	6020A	483975
500-162824-15	Duplicate	Total Recoverable	Water	6020A	483975
500-162824-15	Duplicate	Total Recoverable	Water	6020A	483975
MB 500-483975/1-A	Method Blank	Total Recoverable	Water	6020A	483975
LCS 500-483975/2-A	Lab Control Sample	Total Recoverable	Water	6020A	483975
500-162824-1 MS	MW-01	Total Recoverable	Water	6020A	483975
500-162824-1 MSD	MW-01	Total Recoverable	Water	6020A	483975
500-162824-1 DU	MW-01	Total Recoverable	Water	6020A	483975

Prep Batch: 485450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	7470A	
500-162824-2	MW-02	Total/NA	Water	7470A	
500-162824-3	MW-03	Total/NA	Water	7470A	
500-162824-4	MW-04	Total/NA	Water	7470A	
500-162824-5	MW-05	Total/NA	Water	7470A	

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Metals (Continued)

Prep Batch: 485450 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-6	MW-08	Total/NA	Water	7470A	
500-162824-7	MW-09	Total/NA	Water	7470A	
500-162824-8	MW-10	Total/NA	Water	7470A	
500-162824-9	MW-11	Total/NA	Water	7470A	
500-162824-10	MW-12	Total/NA	Water	7470A	
500-162824-11	MW-15	Total/NA	Water	7470A	
500-162824-12	MW-17	Total/NA	Water	7470A	
500-162824-13	MW-18	Total/NA	Water	7470A	
500-162824-14	MW-19	Total/NA	Water	7470A	
500-162824-15	Duplicate	Total/NA	Water	7470A	
MB 500-485450/12-A	Method Blank	Total/NA	Water	7470A	
LCS 500-485450/13-A	Lab Control Sample	Total/NA	Water	7470A	
500-162824-6 MS	MW-08	Total/NA	Water	7470A	
500-162824-6 MSD	MW-08	Total/NA	Water	7470A	
500-162824-6 DU	MW-08	Total/NA	Water	7470A	

Analysis Batch: 485704

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	7470A	485450
500-162824-2	MW-02	Total/NA	Water	7470A	485450
500-162824-3	MW-03	Total/NA	Water	7470A	485450
500-162824-4	MW-04	Total/NA	Water	7470A	485450
500-162824-5	MW-05	Total/NA	Water	7470A	485450
500-162824-6	MW-08	Total/NA	Water	7470A	485450
500-162824-7	MW-09	Total/NA	Water	7470A	485450
500-162824-8	MW-10	Total/NA	Water	7470A	485450
500-162824-9	MW-11	Total/NA	Water	7470A	485450
500-162824-10	MW-12	Total/NA	Water	7470A	485450
500-162824-11	MW-15	Total/NA	Water	7470A	485450
500-162824-12	MW-17	Total/NA	Water	7470A	485450
500-162824-13	MW-18	Total/NA	Water	7470A	485450
500-162824-14	MW-19	Total/NA	Water	7470A	485450
500-162824-15	Duplicate	Total/NA	Water	7470A	485450
MB 500-485450/12-A	Method Blank	Total/NA	Water	7470A	485450
LCS 500-485450/13-A	Lab Control Sample	Total/NA	Water	7470A	485450
500-162824-6 MS	MW-08	Total/NA	Water	7470A	485450
500-162824-6 MSD	MW-08	Total/NA	Water	7470A	485450
500-162824-6 DU	MW-08	Total/NA	Water	7470A	485450

General Chemistry

Analysis Batch: 440971

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	SM 4500 SO4 E	
500-162824-2	MW-02	Total/NA	Water	SM 4500 SO4 E	
500-162824-3	MW-03	Total/NA	Water	SM 4500 SO4 E	
500-162824-4	MW-04	Total/NA	Water	SM 4500 SO4 E	
500-162824-5	MW-05	Total/NA	Water	SM 4500 SO4 E	
500-162824-7	MW-09	Total/NA	Water	SM 4500 SO4 E	
500-162824-8	MW-10	Total/NA	Water	SM 4500 SO4 E	
500-162824-9	MW-11	Total/NA	Water	SM 4500 SO4 E	

General Chemistry (Continued)

Analysis Batch: 440971 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-10	MW-12	Total/NA	Water	SM 4500 SO4 E	
500-162824-11	MW-15	Total/NA	Water	SM 4500 SO4 E	
500-162824-12	MW-17	Total/NA	Water	SM 4500 SO4 E	
500-162824-13	MW-18	Total/NA	Water	SM 4500 SO4 E	
500-162824-14	MW-19	Total/NA	Water	SM 4500 SO4 E	
500-162824-15	Duplicate	Total/NA	Water	SM 4500 SO4 E	
MB 400-440971/6	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 400-440971/7	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
MRL 400-440971/3	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
500-162824-13 MS	MW-18	Total/NA	Water	SM 4500 SO4 E	
500-162824-13 MSD	MW-18	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 441150

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-6	MW-08	Total/NA	Water	SM 4500 SO4 E	
MB 400-441150/6	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 400-441150/7	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
MRL 400-441150/3	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 483709

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	SM 2540C	
500-162824-2	MW-02	Total/NA	Water	SM 2540C	
500-162824-3	MW-03	Total/NA	Water	SM 2540C	
500-162824-4	MW-04	Total/NA	Water	SM 2540C	
500-162824-5	MW-05	Total/NA	Water	SM 2540C	
500-162824-6	MW-08	Total/NA	Water	SM 2540C	
500-162824-7	MW-09	Total/NA	Water	SM 2540C	
500-162824-8	MW-10	Total/NA	Water	SM 2540C	
500-162824-9	MW-11	Total/NA	Water	SM 2540C	
500-162824-10	MW-12	Total/NA	Water	SM 2540C	
500-162824-11	MW-15	Total/NA	Water	SM 2540C	
500-162824-12	MW-17	Total/NA	Water	SM 2540C	
500-162824-13	MW-18	Total/NA	Water	SM 2540C	
500-162824-14	MW-19	Total/NA	Water	SM 2540C	
500-162824-15	Duplicate	Total/NA	Water	SM 2540C	
MB 500-483709/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-483709/2	Lab Control Sample	Total/NA	Water	SM 2540C	
500-162824-1 DU	MW-01	Total/NA	Water	SM 2540C	

Analysis Batch: 484846

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	SM 4500 Cl- E	
500-162824-2	MW-02	Total/NA	Water	SM 4500 Cl- E	
MB 500-484846/83	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-484846/84	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 485004

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	SM 4500 F C	
MB 500-485004/31	Method Blank	Total/NA	Water	SM 4500 F C	

General Chemistry (Continued)

Analysis Batch: 485004 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-485004/32	Lab Control Sample	Total/NA	Water	SM 4500 F C	

Analysis Batch: 485172

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-2	MW-02	Total/NA	Water	SM 4500 F C	
500-162824-3	MW-03	Total/NA	Water	SM 4500 F C	
500-162824-4	MW-04	Total/NA	Water	SM 4500 F C	
500-162824-5	MW-05	Total/NA	Water	SM 4500 F C	
500-162824-6	MW-08	Total/NA	Water	SM 4500 F C	
500-162824-7	MW-09	Total/NA	Water	SM 4500 F C	
500-162824-8	MW-10	Total/NA	Water	SM 4500 F C	
500-162824-9	MW-11	Total/NA	Water	SM 4500 F C	
500-162824-10	MW-12	Total/NA	Water	SM 4500 F C	
500-162824-11	MW-15	Total/NA	Water	SM 4500 F C	
500-162824-12	MW-17	Total/NA	Water	SM 4500 F C	
500-162824-13	MW-18	Total/NA	Water	SM 4500 F C	
500-162824-14	MW-19	Total/NA	Water	SM 4500 F C	
500-162824-15	Duplicate	Total/NA	Water	SM 4500 F C	
MB 500-485172/31	Method Blank	Total/NA	Water	SM 4500 F C	
LCS 500-485172/32	Lab Control Sample	Total/NA	Water	SM 4500 F C	

Analysis Batch: 485974

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-7	MW-09	Total/NA	Water	SM 4500 Cl- E	
500-162824-8	MW-10	Total/NA	Water	SM 4500 Cl- E	
500-162824-9	MW-11	Total/NA	Water	SM 4500 Cl- E	
500-162824-10	MW-12	Total/NA	Water	SM 4500 Cl- E	
500-162824-13	MW-18	Total/NA	Water	SM 4500 Cl- E	
500-162824-14	MW-19	Total/NA	Water	SM 4500 Cl- E	
500-162824-15	Duplicate	Total/NA	Water	SM 4500 Cl- E	
MB 500-485974/4	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-485974/5	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 485996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-3	MW-03	Total/NA	Water	SM 4500 Cl- E	
500-162824-4	MW-04	Total/NA	Water	SM 4500 Cl- E	
500-162824-5	MW-05	Total/NA	Water	SM 4500 Cl- E	
500-162824-6	MW-08	Total/NA	Water	SM 4500 Cl- E	
500-162824-11	MW-15	Total/NA	Water	SM 4500 Cl- E	
500-162824-12	MW-17	Total/NA	Water	SM 4500 Cl- E	
MB 500-485996/9	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-485996/10	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
500-162824-4 MS	MW-04	Total/NA	Water	SM 4500 Cl- E	
500-162824-4 MSD	MW-04	Total/NA	Water	SM 4500 Cl- E	
500-162824-12 MS	MW-17	Total/NA	Water	SM 4500 Cl- E	
500-162824-12 MSD	MW-17	Total/NA	Water	SM 4500 Cl- E	

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 500-483975/1-A
Matrix: Water
Analysis Batch: 484171

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		05/07/19 08:14	05/07/19 18:13	1

Lab Sample ID: LCS 500-483975/2-A
Matrix: Water
Analysis Batch: 484171

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.500	0.544		mg/L		109	80 - 120

Lab Sample ID: 500-162824-1 MS
Matrix: Water
Analysis Batch: 484171

Client Sample ID: MW-01
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	<0.010		0.500	0.554		mg/L		111	75 - 125

Lab Sample ID: 500-162824-1 MSD
Matrix: Water
Analysis Batch: 484171

Client Sample ID: MW-01
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lithium	<0.010		0.500	0.557		mg/L		111	75 - 125	1	20

Lab Sample ID: 500-162824-1 DU
Matrix: Water
Analysis Batch: 484171

Client Sample ID: MW-01
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Lithium	<0.010		<0.010		mg/L		NC	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 500-483975/1-A
Matrix: Water
Analysis Batch: 484720

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		05/07/19 08:14	05/10/19 02:29	1
Arsenic	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 02:29	1
Barium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 02:29	1
Cadmium	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 02:29	1
Calcium	<0.20		0.20		mg/L		05/07/19 08:14	05/10/19 02:29	1
Chromium	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 02:29	1
Cobalt	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 02:29	1
Molybdenum	<0.0050		0.0050		mg/L		05/07/19 08:14	05/10/19 02:29	1
Selenium	<0.0025		0.0025		mg/L		05/07/19 08:14	05/10/19 02:29	1
Thallium	<0.0020		0.0020		mg/L		05/07/19 08:14	05/10/19 02:29	1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: MB 500-483975/1-A   **Client Sample ID: Method Blank**
Matrix: Water   **Prep Type: Total Recoverable**
Analysis Batch: 484965   **Prep Batch: 483975**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Beryllium	<0.0010		0.0010		mg/L		05/07/19 08:14	05/10/19 17:53	1
Boron	<0.050		0.050		mg/L		05/07/19 08:14	05/10/19 17:53	1
Lead	<0.00050		0.00050		mg/L		05/07/19 08:14	05/10/19 17:53	1

Lab Sample ID: LCS 500-483975/2-A   **Client Sample ID: Lab Control Sample**
Matrix: Water   **Prep Type: Total Recoverable**
Analysis Batch: 484720   **Prep Batch: 483975**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.500	0.504		mg/L		101	80 - 120
Arsenic	0.100	0.0997		mg/L		100	80 - 120
Barium	2.00	2.02		mg/L		101	80 - 120
Cadmium	0.0500	0.0516		mg/L		103	80 - 120
Calcium	10.0	10.0		mg/L		100	80 - 120
Chromium	0.200	0.195		mg/L		98	80 - 120
Cobalt	0.500	0.498		mg/L		100	80 - 120
Molybdenum	1.00	0.978		mg/L		98	80 - 120
Selenium	0.100	0.0994		mg/L		99	80 - 120
Thallium	0.100	0.0964		mg/L		96	80 - 120

Lab Sample ID: LCS 500-483975/2-A   **Client Sample ID: Lab Control Sample**
Matrix: Water   **Prep Type: Total Recoverable**
Analysis Batch: 484965   **Prep Batch: 483975**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	0.0500	0.0520		mg/L		104	80 - 120
Boron	1.00	0.983		mg/L		98	80 - 120
Lead	0.100	0.105		mg/L		105	80 - 120

Lab Sample ID: 500-162824-1 MS   **Client Sample ID: MW-01**
Matrix: Water   **Prep Type: Total Recoverable**
Analysis Batch: 484720   **Prep Batch: 483975**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	<0.0030		0.500	0.486		mg/L		97	75 - 125
Arsenic	0.0014		0.100	0.0971		mg/L		96	75 - 125
Barium	0.039		2.00	2.02		mg/L		99	75 - 125
Cadmium	<0.00050		0.0500	0.0496		mg/L		99	75 - 125
Calcium	78		10.0	87.8	4	mg/L		93	75 - 125
Chromium	<0.0050		0.200	0.192		mg/L		95	75 - 125
Cobalt	<0.0010		0.500	0.475		mg/L		95	75 - 125
Molybdenum	<0.0050		1.00	0.930		mg/L		93	75 - 125
Selenium	<0.0025		0.100	0.0958		mg/L		96	75 - 125
Thallium	<0.0020		0.100	0.0934		mg/L		93	75 - 125

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 500-162824-1 MS | **Client Sample ID: MW-01**
Matrix: Water | **Prep Type: Total Recoverable**
Analysis Batch: 484965 | **Prep Batch: 483975**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Beryllium	<0.0010		0.0500	0.0467		mg/L		93	75 - 125
Boron	0.070		1.00	0.965		mg/L		90	75 - 125
Lead	0.0017		0.100	0.102		mg/L		100	75 - 125

Lab Sample ID: 500-162824-1 MSD | **Client Sample ID: MW-01**
Matrix: Water | **Prep Type: Total Recoverable**
Analysis Batch: 484720 | **Prep Batch: 483975**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Antimony	<0.0030		0.500	0.485		mg/L		97	75 - 125	0	20
Arsenic	0.0014		0.100	0.0931		mg/L		92	75 - 125	4	20
Barium	0.039		2.00	1.97		mg/L		97	75 - 125	2	20
Cadmium	<0.00050		0.0500	0.0494		mg/L		99	75 - 125	0	20
Calcium	78		10.0	85.4	4	mg/L		70	75 - 125	3	20
Chromium	<0.0050		0.200	0.186		mg/L		92	75 - 125	3	20
Cobalt	<0.0010		0.500	0.459		mg/L		92	75 - 125	4	20
Molybdenum	<0.0050		1.00	0.914		mg/L		91	75 - 125	2	20
Selenium	<0.0025		0.100	0.0924		mg/L		92	75 - 125	4	20
Thallium	<0.0020		0.100	0.0910		mg/L		91	75 - 125	3	20

Lab Sample ID: 500-162824-1 MSD | **Client Sample ID: MW-01**
Matrix: Water | **Prep Type: Total Recoverable**
Analysis Batch: 484965 | **Prep Batch: 483975**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Beryllium	<0.0010		0.0500	0.0476		mg/L		95	75 - 125	2	20
Boron	0.070		1.00	0.976		mg/L		91	75 - 125	1	20
Lead	0.0017		0.100	0.103		mg/L		101	75 - 125	1	20

Lab Sample ID: 500-162824-1 DU | **Client Sample ID: MW-01**
Matrix: Water | **Prep Type: Total Recoverable**
Analysis Batch: 484720 | **Prep Batch: 483975**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Antimony	<0.0030		<0.0030		mg/L		NC	20
Arsenic	0.0014		0.00143		mg/L		5	20
Barium	0.039		0.0380		mg/L		3	20
Cadmium	<0.00050		<0.00050		mg/L		NC	20
Calcium	78		76.5		mg/L		3	20
Chromium	<0.0050		<0.0050		mg/L		NC	20
Cobalt	<0.0010		<0.0010		mg/L		NC	20
Molybdenum	<0.0050		<0.0050		mg/L		NC	20
Selenium	<0.0025		<0.0025		mg/L		NC	20
Thallium	<0.0020		<0.0020		mg/L		NC	20

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 500-162824-1 DU
Matrix: Water
Analysis Batch: 484965

Client Sample ID: MW-01
Prep Type: Total Recoverable
Prep Batch: 483975

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Beryllium	<0.0010		<0.0010		mg/L		NC	20
Boron	0.070		0.0576		mg/L		19	20
Lead	0.0017		0.00164		mg/L		4	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-485450/12-A
Matrix: Water
Analysis Batch: 485704

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 485450

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		05/15/19 10:20	05/16/19 08:09	1

Lab Sample ID: LCS 500-485450/13-A
Matrix: Water
Analysis Batch: 485704

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 485450

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00200	0.00200		mg/L		100	80 - 120

Lab Sample ID: 500-162824-6 MS
Matrix: Water
Analysis Batch: 485704

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 485450

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	<0.00020		0.00100	0.00101		mg/L		101	75 - 125

Lab Sample ID: 500-162824-6 MSD
Matrix: Water
Analysis Batch: 485704

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 485450

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	<0.00020		0.00100	0.000965		mg/L		96	75 - 125	4	20

Lab Sample ID: 500-162824-6 DU
Matrix: Water
Analysis Batch: 485704

Client Sample ID: MW-08
Prep Type: Total/NA
Prep Batch: 485450

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Mercury	<0.00020		<0.00020		mg/L		NC	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 500-483709/1
Matrix: Water
Analysis Batch: 483709

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			05/06/19 01:54	1

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 500-483709/2
Matrix: Water
Analysis Batch: 483709

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	250	274		mg/L		110	80 - 120

Lab Sample ID: 500-162824-1 DU
Matrix: Water
Analysis Batch: 483709

Client Sample ID: MW-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Dissolved Solids	450		434		mg/L		3	5

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-484846/83
Matrix: Water
Analysis Batch: 484846

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			05/11/19 08:50	1

Lab Sample ID: LCS 500-484846/84
Matrix: Water
Analysis Batch: 484846

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.7		mg/L		101	85 - 115

Lab Sample ID: MB 500-485974/4
Matrix: Water
Analysis Batch: 485974

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			05/17/19 20:11	1

Lab Sample ID: LCS 500-485974/5
Matrix: Water
Analysis Batch: 485974

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.4		mg/L		101	85 - 115

Lab Sample ID: MB 500-485996/9
Matrix: Water
Analysis Batch: 485996

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			05/17/19 21:52	1

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Method: SM 4500 Cl- E - Chloride, Total (Continued)

Lab Sample ID: LCS 500-485996/10
Matrix: Water
Analysis Batch: 485996

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride			50.0	51.5		mg/L		103	85 - 115		

Lab Sample ID: 500-162824-4 MS
Matrix: Water
Analysis Batch: 485996

Client Sample ID: MW-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride	48		50.0	90.2		mg/L		84	75 - 125		

Lab Sample ID: 500-162824-4 MSD
Matrix: Water
Analysis Batch: 485996

Client Sample ID: MW-04
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	48		50.0	93.7		mg/L		91	75 - 125	4	20

Lab Sample ID: 500-162824-12 MS
Matrix: Water
Analysis Batch: 485996

Client Sample ID: MW-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride	190		50.0	228		mg/L		83	75 - 125		

Lab Sample ID: 500-162824-12 MSD
Matrix: Water
Analysis Batch: 485996

Client Sample ID: MW-17
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	190		50.0	226		mg/L		77	75 - 125	1	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-485004/31
Matrix: Water
Analysis Batch: 485004

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.10		0.10		mg/L			05/11/19 12:57	1

Lab Sample ID: LCS 500-485004/32
Matrix: Water
Analysis Batch: 485004

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Fluoride			10.0	10.5		mg/L		105	80 - 120		

Method: SM 4500 F C - Fluoride (Continued)

Lab Sample ID: MB 500-485172/31 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 485172

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.10		0.10		mg/L			05/13/19 19:45	1

Lab Sample ID: LCS 500-485172/32 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 485172

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride			10.0	10.4		mg/L		104	80 - 120

Method: SM 4500 SO4 E - Sulfate, Total

Lab Sample ID: MB 400-440971/6 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 440971

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			05/14/19 12:26	1

Lab Sample ID: LCS 400-440971/7 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 440971

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate			15.0	14.4		mg/L		96	90 - 110

Lab Sample ID: MRL 400-440971/3 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 440971

Analyte			Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate			5.00	<5.0		mg/L		87	50 - 150

Lab Sample ID: 500-162824-13 MS **Client Sample ID: MW-18**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 440971

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	170		10.0	173	4	mg/L		20	77 - 128

Lab Sample ID: 500-162824-13 MSD **Client Sample ID: MW-18**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 440971

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	170		10.0	172	4	mg/L		12	77 - 128	0	5

QC Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Method: SM 4500 SO4 E - Sulfate, Total (Continued)

Lab Sample ID: MB 400-441150/6 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 441150

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			05/16/19 11:01	1

Lab Sample ID: LCS 400-441150/7 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 441150

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	15.0	14.3		mg/L		95	90 - 110

Lab Sample ID: MRL 400-441150/3 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 441150

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	5.00	<5.0		mg/L		95	50 - 150

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-01 Lab Sample ID: 500-162824-1

Date Collected: 04/30/19 13:25 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 18:33	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:00	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 02:37	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:22	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:06	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	484846	05/11/19 09:12	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485004	05/11/19 13:06	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		1	440971	05/14/19 12:33	RRC	TAL PEN

Client Sample ID: MW-02 Lab Sample ID: 500-162824-2

Date Collected: 04/30/19 09:45 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 18:53	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:30	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:06	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:28	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:12	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	484846	05/11/19 09:12	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:22	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		1	440971	05/14/19 12:33	RRC	TAL PEN

Client Sample ID: MW-03 Lab Sample ID: 500-162824-3

Date Collected: 04/30/19 10:50 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 18:57	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:34	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:10	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:29	MJG	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-03 Lab Sample ID: 500-162824-3
Date Collected: 04/30/19 10:50 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:14	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485996	05/17/19 22:02	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:25	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		2	440971	05/14/19 13:57	RRC	TAL PEN

Client Sample ID: MW-04 Lab Sample ID: 500-162824-4
Date Collected: 04/30/19 11:40 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:01	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:38	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:14	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:31	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:17	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485996	05/17/19 22:03	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:28	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		1	440971	05/14/19 12:40	RRC	TAL PEN

Client Sample ID: MW-05 Lab Sample ID: 500-162824-5
Date Collected: 04/30/19 12:30 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:05	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:42	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:19	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:32	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:19	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485996	05/17/19 22:06	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:31	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	440971	05/14/19 13:57	RRC	TAL PEN

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-08 Lab Sample ID: 500-162824-6

Date Collected: 05/01/19 15:35 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:09	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 18:45	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:23	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:34	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:22	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485996	05/17/19 22:06	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:34	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	441150	05/16/19 11:37	RRC	TAL PEN

Client Sample ID: MW-09 Lab Sample ID: 500-162824-7

Date Collected: 05/01/19 13:15 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:21	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		10	484965	05/10/19 18:49	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:42	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:27	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:40	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:25	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485974	05/17/19 20:32	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:38	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	440971	05/14/19 14:02	RRC	TAL PEN

Client Sample ID: MW-10 Lab Sample ID: 500-162824-8

Date Collected: 05/01/19 09:30 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:25	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:00	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:39	FXG	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-162824-1
Project/Site: Powerton CCR

Client Sample ID: MW-10 Lab Sample ID: 500-162824-8
Date Collected: 05/01/19 09:30 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:42	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:27	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485974	05/17/19 20:32	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:41	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		1	440971	05/14/19 12:40	RRC	TAL PEN

Client Sample ID: MW-11 Lab Sample ID: 500-162824-9
Date Collected: 05/01/19 10:25 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:29	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		5	484965	05/10/19 19:04	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:46	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:44	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:48	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:30	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485974	05/17/19 20:33	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:45	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	440971	05/14/19 14:06	RRC	TAL PEN

Client Sample ID: MW-12 Lab Sample ID: 500-162824-10
Date Collected: 05/01/19 11:55 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:33	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:08	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:48	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:49	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:32	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	485974	05/17/19 20:57	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 20:57	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	440971	05/14/19 14:06	RRC	TAL PEN

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-15

Lab Sample ID: 500-162824-11

Date Collected: 05/02/19 12:15
Date Received: 05/04/19 09:30

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:37	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		5	484965	05/10/19 19:12	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:49	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:52	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:51	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:35	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	485996	05/17/19 22:57	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 21:00	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		30	440971	05/14/19 17:14	RRC	TAL PEN

Client Sample ID: MW-17

Lab Sample ID: 500-162824-12

Date Collected: 04/29/19 15:20
Date Received: 05/04/19 09:30

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:42	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:16	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 03:56	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:52	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:37	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	485996	05/17/19 22:57	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 21:04	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		30	440971	05/15/19 10:19	RRC	TAL PEN

Client Sample ID: MW-18

Lab Sample ID: 500-162824-13

Date Collected: 04/29/19 14:25
Date Received: 05/04/19 09:30

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:46	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:19	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 04:00	FXG	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: MW-18

Lab Sample ID: 500-162824-13
Date Collected: 04/29/19 14:25
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:54	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:40	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	485974	05/17/19 20:56	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 21:07	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	440971	05/14/19 14:02	RRC	TAL PEN

Client Sample ID: MW-19

Lab Sample ID: 500-162824-14
Date Collected: 05/02/19 10:30
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:50	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		10	484965	05/10/19 19:23	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:53	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 04:04	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:55	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:43	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	485974	05/17/19 20:27	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 21:10	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	440971	05/14/19 14:06	RRC	TAL PEN

Client Sample ID: Duplicate

Lab Sample ID: 500-162824-15
Date Collected: 04/29/19 00:00
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6010C		1	484171	05/07/19 19:54	EEN	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		5	484965	05/10/19 19:27	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484965	05/10/19 19:57	FXG	TAL CHI
Total Recoverable	Prep	3005A			483975	05/07/19 08:14	SAH	TAL CHI
Total Recoverable	Analysis	6020A		1	484720	05/10/19 04:08	FXG	TAL CHI
Total/NA	Prep	7470A			485450	05/15/19 10:20	MJG	TAL CHI
Total/NA	Analysis	7470A		1	485704	05/16/19 08:57	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	483709	05/06/19 02:45	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	485974	05/17/19 20:56	EAT	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Client Sample ID: Duplicate
Date Collected: 04/29/19 00:00
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-15
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 4500 F C		1	485172	05/13/19 21:12	EAT	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		20	440971	05/15/19 10:19	RRC	TAL PEN

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Accreditation/Certification Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-1

Laboratory: Eurofins TestAmerica, Chicago

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Illinois	NELAP	5	100201	05-30-19 *

Laboratory: Eurofins TestAmerica, Pensacola

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alabama	State Program	4	40150	06-30-19
ANAB	ISO/IEC 17025		L2471	02-22-20
Arizona	State Program	9	AZ0710	01-12-20
Arkansas DEQ	State Program	6	88-0689	09-01-19
California	State Program	9	2510	06-30-19
Florida	NELAP	4	E81010	06-30-19
Georgia	State Program	4	E81010 (FL)	06-30-19
Illinois	NELAP	5	200041	10-09-19
Iowa	State Program	7	367	08-01-20
Kansas	NELAP	7	E-10253	10-31-19
Kentucky (UST)	State Program	4	53	06-30-19
Kentucky (WW)	State Program	4	98030	12-31-19
Louisiana	NELAP	6	30976	06-30-19
Louisiana (DW)	NELAP	6	LA017	12-31-19
Maryland	State Program	3	233	09-30-19
Massachusetts	State Program	1	M-FL094	06-30-19
Michigan	State Program	5	9912	06-30-19
New Jersey	NELAP	2	FL006	06-30-19
North Carolina (WW/SW)	State Program	4	314	12-31-19
Oklahoma	State Program	6	9810	08-31-19
Pennsylvania	NELAP	3	68-00467	01-31-20
Rhode Island	State Program	1	LAO00307	12-30-19
South Carolina	State Program	4	96026	06-30-19
Tennessee	State Program	4	TN02907	06-30-19
Texas	NELAP	6	T104704286-18-15	09-30-19
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-18-00148	05-17-21
Virginia	NELAP	3	460166	06-14-19
Washington	State Program	10	C915	05-15-20
West Virginia DEP	State Program	3	136	07-31-19

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL
Phone: 708.534.5200 Fax: 708.5

500-162824 COC

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-162824

Chain of Custody Number:

Page 1 of 2

Temperature °C of Cooler: 3.7, 4.7, 2.3 5.3

Client: KPRG and Assoc.
Client Project #: 12313.1
Project Name: NRG Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Cl, Fl, SO4, TDS (Preservative 8)	Rad 226/228 (Preservative 3)							Comments
1		MW-01	4/30	1325	5	W	X	X	X							
2		MW-02	4/30	0945	↓	↓	↓	↓	↓							
3		MW-03	4/30	1050												
4		MW-04	4/30	1140												
5		MW-05	4/30	1230												
6		MW-08	5/1	1535												
7		MW-09	5/1	1315												
8		MW-10	5/1	0930												
9		MW-11	5/1	1025												
10		MW-12	5/1	1155												

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
__ 1 Day __ 2 Days __ 5 Days __ 7 Days __ 10 Days __ 15 Days ____ Other
Requested Due Date ____________

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	5/2/2019	1700	FEDEX		5/2/2019	1700
				Neil Fioravanti	TACHS	05/04/19	0930

Lab Courier:
Shipped: FX Saturday
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

5/22/2019

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-162824
Chain of Custody Number:
Page 2 of 2
Temperature °C of Cooler: 3.7/4.7, 2.3, 5.3

Client: KPRG and Assoc.
Client Project #: 12313.1
Project Name: NRG Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Cl, Fl, SO4, TDS (Preservative 8)	Rad 226/228 (Preservative 3)							Comments
11		MW-15	5/2	1215	5	W	↓	↓	↓							
12		MW-17	4/29	1520	↓	↓	↓	↓	↓							
13		MW-18	4/29	1425	↓	↓	↓	↓	↓							
14		MW-19	5/2	1030	↓	↓	↓	↓	↓							
15		DUPLICATE	–	–	↓	↓	↓	↓	↓							

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
__ 1 Day __ 2 Days __ 5 Days __ 7 Days __ 10 Days __ 15 Days __ Other
Requested Due Date ____

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for __ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	5/2/2019	1700	FEDEX		5/2/2019	1700
				Neil Fioravanti	TAL-UP	05/04/19	0930

Lab Courier:
Shipped: FX/Saturday
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 61.40 LB
CAD: 006894780/SSFE2002
DIMS: 24x14x14 IN

BILL THIRD PARTY

TO ERIC LANG
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484

500-162824 Waybill

(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx Express

E

REL# 3765346

J191019010701av

Part # 156297-435 RRDYXE2EXP 11/19

SATURDAY 4:30P
** 2DAY **

8 of 9
MPS# 0263 7870 1648 7850
Mstr# 7870 1648 7780 0201

SO JOTA

60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 64.10 LB
CAD: 006894- SSFE2002
DIMS: 24

BIL

TO ERIC LANG
TEST AMERICA
2417 BOND ST

RT 717
ST 11
5 16:30
A
7780
05.04

UNIVERSITY PARK

(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx Express

E

REL# 3765346

J191019010701av

Part # 156297-435 RRDYXE2EXP 11/19

SATURDAY 4:30P
** 2DAY **

1 of 9
TRK# 0201 7870 1648 7780
MASTER

SO JOTA

60484
IL-US ORD

Std TC-1, Page 1 of 1

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 57.70 LB
CAD: 006994780/SSFE2002
DIMS: 24x14x14 IN
BILL THIRD PARTY

TO ERIC LANG
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx Express

E

REL# 3765346

J19101901070uv

6 of 9
MPS# 7870 1648 7838
0263
Mstr# 7870 1648 7780
0201

SATURDAY 4:30P
** 2DAY **

SO JOTA
60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 60.00 LB
CAD: 006994780/SSFE2002
DIMS: 24x14x14 IN
BILL THIRD PARTY

Part # 156297

TO ERIC LANG
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx Express

E

REL# 3765346

5 of 9
MPS# 7870 1648 7827
0263
Mstr# 7870 1648 7780
0201

SATURDAY 4:30P
** 2DAY **

SO JOTA
60484
IL-US ORD

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-120630.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-162824-1
Address: 3355 McLemore Drive,	Due Date Requested: 5/17/2019	**Analysis Requested**		**Preservation Codes:**
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			Other:

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM4500_SO4_E	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X		X	
MW-01 (500-162824-1)	4/30/19	13:25 Central		Water			X	1	
MW-02 (500-162824-2)	4/30/19	09:45 Central		Water			X	1	
MW-03 (500-162824-3)	4/30/19	10:50 Central		Water			X	1	
MW-04 (500-162824-4)	4/30/19	11:40 Central		Water			X	1	
MW-05 (500-162824-5)	4/30/19	12:30 Central		Water			X	1	
MW-08 (500-162824-6)	5/1/19	15:35 Central		Water			X	1	
MW-09 (500-162824-7)	5/1/19	13:15 Central		Water			X	1	
MW-10 (500-162824-8)	5/1/19	09:30 Central		Water			X	1	
MW-11 (500-162824-9)	5/1/19	10:25 Central		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification Unconfirmed	*Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)* ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 5/6/19 1500	Company: TA	Received by: Kathy R Auer	Date/Time: 5-7-19 851	Company: TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 0.9°C IR 7		

Ver: 01/16/2019

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-120630.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-162824-1
Address: 3355 McLemore Drive,	Due Date Requested: 5/17/2019	Analysis Requested		Preservation Codes:
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			Other:

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM4500_SO4_E	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-12 (500-162824-10)	5/1/19	11:55 Central		Water			X	1	
MW-15 (500-162824-11)	5/2/19	12:15 Central		Water			X	1	
MW-17 (500-162824-12)	4/29/19	15:20 Central		Water			X	1	
MW-18 (500-162824-13)	4/29/19	14:25 Central		Water			X	1	
MW-19 (500-162824-14)	5/2/19	10:30 Central		Water			X	1	
Duplicate (500-162824-15)	4/29/19	Central		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. I

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ________ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
D. Kuklinski [signature]	5/6/19 1500	TA	Kathy R Auer [signature]	5-7-19 851	TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 0.9°C IR7

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.
Job Number: 500-162824-1

Login Number: 162824
List Source: Eurofins TestAmerica, Chicago
List Number: 1
Creator: Scott, Sherri L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.7,4.7,5.3,2.3
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. Job Number: 500-162824-1

Login Number: 162824
List Number: 2
Creator: Avery, Kathy R

List Source: Eurofins TestAmerica, Pensacola
List Creation: 05/07/19 05:40 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	Not Present
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.9°C IR 7
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-162824-2
Client Project/Site: Powerton CCR

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Authorized for release by:
8/15/2019 1:57:27 PM

Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Job ID: 500-162824-2

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-162824-2

Comments
No additional comments.

Receipt
The samples were received on 5/4/2019 9:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 2.3º C, 3.7º C, 4.7º C and 5.3º C.

RAD
Method(s) 904.0, 9320: Ra-228 Prep Batch 160-430397
The Ra-228 recovery in the LCS was slightly low (72) outside QC limits (75%-125%) indicating a potential slight low bias to the sample results. The barium recovery in the LCS (107%) and the Replicate Error Ratio (RER) were within limits demonstrating acceptable method performance.
MW-01 (500-162824-1), MW-02 (500-162824-2), MW-03 (500-162824-3), MW-04 (500-162824-4), MW-05 (500-162824-5), MW-08 (500-162824-6), MW-09 (500-162824-7), MW-10 (500-162824-8), MW-11 (500-162824-9), (LCS 160-430397/1-A), (MB 160-430397/23-A) and (500-162824-C-1-B DU)

Method(s) PrecSep_0: Radium 228 Prep Batch 160-430139
The following samples had yellow discoloration:MW-12 (500-162824-10), MW-17 (500-162824-12) and MW-18 (500-162824-13). Sample 500-162824-C-10 had brown solids.

Method(s) PrecSep_0: Radium 228 Prep Batch 160-430397
The following samples were prepared at a reduced aliquot due to cloudy discoloration: MW-10 (500-162824-8) and MW-11 (500-162824-9).

Method(s) PrecSep-21: Radium 226 Prep Batch 160-430133
The following samples had white discoloration:MW-12 (500-162824-10), MW-17 (500-162824-12) and MW-18 (500-162824-13). Sample 500-162824-C-10 had brown solids.

Method(s) PrecSep-21: Radium 226 Prep Batch 160-430235
The following samples were prepared at a reduced aliquot due to cloudy discoloration: MW-10 (500-162824-8) and MW-11 (500-162824-9).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-162824-1	MW-01	Water	04/30/19 13:25	05/04/19 09:30	
500-162824-2	MW-02	Water	04/30/19 09:45	05/04/19 09:30	
500-162824-3	MW-03	Water	04/30/19 10:50	05/04/19 09:30	
500-162824-4	MW-04	Water	04/30/19 11:40	05/04/19 09:30	
500-162824-5	MW-05	Water	04/30/19 12:30	05/04/19 09:30	
500-162824-6	MW-08	Water	05/01/19 15:35	05/04/19 09:30	
500-162824-7	MW-09	Water	05/01/19 13:15	05/04/19 09:30	
500-162824-8	MW-10	Water	05/01/19 09:30	05/04/19 09:30	
500-162824-9	MW-11	Water	05/01/19 10:25	05/04/19 09:30	
500-162824-10	MW-12	Water	05/01/19 11:55	05/04/19 09:30	
500-162824-11	MW-15	Water	05/02/19 12:15	05/04/19 09:30	
500-162824-12	MW-17	Water	04/29/19 15:20	05/04/19 09:30	
500-162824-13	MW-18	Water	04/29/19 14:25	05/04/19 09:30	
500-162824-14	MW-19	Water	05/02/19 10:30	05/04/19 09:30	
500-162824-15	Duplicate	Water	04/29/19 00:00	05/04/19 09:30	

Client Sample Results

Client Sample ID: MW-01
Lab Sample ID: 500-162824-1

Date Collected: 04/30/19 13:25
Matrix: Water
Date Received: 05/04/19 09:30

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0249	U	0.0545	0.0545	1.00	0.121	pCi/L	05/30/19 10:35	08/13/19 21:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.1*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:10*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.000	U *	0.369	0.369	1.00	0.656	pCi/L	05/31/19 10:52	07/23/19 14:24	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.1*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:24*	*1*
Y Carrier	*75.5*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:24*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.0249	U	0.373	0.373	5.00	0.656	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-02
Date Collected: 04/30/19 09:45
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-2
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0445	U	0.0705	0.0707	1.00	0.121	pCi/L	05/30/19 10:35	08/13/19 21:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.5*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:10*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.171	U *	0.262	0.262	1.00	0.441	pCi/L	05/31/19 10:52	07/23/19 14:25	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.5*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:25*	*1*
Y Carrier	*76.6*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:25*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.215	U	0.271	0.271	5.00	0.441	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-03
Date Collected: 04/30/19 10:50
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-3
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0298	U	0.0613	0.0613	1.00	0.111	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.0*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0589	U *	0.366	0.366	1.00	0.668	pCi/L	05/31/19 10:52	07/23/19 14:25	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.0*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:25*	*1*
Y Carrier	*73.3*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:25*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.0291	U	0.371	0.371	5.00	0.668	pCi/L		08/15/19 09:45	1

Client Sample Results

Client Sample ID: MW-04
Lab Sample ID: 500-162824-4

Date Collected: 04/30/19 11:40
Matrix: Water
Date Received: 05/04/19 09:30

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0600	U	0.0531	0.0534	1.00	0.130	pCi/L	05/30/19 10:35	08/14/19 06:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.6*		*40 - 110*	*05/30/19 10:35*	*08/14/19 06:57*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.260	U *	0.408	0.409	1.00	0.684	pCi/L	05/31/19 10:52	07/23/19 14:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.6*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*
Y Carrier	*80.4*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.200	U	0.411	0.412	5.00	0.684	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-05
Date Collected: 04/30/19 12:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-5
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.115	U	0.0338	0.0354	1.00	0.136	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.7*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.325	U *	0.427	0.428	1.00	0.709	pCi/L	05/31/19 10:52	07/23/19 14:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.7*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*
Y Carrier	*77.8*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.209	U	0.428	0.429	5.00	0.709	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-08

Date Collected: 05/01/19 15:35
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-6
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0735	U	0.0635	0.0638	1.00	0.0942	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.1*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.819**	*****	0.427	0.433	1.00	0.639	pCi/L	05/31/19 10:52	07/23/19 14:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.1*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*
Y Carrier	*74.4*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.892**		0.432	0.438	5.00	0.639	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-09

Date Collected: 05/01/19 13:15
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-7
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0249	U	0.0422	0.0422	1.00	0.108	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.0*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.606	U *	0.422	0.426	1.00	0.660	pCi/L	05/31/19 10:52	07/23/19 14:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.0*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*
Y Carrier	*78.1*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:29*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.581	U	0.424	0.428	5.00	0.660	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-10

Date Collected: 05/01/19 09:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-8
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.491		0.142	0.148	1.00	0.131	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.1*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.834	*	0.468	0.474	1.00	0.706	pCi/L	05/31/19 10:52	07/23/19 14:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.1*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:32*	*1*
Y Carrier	*74.0*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:32*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.33		0.489	0.497	5.00	0.706	pCi/L		08/15/19 09:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-11
Date Collected: 05/01/19 10:25
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-9
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.679		0.171	0.182	1.00	0.137	pCi/L	05/30/19 10:35	08/13/19 21:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.0*		*40 - 110*	*05/30/19 10:35*	*08/13/19 21:11*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.906	*	0.490	0.497	1.00	0.733	pCi/L	05/31/19 10:52	07/23/19 14:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.0*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:32*	*1*
Y Carrier	*76.3*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:32*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.59		0.519	0.529	5.00	0.733	pCi/L		08/15/19 09:45	1

Client Sample Results

Client Sample ID: MW-12 **Lab Sample ID: 500-162824-10**
Date Collected: 05/01/19 11:55 **Matrix: Water**
Date Received: 05/04/19 09:30

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.309**		0.0978	0.102	1.00	0.0781	pCi/L	05/29/19 11:23	08/03/19 12:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.7*		*40 - 110*	*05/29/19 11:23*	*08/03/19 12:56*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.358	U	0.277	0.279	1.00	0.439	pCi/L	05/29/19 12:41	07/17/19 08:46	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.7*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:46*	*1*
Y Carrier	*86.4*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:46*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.666**		0.294	0.297	5.00	0.439	pCi/L		08/06/19 11:03	1

Client Sample Results

Client Sample ID: MW-15 **Lab Sample ID: 500-162824-11**
Date Collected: 05/02/19 12:15 **Matrix: Water**
Date Received: 05/04/19 09:30

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0738	U	0.0681	0.0684	1.00	0.105	pCi/L	05/29/19 11:23	08/03/19 12:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.1*		*40 - 110*	*05/29/19 11:23*	*08/03/19 12:56*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.204	U	0.256	0.257	1.00	0.424	pCi/L	05/29/19 12:41	07/17/19 08:46	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.1*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:46*	*1*
Y Carrier	*88.6*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:46*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.278	U	0.265	0.266	5.00	0.424	pCi/L		08/06/19 11:03	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-17

Date Collected: 04/29/19 15:20
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-12
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.120**		0.0667	0.0675	1.00	0.0798	pCi/L	05/29/19 11:23	08/03/19 13:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/29/19 11:23*	*08/03/19 13:00*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.397	U	0.265	0.267	1.00	0.411	pCi/L	05/29/19 12:41	07/17/19 08:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*
Y Carrier	*89.7*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.517**		0.273	0.275	5.00	0.411	pCi/L		08/06/19 11:03	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-18

Date Collected: 04/29/19 14:25
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-13
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.220**		0.0987	0.101	1.00	0.112	pCi/L	05/29/19 11:23	08/03/19 13:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.4*		*40 - 110*	*05/29/19 11:23*	*08/03/19 13:00*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.122	U	0.261	0.261	1.00	0.445	pCi/L	05/29/19 12:41	07/17/19 08:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.4*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*
Y Carrier	*89.7*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.342	U	0.279	0.280	5.00	0.445	pCi/L		08/06/19 11:03	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-19
Date Collected: 05/02/19 10:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-14
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.129**		0.0694	0.0704	1.00	0.0795	pCi/L	05/29/19 11:23	08/03/19 14:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.7*		*40 - 110*	*05/29/19 11:23*	*08/03/19 14:52*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.175	U	0.257	0.257	1.00	0.431	pCi/L	05/29/19 12:41	07/17/19 08:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.7*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*
Y Carrier	*88.2*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.304	U	0.266	0.266	5.00	0.431	pCi/L		08/06/19 11:03	1

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-162824-2
Project/Site: Powerton CCR

Client Sample ID: Duplicate Lab Sample ID: 500-162824-15

Date Collected: 04/29/19 00:00 **Matrix: Water**
Date Received: 05/04/19 09:30

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.165**		0.0830	0.0843	1.00	0.103	pCi/L	05/29/19 11:23	08/03/19 14:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*40 - 110*	*05/29/19 11:23*	*08/03/19 14:52*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.134	U	0.230	0.230	1.00	0.390	pCi/L	05/29/19 12:41	07/17/19 08:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:47*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.298	U	0.245	0.245	5.00	0.390	pCi/L		08/06/19 11:04	1

Qualifiers

Rad

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Rad

Prep Batch: 430133

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-10	MW-12	Total/NA	Water	PrecSep-21	
500-162824-11	MW-15	Total/NA	Water	PrecSep-21	
500-162824-12	MW-17	Total/NA	Water	PrecSep-21	
500-162824-13	MW-18	Total/NA	Water	PrecSep-21	
500-162824-14	MW-19	Total/NA	Water	PrecSep-21	
500-162824-15	Duplicate	Total/NA	Water	PrecSep-21	
MB 160-430133/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-430133/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 430139

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-10	MW-12	Total/NA	Water	PrecSep_0	
500-162824-11	MW-15	Total/NA	Water	PrecSep_0	
500-162824-12	MW-17	Total/NA	Water	PrecSep_0	
500-162824-13	MW-18	Total/NA	Water	PrecSep_0	
500-162824-14	MW-19	Total/NA	Water	PrecSep_0	
500-162824-15	Duplicate	Total/NA	Water	PrecSep_0	
MB 160-430139/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-430139/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Prep Batch: 430235

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	PrecSep-21	
500-162824-2	MW-02	Total/NA	Water	PrecSep-21	
500-162824-3	MW-03	Total/NA	Water	PrecSep-21	
500-162824-4	MW-04	Total/NA	Water	PrecSep-21	
500-162824-5	MW-05	Total/NA	Water	PrecSep-21	
500-162824-6	MW-08	Total/NA	Water	PrecSep-21	
500-162824-7	MW-09	Total/NA	Water	PrecSep-21	
500-162824-8	MW-10	Total/NA	Water	PrecSep-21	
500-162824-9	MW-11	Total/NA	Water	PrecSep-21	
MB 160-430235/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-430235/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
500-162824-1 DU	MW-01	Total/NA	Water	PrecSep-21	

Prep Batch: 430397

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-162824-1	MW-01	Total/NA	Water	PrecSep_0	
500-162824-2	MW-02	Total/NA	Water	PrecSep_0	
500-162824-3	MW-03	Total/NA	Water	PrecSep_0	
500-162824-4	MW-04	Total/NA	Water	PrecSep_0	
500-162824-5	MW-05	Total/NA	Water	PrecSep_0	
500-162824-6	MW-08	Total/NA	Water	PrecSep_0	
500-162824-7	MW-09	Total/NA	Water	PrecSep_0	
500-162824-8	MW-10	Total/NA	Water	PrecSep_0	
500-162824-9	MW-11	Total/NA	Water	PrecSep_0	
MB 160-430397/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-430397/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
500-162824-1 DU	MW-01	Total/NA	Water	PrecSep_0	

QC Sample Results

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-430133/23-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 438092 — **Prep Batch: 430133**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.03041	U	0.0531	0.0531	1.00	0.120	pCi/L	05/29/19 11:23	08/04/19 21:19	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*05/29/19 11:23*	*08/04/19 21:19*	*1*

Lab Sample ID: LCS 160-430133/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 437770 — **Prep Batch: 430133**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-226	11.4	8.842		0.939	1.00	0.103	pCi/L	78	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*103*		*40 - 110*

Lab Sample ID: MB 160-430235/23-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 439426 — **Prep Batch: 430235**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.005455	U	0.0525	0.0525	1.00	0.107	pCi/L	05/30/19 10:35	08/13/19 23:00	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.9*		*40 - 110*	*05/30/19 10:35*	*08/13/19 23:00*	*1*

Lab Sample ID: LCS 160-430235/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 439308 — **Prep Batch: 430235**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-226	11.4	8.579		0.902	1.00	0.103	pCi/L	76	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*95.2*		*40 - 110*

Lab Sample ID: 500-162824-1 DU — **Client Sample ID: MW-01**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 439426 — **Prep Batch: 430235**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-226	-0.0249	U	0.02744	U	0.0559	1.00	0.100	pCi/L	0.47	1

Client: KPRG and Associates, Inc. Job ID: 500-162824-2
Project/Site: Powerton CCR

Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: 500-162824-1 DU **Client Sample ID: MW-01**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 439426 **Prep Batch: 430235**

Carrier	DU %Yield	DU Qualifier	Limits
Ba Carrier	*88.7*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-430139/23-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 435082 **Prep Batch: 430139**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3048	U	0.265	0.267	1.00	0.426	pCi/L	05/29/19 12:41	07/17/19 08:57	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*102*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:57*	*1*
Y Carrier	*82.6*		*40 - 110*	*05/29/19 12:41*	*07/17/19 08:57*	*1*

Lab Sample ID: LCS 160-430139/1-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 435081 **Prep Batch: 430139**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-228	9.02	8.352		0.988	1.00	0.440	pCi/L	93	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	*103*		*40 - 110*
Y Carrier	*87.1*		*40 - 110*

Lab Sample ID: MB 160-430397/23-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 435974 **Prep Batch: 430397**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.03968	U	0.302	0.302	1.00	0.553	pCi/L	05/31/19 10:52	07/23/19 14:34	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	*98.9*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:34*	*1*
Y Carrier	*62.8*		*40 - 110*	*05/31/19 10:52*	*07/23/19 14:34*	*1*

Lab Sample ID: LCS 160-430397/1-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 436112 **Prep Batch: 430397**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-228	9.00	6.483	*	0.923	1.00	0.554	pCi/L	72	75 - 125

QC Sample Results

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-430397/1-A
Matrix: Water
Analysis Batch: 436112

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 430397

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*95.2*		*40 - 110*
Y Carrier	*65.8*		*40 - 110*

Lab Sample ID: 500-162824-1 DU
Matrix: Water
Analysis Batch: 436112

Client Sample ID: MW-01
Prep Type: Total/NA
Prep Batch: 430397

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Radium-228	0.000	U *	-0.07644	U *	0.300	1.00	0.550	pCi/L	0.11	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*88.7*		*40 - 110*
Y Carrier	*75.5*		*40 - 110*

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-01

Lab Sample ID: 500-162824-1
Date Collected: 04/30/19 13:25
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:10	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436112	07/23/19 14:24	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-02

Lab Sample ID: 500-162824-2
Date Collected: 04/30/19 09:45
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:10	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436112	07/23/19 14:25	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-03

Lab Sample ID: 500-162824-3
Date Collected: 04/30/19 10:50
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436112	07/23/19 14:25	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-04

Lab Sample ID: 500-162824-4
Date Collected: 04/30/19 11:40
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439521	08/14/19 06:57	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436097	07/23/19 14:29	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-162824-2
Project/Site: Powerton CCR

Client Sample ID: MW-05 Lab Sample ID: 500-162824-5
Date Collected: 04/30/19 12:30 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436097	07/23/19 14:29	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-08 Lab Sample ID: 500-162824-6
Date Collected: 05/01/19 15:35 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436097	07/23/19 14:29	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-09 Lab Sample ID: 500-162824-7
Date Collected: 05/01/19 13:15 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	436097	07/23/19 14:29	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-10 Lab Sample ID: 500-162824-8
Date Collected: 05/01/19 09:30 **Matrix: Water**
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	435974	07/23/19 14:32	AMJ	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Lab Chronicle

Client: KPRG and Associates, Inc.
Job ID: 500-162824-2
Project/Site: Powerton CCR

Client Sample ID: MW-11
Lab Sample ID: 500-162824-9
Date Collected: 05/01/19 10:25
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430235	05/30/19 10:35	ORM	TAL SL
Total/NA	Analysis	903.0		1	439426	08/13/19 21:11	CDR	TAL SL
Total/NA	Prep	PrecSep_0			430397	05/31/19 10:52	ORM	TAL SL
Total/NA	Analysis	904.0		1	435974	07/23/19 14:32	AMJ	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	439616	08/15/19 09:45	SMP	TAL SL

Client Sample ID: MW-12
Lab Sample ID: 500-162824-10
Date Collected: 05/01/19 11:55
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437844	08/03/19 12:56	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:46	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:03	SMP	TAL SL

Client Sample ID: MW-15
Lab Sample ID: 500-162824-11
Date Collected: 05/02/19 12:15
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437844	08/03/19 12:56	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:46	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:03	SMP	TAL SL

Client Sample ID: MW-17
Lab Sample ID: 500-162824-12
Date Collected: 04/29/19 15:20
Matrix: Water
Date Received: 05/04/19 09:30

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437902	08/03/19 13:00	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:47	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:03	SMP	TAL SL

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-162824-2

Client Sample ID: MW-18
Date Collected: 04/29/19 14:25
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-13
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437902	08/03/19 13:00	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:47	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:03	SMP	TAL SL

Client Sample ID: MW-19
Date Collected: 05/02/19 10:30
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-14
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437844	08/03/19 14:52	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:47	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:03	SMP	TAL SL

Client Sample ID: Duplicate
Date Collected: 04/29/19 00:00
Date Received: 05/04/19 09:30

Lab Sample ID: 500-162824-15
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			430133	05/29/19 11:23	ORM	TAL SL
Total/NA	Analysis	903.0		1	437844	08/03/19 14:52	KLS	TAL SL
Total/NA	Prep	PrecSep_0			430139	05/29/19 12:41	ORM	TAL SL
Total/NA	Analysis	904.0		1	435081	07/17/19 08:47	CDR	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	438275	08/06/19 11:04	SMP	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Laboratory: Eurofins TestAmerica, Chicago

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Illinois	NELAP	5	100201	04-30-20

Laboratory: Eurofins TestAmerica, St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Illinois	NELAP	5	200023	11-30-19

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
903.0	PrecSep-21	Water	Radium-226
904.0	PrecSep_0	Water	Radium-228
Ra226_Ra228		Water	Combined Radium 226 + 228

1 2 3 4 5 6 7 8 9 10 11 12 13 14

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL
Phone: 708.534.5200 Fax: 708.5

500-162824 COC

Report To (optional)		Bill To (optional)	
Contact:		Contact:	
Company:		Company:	
Address:		Address:	
Address:		Address:	
Phone:		Phone:	
Fax:		Fax:	
E-Mail:		PO#/Reference#	

Chain of Custody Record

Lab Job #: 500-162824

Chain of Custody Number:

Page 1 of 2

Temperature °C of Cooler: 3.7, 4.7, 2.3 5.3

Client: KPRG and Assoc.
Client Project #: 12313.1
Project Name: NRG Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Cl, Fl, SO4, TDS (Preservative 8)	Rad 226/228 (Preservative 3)	Comments
1		MW-01	4/30	1325	5	W	X	X	X	
2		MW-02	4/30	0945	↓	↓	↓	↓	↓	
3		MW-03	4/30	1050						
4		MW-04	4/30	1140						
5		MW-05	4/30	1230						
6		MW-08	5/1	1535						
7		MW-09	5/1	1315						
8		MW-10	5/1	0930						
9		MW-11	5/1	1025						
10		MW-12	5/1	1155	↓	↓	↓	↓	↓	

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days ______ Other
Requested Due Date ______________

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	5/2/2019	1700	FEDEX		5/2/2019	1700
				Neil Fioravanti	TACHS	05/04/19	0930

Lab Courier:
Shipped: FX Saturday
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional)	Bill To (optional)
Contact:	Contact:
Company:	Company:
Address:	Address:
Address:	Address:
Phone:	Phone:
Fax:	Fax:
E-Mail:	PO#/Reference#

Chain of Custody Record

Lab Job #: 500-162824

Chain of Custody Number:

Page 2 of 2

Temperature °C of Cooler: 3.7, 4.7, 2.3, 5.3

Client: KPRG and Assoc.
Client Project #: 12313.1
Project Name: NRG Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Cl, Fl, SO4, TDS (Preservative 8)	Rad 226/228 (Preservative 3)						Comments
11		MW-15	5/2	1215	5	W	↓	↓	↓						
12		MW-17	4/29	1520	↓	↓	↓	↓	↓						
13		MW-18	4/29	1425	↓	↓	↓	↓	↓						
14		MW-19	5/2	1030	↓	↓	↓	↓	↓						
15		DUPLICATE	—	—	↓	↓	↓	↓	↓						

Turnaround Time Required (Business Days)
__ 1 Day __ 2 Days __ 5 Days __ 7 Days __ 10 Days __ 15 Days __ Other
Requested Due Date _____

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ___ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	5/2/2019	1700	FEDEX		5/2/2019	1700
				Neil Fioravanti	THHF	05/04/19	0930

Lab Courier:
Shipped: F/Saturday
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 61.40 LB
CAD: 006994780/SSFE2002
DIMS: 24x14x14 IN

BILL THIRD PARTY

TO **ERIC LANG**
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484 500-162824 Waybill
(000) 000-0000 REF:
INV:
PO: DEPT:

Part # 156297-435 RRD 2/15 EXP 11/19

FedEx Express

E

J191019010701uv

REL# 3765346

SATURDAY 4:30P
**** 2DAY ****

8 of 9
MPS# 0263 **7870 1648 7850**
Mstr# 7870 1648 7780 0201

SO JOTA

60484
IL-US **ORD**

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 64.10 LB
CAD: 006994 SSFE2002
DIMS: 24

BILL

TO **ERIC LANG**
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK
(000) 000-0000 REF:
INV:
PO: DEPT:

RT 717
ST 11
5 16:30
A 7780 05.04

Part # 156297-435 RRD 2/15 EXP 11/19

FedEx Express

E

J191019010701uv

REL# 3765346

SATURDAY 4:30P
**** 2DAY ****

1 of 9
TRK# 0201 **7870 1648 7780**
MASTER

SO JOTA

60484
IL-US **ORD**

Std TC-1, Page 1 of 1

8/15/2019

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 57.70 LB
CAD: 006994780/SSFE2002
DIMS: 24x14x14 IN

BILL THIRD PARTY

TO ERIC LANG
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx
Express

E

REL#
3765346

6 of 9

SATURDAY 4:30P
** 2DAY **

MPS# 0263 7870 1648 7838
Mstr# 7870 1648 7780 0201

SO JOTA

60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
KPRG
414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 02MAY19
ACTWGT: 60.00 LB
CAD: 006994780/SSFE2002
DIMS: 24x14x14 IN

BILL THIRD PARTY

TO ERIC LANG
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(000) 000-0000 REF:
INV:
PO: DEPT:

FedEx
Express

E

REL#
3765346

5 of 9

SATURDAY 4:30P
** 2DAY **

MPS# 0263 7870 1648 7827
Mstr# 7870 1648 7780 0201

SO JOTA

60484
IL-US ORD

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-120636.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-162824-2
Address: 13715 Rider Trail North,	Due Date Requested: 6/4/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-12 (500-162824-10)	5/1/19	11:55 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-15 (500-162824-11)	5/2/19	12:15 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-17 (500-162824-12)	4/29/19	15:20 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-18 (500-162824-13)	4/29/19	14:25 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-19 (500-162824-14)	5/2/19	10:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
Duplicate (500-162824-15)	4/29/19	Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs

500-162824 Chain of Custody

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. I

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For ______ Months*

Deliverable Requested: I, II, III, IV, Other (specify) — Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 5/6/19 1500	Company: TA	Received by: [signature]	Date/Time: 5-7-19 09:00	Company: MSL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:	

Ver: 01/16/2019

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone (708) 534-5200 Fax (708) 534-5211

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-120636.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-162824-2
Address: 13715 Rider Trail North,	Due Date Requested: 6/4/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-01 (500-162824-1)	4/30/19	13:25 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-02 (500-162824-2)	4/30/19	09:45 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-03 (500-162824-3)	4/30/19	10:50 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-04 (500-162824-4)	4/30/19	11:40 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-05 (500-162824-5)	4/30/19	12:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-08 (500-162824-6)	5/1/19	15:35 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-09 (500-162824-7)	5/1/19	13:15 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-10 (500-162824-8)	5/1/19	09:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-11 (500-162824-9)	5/1/19	10:25 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) | Primary Deliverable Rank: 2 | Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: W. Emil[illegible]	Date/Time: 5/6/19 1500	Company: TA	Received by: [illegible]	Date/Time: 5-7-19 09:00	Company: TA STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. Job Number: 500-162824-2

Login Number: 162824 **List Source: Eurofins TestAmerica, Chicago**
List Number: 1
Creator: Scott, Sherri L

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.7,4.7,5.3,2.3
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.

Job Number: 500-162824-2

Login Number: 162824
List Number: 3
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/09/19 11:00 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	18.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Tracer/Carrier Summary

Client: KPRG and Associates, Inc. Job ID: 500-162824-2
Project/Site: Powerton CCR

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits): Ba Carrier (40-110)
500-162824-1	MW-01	79.1
500-162824-1 DU	MW-01	88.7
500-162824-2	MW-02	91.5
500-162824-3	MW-03	74.0
500-162824-4	MW-04	83.6
500-162824-5	MW-05	73.7
500-162824-6	MW-08	83.1
500-162824-7	MW-09	76.0
500-162824-8	MW-10	94.1
500-162824-9	MW-11	89.0
500-162824-10	MW-12	88.7
500-162824-11	MW-15	88.1
500-162824-12	MW-17	89.8
500-162824-13	MW-18	88.4
500-162824-14	MW-19	86.7
500-162824-15	Duplicate	90.7
LCS 160-430133/1-A	Lab Control Sample	103
LCS 160-430235/1-A	Lab Control Sample	95.2
MB 160-430133/23-A	Method Blank	102
MB 160-430235/23-A	Method Blank	98.9

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits): Ba Carrier (40-110)	Y Carrier (40-110)
500-162824-1	MW-01	79.1	75.5
500-162824-1 DU	MW-01	88.7	75.5
500-162824-2	MW-02	91.5	76.6
500-162824-3	MW-03	74.0	73.3
500-162824-4	MW-04	83.6	80.4
500-162824-5	MW-05	73.7	77.8
500-162824-6	MW-08	83.1	74.4
500-162824-7	MW-09	76.0	78.1
500-162824-8	MW-10	94.1	74.0
500-162824-9	MW-11	89.0	76.3
500-162824-10	MW-12	88.7	86.4
500-162824-11	MW-15	88.1	88.6
500-162824-12	MW-17	89.8	89.7
500-162824-13	MW-18	88.4	89.7
500-162824-14	MW-19	86.7	88.2
500-162824-15	Duplicate	90.7	87.9
LCS 160-430139/1-A	Lab Control Sample	103	87.1
LCS 160-430397/1-A	Lab Control Sample	95.2	65.8
MB 160-430139/23-A	Method Blank	102	82.6
MB 160-430397/23-A	Method Blank	98.9	62.8

Tracer/Carrier Summary

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

eurofins

Environment Testing
TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-173472-1
Client Project/Site: Powerton CCR

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Authorized for release by:
12/5/2019 10:30:05 AM

Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Job ID: 500-173472-1

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-173472-1

Comments
No additional comments.

Receipt
The samples were received on 11/14/2019 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.3º C, 1.7º C, 3.3º C and 3.9º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: KPRG and Associates, Inc.
Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-01
Lab Sample ID: 500-173472-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.012		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.029		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.091		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.52		0.050		mg/L	1		6020A	Total Recoverable
Cadmium	0.00085		0.00050		mg/L	1		6020A	Total Recoverable
Calcium	95		0.20		mg/L	1		6020A	Total Recoverable
Chromium	0.025		0.0050		mg/L	1		6020A	Total Recoverable
Cobalt	0.016		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.034		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.0079		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	390		10		mg/L	1		SM 2540C	Total/NA
Chloride	47		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.18		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	41		10		mg/L	2		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-08
Lab Sample ID: 500-173472-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.022		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0025		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.087		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.98		0.25		mg/L	5		6020A	Total Recoverable
Calcium	110		0.20		mg/L	1		6020A	Total Recoverable
Lead	0.00094		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.013		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	640		10		mg/L	1		SM 2540C	Total/NA
Chloride	92		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.33		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	110		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-18
Lab Sample ID: 500-173472-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.014		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0013		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.12		0.0025		mg/L	1		6020A	Total Recoverable

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-18 (Continued)

Lab Sample ID: 500-173472-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Boron	0.79		0.25		mg/L	5		6020A	Total Recoverable
Calcium	130		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1100		10		mg/L	1		SM 2540C	Total/NA
Chloride	180		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.56		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	210		50		mg/L	10		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-19

Lab Sample ID: 500-173472-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0014		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.10		0.0025		mg/L	1		6020A	Total Recoverable
Boron	2.5		0.50		mg/L	10		6020A	Total Recoverable
Calcium	130		0.20		mg/L	1		6020A	Total Recoverable
Lead	0.00056		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.036		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	740		10		mg/L	1		SM 2540C	Total/NA
Chloride	53		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.15		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	140		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-17

Lab Sample ID: 500-173472-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.021		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.088		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.10		0.0025		mg/L	1		6020A	Total Recoverable
Boron	1.9		0.50		mg/L	10		6020A	Total Recoverable
Cadmium	0.0015		0.00050		mg/L	1		6020A	Total Recoverable
Calcium	230		0.20		mg/L	1		6020A	Total Recoverable
Cobalt	0.0011		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.00093		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.058		0.0050		mg/L	1		6020A	Total Recoverable
Thallium	0.0029		0.0020		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	2300		10		mg/L	1		SM 2540C	Total/NA
Chloride	600		50		mg/L	25		SM 4500 Cl- E	Total/NA
Fluoride	0.55		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	730		150		mg/L	30		SM 4500 SO4 E	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: Duplicate

Lab Sample ID: 500-173472-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.013		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0012		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.12		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.74		0.25		mg/L	5		6020A	Total Recoverable
Calcium	130		0.20		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1000		10		mg/L	1		SM 2540C	Total/NA
Chloride	180		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.58		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	210		50		mg/L	10		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-09

Lab Sample ID: 500-173472-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0056		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.057		0.0025		mg/L	1		6020A	Total Recoverable
Boron	2.5		0.50		mg/L	10		6020A	Total Recoverable
Calcium	85		0.20		mg/L	1		6020A	Total Recoverable
Cobalt	0.0032		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.00076		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.026		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	500		10		mg/L	1		SM 2540C	Total/NA
Chloride	36		2.0		mg/L	1		SM 4500 Cl- E	Total/NA
Fluoride	0.18		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	82		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-11

Lab Sample ID: 500-173472-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.14		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.72		0.0025		mg/L	1		6020A	Total Recoverable
Boron	1.8		0.25		mg/L	5		6020A	Total Recoverable
Calcium	120		0.20		mg/L	1		6020A	Total Recoverable
Cobalt	0.0041		0.0010		mg/L	1		6020A	Total Recoverable
Lead	0.0021		0.00050		mg/L	1		6020A	Total Recoverable
Molybdenum	0.020		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	890		10		mg/L	1		SM 2540C	Total/NA
Chloride	83		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.55		0.10		mg/L	1		SM 4500 F C	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-11 (Continued) — Lab Sample ID: 500-173472-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	150		25		mg/L	5		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-12 — Lab Sample ID: 500-173472-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.014		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.026		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.072		0.0025		mg/L	1		6020A	Total Recoverable
Boron	0.74		0.050		mg/L	1		6020A	Total Recoverable
Calcium	120		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.027		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1100		10		mg/L	1		SM 2540C	Total/NA
Chloride	160		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.45		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	280		50		mg/L	10		SM 4500 SO4 E	Total/NA

Client Sample ID: MW-15 — Lab Sample ID: 500-173472-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Lithium	0.029		0.010		mg/L	1		6010C	Total Recoverable
Arsenic	0.0044		0.0010		mg/L	1		6020A	Total Recoverable
Barium	0.053		0.0025		mg/L	1		6020A	Total Recoverable
Boron	1.8		0.25		mg/L	5		6020A	Total Recoverable
Calcium	170		0.20		mg/L	1		6020A	Total Recoverable
Molybdenum	0.025		0.0050		mg/L	1		6020A	Total Recoverable
Total Dissolved Solids	1300		10		mg/L	1		SM 2540C	Total/NA
Chloride	170		10		mg/L	5		SM 4500 Cl- E	Total/NA
Fluoride	0.50		0.10		mg/L	1		SM 4500 F C	Total/NA
Sulfate	260		50		mg/L	10		SM 4500 SO4 E	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Method	Method Description	Protocol	Laboratory
6010C	Metals (ICP)	SW846	TAL CHI
6020A	Metals (ICP/MS)	SW846	TAL CHI
7470A	Mercury (CVAA)	SW846	TAL CHI
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CHI
SM 4500 Cl- E	Chloride, Total	SM	TAL CHI
SM 4500 F C	Fluoride	SM	TAL CHI
SM 4500 SO4 E	Sulfate, Total	SM	TAL PEN
3005A	Preparation, Total Recoverable or Dissolved Metals	SW846	TAL CHI
7470A	Preparation, Mercury	SW846	TAL CHI

Protocol References:

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-173472-1	MW-01	Water	11/13/19 11:20	11/14/19 09:40	
500-173472-2	MW-08	Water	11/13/19 12:30	11/14/19 09:40	
500-173472-3	MW-18	Water	11/13/19 13:50	11/14/19 09:40	
500-173472-4	MW-19	Water	11/13/19 14:42	11/14/19 09:40	
500-173472-5	MW-17	Water	11/13/19 15:11	11/14/19 09:40	
500-173472-6	Duplicate	Water	11/13/19 00:00	11/14/19 09:40	
500-173472-7	MW-09	Water	11/14/19 08:32	11/15/19 08:55	
500-173472-8	MW-11	Water	11/14/19 09:30	11/15/19 08:55	
500-173472-9	MW-12	Water	11/14/19 10:17	11/15/19 08:55	
500-173472-10	MW-15	Water	11/14/19 11:53	11/15/19 08:55	

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-01

Date Collected: 11/13/19 11:20
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-1
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.012**		0.010		mg/L		11/26/19 17:10	11/27/19 08:45	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:06	1
Arsenic	**0.029**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:06	1
Barium	**0.091**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:06	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:06	1
Boron	**0.52**		0.050		mg/L		11/26/19 17:10	11/29/19 13:04	1
Cadmium	**0.00085**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:06	1
Calcium	**95**		0.20		mg/L		11/26/19 17:10	11/27/19 22:06	1
Chromium	**0.025**		0.0050		mg/L		11/26/19 17:10	11/27/19 22:06	1
Cobalt	**0.016**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:06	1
Lead	**0.034**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:06	1
Molybdenum	**0.0079**		0.0050		mg/L		11/26/19 17:10	11/27/19 22:06	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:06	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 22:06	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**390**		10		mg/L			11/19/19 22:52	1
Chloride	**47**		2.0		mg/L			11/25/19 10:49	1
Fluoride	**0.18**		0.10		mg/L			11/26/19 19:38	1
Sulfate	**41**		10		mg/L			11/26/19 13:09	2

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-08

Lab Sample ID: 500-173472-2

Date Collected: 11/13/19 12:30
Date Received: 11/14/19 09:40

Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.022**		0.010		mg/L		11/26/19 17:10	11/27/19 08:50	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:10	1
Arsenic	**0.0025**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:10	1
Barium	**0.087**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:10	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:10	1
Boron	**0.98**		0.25		mg/L		11/26/19 17:10	11/29/19 13:08	5
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:10	1
Calcium	**110**		0.20		mg/L		11/26/19 17:10	11/27/19 22:10	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:10	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:10	1
Lead	**0.00094**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:10	1
Molybdenum	**0.013**		0.0050		mg/L		11/26/19 17:10	11/27/19 22:10	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:10	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 22:10	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**640**		10		mg/L			11/19/19 22:55	1
Chloride	**92**		10		mg/L			11/25/19 11:57	5
Fluoride	**0.33**		0.10		mg/L			11/26/19 19:42	1
Sulfate	**110**		25		mg/L			11/26/19 13:09	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-18
Date Collected: 11/13/19 13:50
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-3
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.014**		0.010		mg/L		11/26/19 17:10	11/27/19 08:54	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:13	1
Arsenic	**0.0013**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:13	1
Barium	**0.12**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:13	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:13	1
Boron	**0.79**		0.25		mg/L		11/26/19 17:10	11/29/19 13:12	5
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:13	1
Calcium	**130**		0.20		mg/L		11/26/19 17:10	11/27/19 22:13	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:13	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:13	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:13	1
Molybdenum	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:13	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:13	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 22:13	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1100**		10		mg/L			11/20/19 23:41	1
Chloride	**180**		10		mg/L			11/25/19 11:58	5
Fluoride	**0.56**		0.10		mg/L			11/26/19 19:49	1
Sulfate	**210**		50		mg/L			11/26/19 13:13	10

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-19

Date Collected: 11/13/19 14:42
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-4
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		11/26/19 17:10	11/27/19 08:59	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:17	1
Arsenic	**0.0014**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:17	1
Barium	**0.10**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:17	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:17	1
Boron	**2.5**		0.50		mg/L		11/26/19 17:10	11/29/19 13:16	10
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:17	1
Calcium	**130**		0.20		mg/L		11/26/19 17:10	11/27/19 22:17	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:17	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:17	1
Lead	**0.00056**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:17	1
Molybdenum	**0.036**		0.0050		mg/L		11/26/19 17:10	11/27/19 22:17	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:17	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 22:17	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**740**		10		mg/L			11/20/19 23:43	1
Chloride	**53**		2.0		mg/L			11/25/19 11:59	1
Fluoride	**0.15**		0.10		mg/L			11/26/19 19:52	1
Sulfate	**140**		25		mg/L			11/26/19 13:13	5

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-17 Lab Sample ID: 500-173472-5

Date Collected: 11/13/19 15:11 **Matrix: Water**
Date Received: 11/14/19 09:40

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.021**		0.010		mg/L		11/26/19 17:10	11/27/19 09:03	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:21	1
Arsenic	**0.088**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:21	1
Barium	**0.10**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:21	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:21	1
Boron	**1.9**		0.50		mg/L		11/26/19 17:10	11/29/19 13:19	10
Cadmium	**0.0015**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:21	1
Calcium	**230**		0.20		mg/L		11/26/19 17:10	11/27/19 22:21	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:21	1
Cobalt	**0.0011**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:21	1
Lead	**0.00093**		0.00050		mg/L		11/26/19 17:10	11/27/19 22:21	1
Molybdenum	**0.058**		0.0050		mg/L		11/26/19 17:10	11/27/19 22:21	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:21	1
Thallium	**0.0029**		0.0020		mg/L		11/26/19 17:10	11/27/19 22:21	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**2300**		10		mg/L			11/20/19 23:46	1
Chloride	**600**		50		mg/L			11/25/19 12:02	25
Fluoride	**0.55**		0.10		mg/L			11/26/19 20:10	1
Sulfate	**730**		150		mg/L			11/26/19 13:13	30

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: Duplicate

Date Collected: 11/13/19 00:00
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-6
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.013**		0.010		mg/L		11/26/19 17:10	11/27/19 09:08	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 22:25	1
Arsenic	**0.0012**		0.0010		mg/L		11/26/19 17:10	11/27/19 22:25	1
Barium	**0.12**		0.0025		mg/L		11/26/19 17:10	11/27/19 22:25	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:25	1
Boron	**0.74**		0.25		mg/L		11/26/19 17:10	11/29/19 13:23	5
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:25	1
Calcium	**130**		0.20		mg/L		11/26/19 17:10	11/27/19 22:25	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:25	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 22:25	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 22:25	1
Molybdenum	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 22:25	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 22:25	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 22:25	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 10:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1000**		10		mg/L			11/20/19 23:48	1
Chloride	**180**		10		mg/L			11/25/19 12:03	5
Fluoride	**0.58**		0.10		mg/L			11/26/19 20:19	1
Sulfate	**210**		50		mg/L			11/26/19 13:13	10

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-09 Lab Sample ID: 500-173472-7
Date Collected: 11/14/19 08:32 **Matrix: Water**
Date Received: 11/15/19 08:55

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		12/03/19 17:10	12/04/19 13:07	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:06	11/27/19 20:50	1
Arsenic	**0.0056**		0.0010		mg/L		11/26/19 17:06	11/27/19 20:50	1
Barium	**0.057**		0.0025		mg/L		11/26/19 17:06	11/27/19 20:50	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:50	1
Boron	**2.5**		0.50		mg/L		11/26/19 17:06	11/29/19 12:28	10
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:50	1
Calcium	**85**		0.20		mg/L		11/26/19 17:06	11/27/19 20:50	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 20:50	1
Cobalt	**0.0032**		0.0010		mg/L		11/26/19 17:06	11/27/19 20:50	1
Lead	**0.00076**		0.00050		mg/L		11/26/19 17:06	11/27/19 20:50	1
Molybdenum	**0.026**		0.0050		mg/L		11/26/19 17:06	11/27/19 20:50	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 20:50	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:06	11/27/19 20:50	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:28	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**500**		10		mg/L			11/21/19 05:28	1
Chloride	**36**		2.0		mg/L			11/25/19 12:04	1
Fluoride	**0.18**		0.10		mg/L			11/26/19 20:34	1
Sulfate	**82**		25		mg/L			11/26/19 21:34	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-11

Date Collected: 11/14/19 09:30
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-8

Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		12/03/19 17:10	12/04/19 13:11	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:06	11/27/19 20:54	1
Arsenic	**0.14**		0.0010		mg/L		11/26/19 17:06	11/27/19 20:54	1
Barium	**0.72**		0.0025		mg/L		11/26/19 17:06	11/27/19 20:54	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:54	1
Boron	**1.8**		0.25		mg/L		11/26/19 17:06	11/29/19 12:32	5
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:54	1
Calcium	**120**		0.20		mg/L		11/26/19 17:06	11/27/19 20:54	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 20:54	1
Cobalt	**0.0041**		0.0010		mg/L		11/26/19 17:06	11/27/19 20:54	1
Lead	**0.0021**		0.00050		mg/L		11/26/19 17:06	11/27/19 20:54	1
Molybdenum	**0.020**		0.0050		mg/L		11/26/19 17:06	11/27/19 20:54	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 20:54	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:06	11/27/19 20:54	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:30	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**890**		10		mg/L			11/21/19 05:30	1
Chloride	**83**		10		mg/L			11/25/19 12:05	5
Fluoride	**0.55**		0.10		mg/L			11/26/19 20:37	1
Sulfate	**150**		25		mg/L			11/26/19 21:34	5

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: MW-12

Date Collected: 11/14/19 10:17
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-9
Matrix: Water

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.014**		0.010		mg/L		12/03/19 17:10	12/04/19 13:16	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:06	11/27/19 20:58	1
Arsenic	**0.026**		0.0010		mg/L		11/26/19 17:06	11/27/19 20:58	1
Barium	**0.072**		0.0025		mg/L		11/26/19 17:06	11/27/19 20:58	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:58	1
Boron	**0.74**		0.050		mg/L		11/26/19 17:06	11/29/19 12:49	1
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:58	1
Calcium	**120**		0.20		mg/L		11/26/19 17:06	11/27/19 20:58	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 20:58	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:58	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:58	1
Molybdenum	**0.027**		0.0050		mg/L		11/26/19 17:06	11/27/19 20:58	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 20:58	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:06	11/27/19 20:58	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:31	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1100**		10		mg/L			11/21/19 05:33	1
Chloride	**160**		10		mg/L			11/25/19 12:06	5
Fluoride	**0.45**		0.10		mg/L			11/26/19 20:42	1
Sulfate	**280**		50		mg/L			11/26/19 23:19	10

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-15 Lab Sample ID: 500-173472-10

Date Collected: 11/14/19 11:53 **Matrix: Water**
Date Received: 11/15/19 08:55

Method: 6010C - Metals (ICP) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	**0.029**		0.010		mg/L		12/03/19 17:10	12/04/19 13:20	1

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:06	11/27/19 21:02	1
Arsenic	**0.0044**		0.0010		mg/L		11/26/19 17:06	11/27/19 21:02	1
Barium	**0.053**		0.0025		mg/L		11/26/19 17:06	11/27/19 21:02	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 21:02	1
Boron	**1.8**		0.25		mg/L		11/26/19 17:06	11/29/19 12:53	5
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 21:02	1
Calcium	**170**		0.20		mg/L		11/26/19 17:06	11/27/19 21:02	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 21:02	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 21:02	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 21:02	1
Molybdenum	**0.025**		0.0050		mg/L		11/26/19 17:06	11/27/19 21:02	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 21:02	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:06	11/27/19 21:02	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:33	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**1300**		10		mg/L			11/21/19 05:35	1
Chloride	**170**		10		mg/L			11/25/19 12:06	5
Fluoride	**0.50**		0.10		mg/L			11/26/19 20:46	1
Sulfate	**260**		50		mg/L			11/26/19 23:19	10

Definitions/Glossary

Qualifiers

General Chemistry

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Metals

Prep Batch: 516379

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total/NA	Water	7470A	
500-173472-8	MW-11	Total/NA	Water	7470A	
500-173472-9	MW-12	Total/NA	Water	7470A	
500-173472-10	MW-15	Total/NA	Water	7470A	
MB 500-516379/12-A	Method Blank	Total/NA	Water	7470A	
LCS 500-516379/13-A	Lab Control Sample	Total/NA	Water	7470A	

Prep Batch: 516382

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	7470A	
500-173472-2	MW-08	Total/NA	Water	7470A	
500-173472-3	MW-18	Total/NA	Water	7470A	
500-173472-4	MW-19	Total/NA	Water	7470A	
500-173472-5	MW-17	Total/NA	Water	7470A	
500-173472-6	Duplicate	Total/NA	Water	7470A	
MB 500-516382/12-A	Method Blank	Total/NA	Water	7470A	
LCS 500-516382/13-A	Lab Control Sample	Total/NA	Water	7470A	
500-173472-5 MS	MW-17	Total/NA	Water	7470A	
500-173472-5 MSD	MW-17	Total/NA	Water	7470A	
500-173472-5 DU	MW-17	Total/NA	Water	7470A	

Analysis Batch: 516627

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	7470A	516382
500-173472-2	MW-08	Total/NA	Water	7470A	516382
500-173472-3	MW-18	Total/NA	Water	7470A	516382
500-173472-4	MW-19	Total/NA	Water	7470A	516382
500-173472-5	MW-17	Total/NA	Water	7470A	516382
500-173472-6	Duplicate	Total/NA	Water	7470A	516382
500-173472-7	MW-09	Total/NA	Water	7470A	516379
500-173472-8	MW-11	Total/NA	Water	7470A	516379
500-173472-9	MW-12	Total/NA	Water	7470A	516379
500-173472-10	MW-15	Total/NA	Water	7470A	516379
MB 500-516379/12-A	Method Blank	Total/NA	Water	7470A	516379
MB 500-516382/12-A	Method Blank	Total/NA	Water	7470A	516382
LCS 500-516379/13-A	Lab Control Sample	Total/NA	Water	7470A	516379
LCS 500-516382/13-A	Lab Control Sample	Total/NA	Water	7470A	516382
500-173472-5 MS	MW-17	Total/NA	Water	7470A	516382
500-173472-5 MSD	MW-17	Total/NA	Water	7470A	516382
500-173472-5 DU	MW-17	Total/NA	Water	7470A	516382

Prep Batch: 517477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total Recoverable	Water	3005A	
500-173472-8	MW-11	Total Recoverable	Water	3005A	
500-173472-9	MW-12	Total Recoverable	Water	3005A	
500-173472-10	MW-15	Total Recoverable	Water	3005A	
MB 500-517477/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-517477/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Metals

Prep Batch: 517478

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total Recoverable	Water	3005A	
500-173472-2	MW-08	Total Recoverable	Water	3005A	
500-173472-3	MW-18	Total Recoverable	Water	3005A	
500-173472-4	MW-19	Total Recoverable	Water	3005A	
500-173472-5	MW-17	Total Recoverable	Water	3005A	
500-173472-6	Duplicate	Total Recoverable	Water	3005A	
MB 500-517478/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-517478/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 517624

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total Recoverable	Water	6010C	517478
500-173472-2	MW-08	Total Recoverable	Water	6010C	517478
500-173472-3	MW-18	Total Recoverable	Water	6010C	517478
500-173472-4	MW-19	Total Recoverable	Water	6010C	517478
500-173472-5	MW-17	Total Recoverable	Water	6010C	517478
500-173472-6	Duplicate	Total Recoverable	Water	6010C	517478
MB 500-517478/1-A	Method Blank	Total Recoverable	Water	6010C	517478
LCS 500-517478/2-A	Lab Control Sample	Total Recoverable	Water	6010C	517478

Analysis Batch: 517825

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total Recoverable	Water	6020A	517478
500-173472-2	MW-08	Total Recoverable	Water	6020A	517478
500-173472-3	MW-18	Total Recoverable	Water	6020A	517478
500-173472-4	MW-19	Total Recoverable	Water	6020A	517478
500-173472-5	MW-17	Total Recoverable	Water	6020A	517478
500-173472-6	Duplicate	Total Recoverable	Water	6020A	517478
500-173472-7	MW-09	Total Recoverable	Water	6020A	517477
500-173472-8	MW-11	Total Recoverable	Water	6020A	517477
500-173472-9	MW-12	Total Recoverable	Water	6020A	517477
500-173472-10	MW-15	Total Recoverable	Water	6020A	517477
MB 500-517477/1-A	Method Blank	Total Recoverable	Water	6020A	517477
MB 500-517478/1-A	Method Blank	Total Recoverable	Water	6020A	517478
LCS 500-517477/2-A	Lab Control Sample	Total Recoverable	Water	6020A	517477
LCS 500-517478/2-A	Lab Control Sample	Total Recoverable	Water	6020A	517478

Analysis Batch: 517918

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total Recoverable	Water	6020A	517478
500-173472-2	MW-08	Total Recoverable	Water	6020A	517478
500-173472-3	MW-18	Total Recoverable	Water	6020A	517478
500-173472-4	MW-19	Total Recoverable	Water	6020A	517478
500-173472-5	MW-17	Total Recoverable	Water	6020A	517478
500-173472-6	Duplicate	Total Recoverable	Water	6020A	517478
500-173472-7	MW-09	Total Recoverable	Water	6020A	517477
500-173472-8	MW-11	Total Recoverable	Water	6020A	517477
500-173472-9	MW-12	Total Recoverable	Water	6020A	517477
500-173472-10	MW-15	Total Recoverable	Water	6020A	517477
MB 500-517477/1-A	Method Blank	Total Recoverable	Water	6020A	517477
MB 500-517478/1-A	Method Blank	Total Recoverable	Water	6020A	517478

Metals (Continued)

Analysis Batch: 517918 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 500-517477/2-A	Lab Control Sample	Total Recoverable	Water	6020A	517477
LCS 500-517478/2-A	Lab Control Sample	Total Recoverable	Water	6020A	517478

Prep Batch: 518505

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total Recoverable	Water	3005A	
500-173472-8	MW-11	Total Recoverable	Water	3005A	
500-173472-9	MW-12	Total Recoverable	Water	3005A	
500-173472-10	MW-15	Total Recoverable	Water	3005A	
MB 500-518505/1-A	Method Blank	Total Recoverable	Water	3005A	
LCS 500-518505/2-A	Lab Control Sample	Total Recoverable	Water	3005A	

Analysis Batch: 518695

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total Recoverable	Water	6010C	518505
500-173472-8	MW-11	Total Recoverable	Water	6010C	518505
500-173472-9	MW-12	Total Recoverable	Water	6010C	518505
500-173472-10	MW-15	Total Recoverable	Water	6010C	518505
MB 500-518505/1-A	Method Blank	Total Recoverable	Water	6010C	518505
LCS 500-518505/2-A	Lab Control Sample	Total Recoverable	Water	6010C	518505

General Chemistry

Analysis Batch: 467607

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	SM 4500 SO4 E	
500-173472-2	MW-08	Total/NA	Water	SM 4500 SO4 E	
500-173472-3	MW-18	Total/NA	Water	SM 4500 SO4 E	
500-173472-4	MW-19	Total/NA	Water	SM 4500 SO4 E	
500-173472-5	MW-17	Total/NA	Water	SM 4500 SO4 E	
500-173472-6	Duplicate	Total/NA	Water	SM 4500 SO4 E	
MB 400-467607/6	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 400-467607/7	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
MRL 400-467607/3	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
500-173472-2 MS	MW-08	Total/NA	Water	SM 4500 SO4 E	
500-173472-2 MSD	MW-08	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 467673

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total/NA	Water	SM 4500 SO4 E	
500-173472-8	MW-11	Total/NA	Water	SM 4500 SO4 E	
MB 400-467673/6	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 400-467673/7	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
MRL 400-467673/3	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 467674

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-9	MW-12	Total/NA	Water	SM 4500 SO4 E	
500-173472-10	MW-15	Total/NA	Water	SM 4500 SO4 E	
MB 400-467674/6	Method Blank	Total/NA	Water	SM 4500 SO4 E	
LCS 400-467674/7	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	

General Chemistry (Continued)

Analysis Batch: 467674 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MRL 400-467674/3	Lab Control Sample	Total/NA	Water	SM 4500 SO4 E	
500-173472-9 MS	MW-12	Total/NA	Water	SM 4500 SO4 E	
500-173472-9 MSD	MW-12	Total/NA	Water	SM 4500 SO4 E	

Analysis Batch: 516292

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	SM 2540C	
500-173472-2	MW-08	Total/NA	Water	SM 2540C	
MB 500-516292/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-516292/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 516510

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-3	MW-18	Total/NA	Water	SM 2540C	
500-173472-4	MW-19	Total/NA	Water	SM 2540C	
500-173472-5	MW-17	Total/NA	Water	SM 2540C	
500-173472-6	Duplicate	Total/NA	Water	SM 2540C	
MB 500-516510/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-516510/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 516512

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-7	MW-09	Total/NA	Water	SM 2540C	
500-173472-8	MW-11	Total/NA	Water	SM 2540C	
500-173472-9	MW-12	Total/NA	Water	SM 2540C	
500-173472-10	MW-15	Total/NA	Water	SM 2540C	
MB 500-516512/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 500-516512/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 517228

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	SM 4500 Cl- E	
500-173472-2	MW-08	Total/NA	Water	SM 4500 Cl- E	
500-173472-3	MW-18	Total/NA	Water	SM 4500 Cl- E	
500-173472-4	MW-19	Total/NA	Water	SM 4500 Cl- E	
500-173472-5	MW-17	Total/NA	Water	SM 4500 Cl- E	
500-173472-6	Duplicate	Total/NA	Water	SM 4500 Cl- E	
500-173472-7	MW-09	Total/NA	Water	SM 4500 Cl- E	
500-173472-8	MW-11	Total/NA	Water	SM 4500 Cl- E	
500-173472-9	MW-12	Total/NA	Water	SM 4500 Cl- E	
500-173472-10	MW-15	Total/NA	Water	SM 4500 Cl- E	
MB 500-517228/12	Method Blank	Total/NA	Water	SM 4500 Cl- E	
LCS 500-517228/13	Lab Control Sample	Total/NA	Water	SM 4500 Cl- E	
500-173472-1 MS	MW-01	Total/NA	Water	SM 4500 Cl- E	
500-173472-1 MSD	MW-01	Total/NA	Water	SM 4500 Cl- E	
500-173472-4 MS	MW-19	Total/NA	Water	SM 4500 Cl- E	
500-173472-4 MSD	MW-19	Total/NA	Water	SM 4500 Cl- E	

Analysis Batch: 517561

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	SM 4500 F C	

1 2 3 4 5 6 7 8 9 10 11 12 13 14

General Chemistry (Continued)

Analysis Batch: 517561 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-2	MW-08	Total/NA	Water	SM 4500 F C	
500-173472-3	MW-18	Total/NA	Water	SM 4500 F C	
500-173472-4	MW-19	Total/NA	Water	SM 4500 F C	
500-173472-5	MW-17	Total/NA	Water	SM 4500 F C	
500-173472-6	Duplicate	Total/NA	Water	SM 4500 F C	
500-173472-7	MW-09	Total/NA	Water	SM 4500 F C	
500-173472-8	MW-11	Total/NA	Water	SM 4500 F C	
500-173472-9	MW-12	Total/NA	Water	SM 4500 F C	
500-173472-10	MW-15	Total/NA	Water	SM 4500 F C	
MB 500-517561/3	Method Blank	Total/NA	Water	SM 4500 F C	
MB 500-517561/31	Method Blank	Total/NA	Water	SM 4500 F C	
LCS 500-517561/32	Lab Control Sample	Total/NA	Water	SM 4500 F C	
LCS 500-517561/4	Lab Control Sample	Total/NA	Water	SM 4500 F C	
500-173472-5 MS	MW-17	Total/NA	Water	SM 4500 F C	
500-173472-5 MSD	MW-17	Total/NA	Water	SM 4500 F C	

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 500-517478/1-A
Matrix: Water
Analysis Batch: 517624

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 517478

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		11/26/19 17:10	11/27/19 08:37	1

Lab Sample ID: LCS 500-517478/2-A
Matrix: Water
Analysis Batch: 517624

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 517478

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.500	0.522		mg/L		104	80 - 120

Lab Sample ID: MB 500-518505/1-A
Matrix: Water
Analysis Batch: 518695

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 518505

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lithium	<0.010		0.010		mg/L		12/03/19 17:10	12/04/19 12:49	1

Lab Sample ID: LCS 500-518505/2-A
Matrix: Water
Analysis Batch: 518695

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 518505

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lithium	0.100	0.112		mg/L		112	80 - 120

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 500-517477/1-A
Matrix: Water
Analysis Batch: 517825

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 517477

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:06	11/27/19 20:13	1
Arsenic	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:13	1
Barium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 20:13	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:13	1
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:13	1
Calcium	<0.20		0.20		mg/L		11/26/19 17:06	11/27/19 20:13	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 20:13	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:06	11/27/19 20:13	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:06	11/27/19 20:13	1
Molybdenum	<0.0050		0.0050		mg/L		11/26/19 17:06	11/27/19 20:13	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:06	11/27/19 20:13	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:06	11/27/19 20:13	1

Lab Sample ID: MB 500-517477/1-A
Matrix: Water
Analysis Batch: 517918

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 517477

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<0.050		0.050		mg/L		11/26/19 17:06	11/29/19 11:58	1

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 500-517477/2-A
Matrix: Water
Analysis Batch: 517825

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 517477

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.500	0.499		mg/L		100	80 - 120
Arsenic	0.100	0.0939		mg/L		94	80 - 120
Barium	0.500	0.493		mg/L		99	80 - 120
Beryllium	0.0500	0.0496		mg/L		99	80 - 120
Cadmium	0.0500	0.0492		mg/L		98	80 - 120
Calcium	10.0	8.95		mg/L		89	80 - 120
Chromium	0.200	0.206		mg/L		103	80 - 120
Cobalt	0.500	0.526		mg/L		105	80 - 120
Lead	0.100	0.108		mg/L		108	80 - 120
Molybdenum	1.00	0.931		mg/L		93	80 - 120
Selenium	0.100	0.104		mg/L		104	80 - 120
Thallium	0.100	0.108		mg/L		108	80 - 120

Lab Sample ID: LCS 500-517477/2-A
Matrix: Water
Analysis Batch: 517918

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 517477

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	1.05		mg/L		105	80 - 120

Lab Sample ID: MB 500-517478/1-A
Matrix: Water
Analysis Batch: 517825

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 517478

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.0030		0.0030		mg/L		11/26/19 17:10	11/27/19 21:17	1
Arsenic	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 21:17	1
Barium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 21:17	1
Beryllium	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 21:17	1
Cadmium	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 21:17	1
Calcium	<0.20		0.20		mg/L		11/26/19 17:10	11/27/19 21:17	1
Chromium	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 21:17	1
Cobalt	<0.0010		0.0010		mg/L		11/26/19 17:10	11/27/19 21:17	1
Lead	<0.00050		0.00050		mg/L		11/26/19 17:10	11/27/19 21:17	1
Molybdenum	<0.0050		0.0050		mg/L		11/26/19 17:10	11/27/19 21:17	1
Selenium	<0.0025		0.0025		mg/L		11/26/19 17:10	11/27/19 21:17	1
Thallium	<0.0020		0.0020		mg/L		11/26/19 17:10	11/27/19 21:17	1

Lab Sample ID: MB 500-517478/1-A
Matrix: Water
Analysis Batch: 517918

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 517478

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<0.050		0.050		mg/L		11/26/19 17:10	11/29/19 12:57	1

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 500-517478/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total Recoverable**
Analysis Batch: 517825 **Prep Batch: 517478**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	0.500	0.529		mg/L		106	80 - 120
Arsenic	0.100	0.101		mg/L		101	80 - 120
Barium	2.00	2.11		mg/L		106	80 - 120
Beryllium	0.0500	0.0517		mg/L		103	80 - 120
Cadmium	0.0500	0.0509		mg/L		102	80 - 120
Calcium	10.0	9.17		mg/L		92	80 - 120
Chromium	0.200	0.205		mg/L		103	80 - 120
Cobalt	0.500	0.533		mg/L		107	80 - 120
Lead	0.100	0.109		mg/L		109	80 - 120
Molybdenum	1.00	0.975		mg/L		98	80 - 120
Selenium	0.100	0.104		mg/L		104	80 - 120
Thallium	0.100	0.107		mg/L		107	80 - 120

Lab Sample ID: LCS 500-517478/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total Recoverable**
Analysis Batch: 517918 **Prep Batch: 517478**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.00	1.11		mg/L		111	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 500-516379/12-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516627 **Prep Batch: 516379**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 08:37	1

Lab Sample ID: LCS 500-516379/13-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516627 **Prep Batch: 516379**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00200	0.00183		mg/L		92	80 - 120

Lab Sample ID: MB 500-516382/12-A **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516627 **Prep Batch: 516382**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.00020		0.00020		mg/L		11/20/19 09:25	11/21/19 09:34	1

Lab Sample ID: LCS 500-516382/13-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516627 **Prep Batch: 516382**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00200	0.00196		mg/L		98	80 - 120

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: 500-173472-5 MS
Matrix: Water
Analysis Batch: 516627

Client Sample ID: MW-17
Prep Type: Total/NA
Prep Batch: 516382

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	<0.00020		0.00100	0.00110		mg/L		110	75 - 125

Lab Sample ID: 500-173472-5 MSD
Matrix: Water
Analysis Batch: 516627

Client Sample ID: MW-17
Prep Type: Total/NA
Prep Batch: 516382

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	<0.00020		0.00100	0.00110		mg/L		110	75 - 125	0	20

Lab Sample ID: 500-173472-5 DU
Matrix: Water
Analysis Batch: 516627

Client Sample ID: MW-17
Prep Type: Total/NA
Prep Batch: 516382

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Mercury	<0.00020		<0.00020		mg/L		NC	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 500-516292/1
Matrix: Water
Analysis Batch: 516292

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			11/19/19 21:56	1

Lab Sample ID: LCS 500-516292/2
Matrix: Water
Analysis Batch: 516292

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	250	264		mg/L		106	80 - 120

Lab Sample ID: MB 500-516510/1
Matrix: Water
Analysis Batch: 516510

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			11/20/19 23:05	1

Lab Sample ID: LCS 500-516510/2
Matrix: Water
Analysis Batch: 516510

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	250	266		mg/L		106	80 - 120

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: MB 500-516512/1 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516512

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<10		10		mg/L			11/21/19 04:57	1

Lab Sample ID: LCS 500-516512/2 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 516512

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	250	276		mg/L		110	80 - 120

Method: SM 4500 Cl- E - Chloride, Total

Lab Sample ID: MB 500-517228/12 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<2.0		2.0		mg/L			11/25/19 10:46	1

Lab Sample ID: LCS 500-517228/13 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	49.1		mg/L		98	85 - 115

Lab Sample ID: 500-173472-1 MS **Client Sample ID: MW-01**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	47		50.0	90.5		mg/L		86	75 - 125

Lab Sample ID: 500-173472-1 MSD **Client Sample ID: MW-01**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	47		50.0	89.9		mg/L		85	75 - 125	1	20

Lab Sample ID: 500-173472-4 MS **Client Sample ID: MW-19**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	53		50.0	91.0		mg/L		77	75 - 125

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Method: SM 4500 Cl- E - Chloride, Total (Continued)

Lab Sample ID: 500-173472-4 MSD **Client Sample ID: MW-19**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517228

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	53		50.0	96.4		mg/L		88	75 - 125	6	20

Method: SM 4500 F C - Fluoride

Lab Sample ID: MB 500-517561/3 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.10		0.10		mg/L			11/26/19 17:54	1

Lab Sample ID: MB 500-517561/31 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	<0.10		0.10		mg/L			11/26/19 19:56	1

Lab Sample ID: LCS 500-517561/32 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	20.0	21.4		mg/L		107	80 - 120

Lab Sample ID: LCS 500-517561/4 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	20.0	21.2		mg/L		106	80 - 120

Lab Sample ID: 500-173472-5 MS **Client Sample ID: MW-17**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	0.55		5.00	5.49		mg/L		99	75 - 125

Lab Sample ID: 500-173472-5 MSD **Client Sample ID: MW-17**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 517561

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Fluoride	0.55		5.00	5.57		mg/L		100	75 - 125	1	20

QC Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Method: SM 4500 SO4 E - Sulfate, Total

Lab Sample ID: MB 400-467607/6
Matrix: Water
Analysis Batch: 467607

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			11/26/19 12:34	1

Lab Sample ID: LCS 400-467607/7
Matrix: Water
Analysis Batch: 467607

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	15.0	15.8		mg/L		105	90 - 110

Lab Sample ID: MRL 400-467607/3
Matrix: Water
Analysis Batch: 467607

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	5.00	5.62		mg/L		112	50 - 150

Lab Sample ID: 500-173472-2 MS
Matrix: Water
Analysis Batch: 467607

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	110		10.0	113	4	mg/L		62	77 - 128

Lab Sample ID: 500-173472-2 MSD
Matrix: Water
Analysis Batch: 467607

Client Sample ID: MW-08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	110		10.0	112	4	mg/L		49	77 - 128	1	5

Lab Sample ID: MB 400-467673/6
Matrix: Water
Analysis Batch: 467673

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			11/26/19 20:53	1

Lab Sample ID: LCS 400-467673/7
Matrix: Water
Analysis Batch: 467673

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	15.0	15.9		mg/L		106	90 - 110

Lab Sample ID: MRL 400-467673/3
Matrix: Water
Analysis Batch: 467673

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	5.00	5.62		mg/L		112	50 - 150

Method: SM 4500 SO4 E - Sulfate, Total

Lab Sample ID: MB 400-467674/6 **Client Sample ID: Method Blank**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 467674

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	<5.0		5.0		mg/L			11/26/19 22:53	1

Lab Sample ID: LCS 400-467674/7 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 467674

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	15.0	14.9		mg/L		100	90 - 110

Lab Sample ID: MRL 400-467674/3 **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 467674

Analyte	Spike Added	MRL Result	MRL Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	5.00	5.31		mg/L		106	50 - 150

Lab Sample ID: 500-173472-9 MS **Client Sample ID: MW-12**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 467674

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	280		10.0	281	4	mg/L		0.5	77 - 128

Lab Sample ID: 500-173472-9 MSD **Client Sample ID: MW-12**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 467674

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	280		10.0	281	4	mg/L		1	77 - 128	0	5

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-01 Lab Sample ID: 500-173472-1
Date Collected: 11/13/19 11:20 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 08:45	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:06	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517918	11/29/19 13:04	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:51	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516292	11/19/19 22:52	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	517228	11/25/19 10:49	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 19:38	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		2	467607	11/26/19 13:09	RRC	TAL PEN

Client Sample ID: MW-08 Lab Sample ID: 500-173472-2
Date Collected: 11/13/19 12:30 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 08:50	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:10	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		5	517918	11/29/19 13:08	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:53	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516292	11/19/19 22:55	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 11:57	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 19:42	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	467607	11/26/19 13:09	RRC	TAL PEN

Client Sample ID: MW-18 Lab Sample ID: 500-173472-3
Date Collected: 11/13/19 13:50 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 08:54	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:13	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		5	517918	11/29/19 13:12	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:55	MJG	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-18 Lab Sample ID: 500-173472-3

Date Collected: 11/13/19 13:50 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	516510	11/20/19 23:41	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 11:58	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 19:49	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	467607	11/26/19 13:13	RRC	TAL PEN

Client Sample ID: MW-19 Lab Sample ID: 500-173472-4

Date Collected: 11/13/19 14:42 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 08:59	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:17	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		10	517918	11/29/19 13:16	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:56	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516510	11/20/19 23:43	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	517228	11/25/19 11:59	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 19:52	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	467607	11/26/19 13:13	RRC	TAL PEN

Client Sample ID: MW-17 Lab Sample ID: 500-173472-5

Date Collected: 11/13/19 15:11 **Matrix: Water**
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 09:03	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:21	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		10	517918	11/29/19 13:19	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:58	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516510	11/20/19 23:46	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		25	517228	11/25/19 12:02	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:10	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		30	467607	11/26/19 13:13	RRC	TAL PEN

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-1

Client Sample ID: Duplicate

Lab Sample ID: 500-173472-6

Date Collected: 11/13/19 00:00

Matrix: Water

Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	517624	11/27/19 09:08	JEF	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 22:25	FXG	TAL CHI
Total Recoverable	Prep	3005A			517478	11/26/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6020A		5	517918	11/29/19 13:23	FXG	TAL CHI
Total/NA	Prep	7470A			516382	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 10:09	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516510	11/20/19 23:48	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 12:03	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:19	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	467607	11/26/19 13:13	RRC	TAL PEN

Client Sample ID: MW-09

Lab Sample ID: 500-173472-7

Date Collected: 11/14/19 08:32

Matrix: Water

Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			518505	12/03/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	518695	12/04/19 13:07	JEF	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 20:50	FXG	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		10	517918	11/29/19 12:28	FXG	TAL CHI
Total/NA	Prep	7470A			516379	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:28	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516512	11/21/19 05:28	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		1	517228	11/25/19 12:04	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:34	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	467673	11/26/19 21:34	RRC	TAL PEN

Client Sample ID: MW-11

Lab Sample ID: 500-173472-8

Date Collected: 11/14/19 09:30

Matrix: Water

Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			518505	12/03/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	518695	12/04/19 13:11	JEF	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 20:54	FXG	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		5	517918	11/29/19 12:32	FXG	TAL CHI
Total/NA	Prep	7470A			516379	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:30	MJG	TAL CHI

Lab Chronicle

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Client Sample ID: MW-11 Lab Sample ID: 500-173472-8

Date Collected: 11/14/19 09:30 **Matrix: Water**
Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 2540C		1	516512	11/21/19 05:30	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 12:05	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:37	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		5	467673	11/26/19 21:34	RRC	TAL PEN

Client Sample ID: MW-12 Lab Sample ID: 500-173472-9

Date Collected: 11/14/19 10:17 **Matrix: Water**
Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			518505	12/03/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	518695	12/04/19 13:16	JEF	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 20:58	FXG	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517918	11/29/19 12:49	FXG	TAL CHI
Total/NA	Prep	7470A			516379	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:31	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516512	11/21/19 05:33	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 12:06	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:42	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	467674	11/26/19 23:19	RRC	TAL PEN

Client Sample ID: MW-15 Lab Sample ID: 500-173472-10

Date Collected: 11/14/19 11:53 **Matrix: Water**
Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			518505	12/03/19 17:10	BDE	TAL CHI
Total Recoverable	Analysis	6010C		1	518695	12/04/19 13:20	JEF	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		1	517825	11/27/19 21:02	FXG	TAL CHI
Total Recoverable	Prep	3005A			517477	11/26/19 17:06	BDE	TAL CHI
Total Recoverable	Analysis	6020A		5	517918	11/29/19 12:53	FXG	TAL CHI
Total/NA	Prep	7470A			516379	11/20/19 09:25	MJG	TAL CHI
Total/NA	Analysis	7470A		1	516627	11/21/19 09:33	MJG	TAL CHI
Total/NA	Analysis	SM 2540C		1	516512	11/21/19 05:35	CLB	TAL CHI
Total/NA	Analysis	SM 4500 Cl- E		5	517228	11/25/19 12:06	EAT	TAL CHI
Total/NA	Analysis	SM 4500 F C		1	517561	11/26/19 20:46	MS	TAL CHI
Total/NA	Analysis	SM 4500 SO4 E		10	467674	11/26/19 23:19	RRC	TAL PEN

Laboratory References:

TAL CHI = Eurofins TestAmerica, Chicago, 2417 Bond Street, University Park, IL 60484, TEL (708)534-5200

TAL PEN = Eurofins TestAmerica, Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Accreditation/Certification Summary

Client: KPRG and Associates, Inc. Job ID: 500-173472-1
Project/Site: Powerton CCR

Laboratory: Eurofins TestAmerica, Chicago

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Illinois	NELAP	100201	04-30-20

Laboratory: Eurofins TestAmerica, Pensacola

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alabama	State	40150	07-01-20
ANAB	ISO/IEC 17025	L2471	02-22-20
Arizona	State	AZ0710	01-12-20
Arkansas DEQ	State	88-0689	09-01-20
California	State	2510	07-01-20
Florida	NELAP	E81010	06-30-20
Georgia	State	E81010(FL)	06-30-20
Iowa	State	367	08-01-20
Iowa	State Program	367	08-01-20
Kansas	NELAP	E-10253	08-16-20
Kentucky (UST)	State	53	06-30-20
Kentucky (UST)	State Program	53	06-30-20
Kentucky (WW)	State	KY98030	12-30-19
Louisiana	NELAP	30976	06-30-20
Louisiana	NELAP	30976	06-30-20
Louisiana (DW)	NELAP	LA017	12-31-19
Louisiana (DW)	State	<cert No.>	12-31-19
Maryland	State	233	09-30-20
Massachusetts	State	M-FL094	06-30-20
Michigan	State	9912	05-06-20
Minnesota	NELAP	012-999-481	12-31-19
New Jersey	NELAP	FL006	07-30-20
North Carolina (WW/SW)	State	314	12-31-19
North Carolina (WW/SW)	State Program	314	12-31-19
Oklahoma	State	9810-186	08-31-20
Pennsylvania	NELAP	68-00467	01-31-20
Rhode Island	State	LAO00307	12-30-19
Rhode Island	State Program	LAO00307	12-30-19
South Carolina	State	96026002	06-30-20
South Carolina	State Program	96026	06-30-20
Tennessee	State	TN02907	06-30-20
Texas	NELAP	T104704286	09-30-20
US Fish & Wildlife	Federal	LE058448-0	07-31-20
US Fish & Wildlife	US Federal Programs	LE058448	06-07-20
USDA	Federal	P330-18-00148	05-17-21
USDA	US Federal Programs	P330-18-00148	05-17-21
Virginia	NELAP	460166	06-14-20
Washington	State	C915	05-15-20
West Virginia DEP	State	136	06-30-20

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

500-173472 COC

Lab Job #: 500-173472
Chain of Custody Number:
Page 1 of 1
Temperature °C of Cooler: 3.3, 7.9 (0.7 = 1.7)

Client: KPRG
Client Project #: 12313.1
Project Name: Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM:

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Pres. 3)	Sulfate (Pres. 8)	TDS, Cl, Fl (Pres. 8)	Rad 226/228 (Pres. 3)						Comments
1		MW-01	11/13/19	1120	6	GW	X	X	X	X						
2		MW-08	↓	1230	↓	↓	↓	↓	↓	↓						
3		MW-18	↓	1350	↓	↓	↓	↓	↓	↓						
4		MW-19	↓	1442	↓	↓	↓	↓	↓	↓						
5		MW-17	↓	1511	↓	↓	↓	↓	↓	↓						
6		Duplicate	↓	–	↓	↓	↓	↓	↓	↓						

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days _______ Other
Requested Due Date ___________

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	11/13/19	1630	FEDEX		11/13/19	1630

Lab Courier ☐
Shipped ☐
Hand Delivered ☐

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone: 500-173472 COC
Fax:
PO#/Reference#

Chain of Custody Record

Lab Job #: 500-173472

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler:

Client: KPRG
Client Project #: 12313.1
Project Name: Powerton CCR
Project Location/State: Pekin IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Sulfate (Preservative 8)	TDS, Cl, Fl (Preservative 8)	Rad 226/228 (Preservative 3)						Comments
1		MW-09	11/14/19	0832	6	GW	X	X	X	X						
2		MW-11	↓	0930	↓	↓	↓	↓	↓	↓						
3		MW-12	↓	1017	↓	↓	↓	↓	↓	↓						
4		MW-15	↓	1153	↓	↓	↓	↓	↓	↓						

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days _______ Other
Requested Due Date ___________

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	11/14/19	1400	FEDEX		11/14/19	1400
				[signature]	TA	11-15-19	0855

Lab Courier
Shipped
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)
12/5/2019

500-173472 Waybill

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA

414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 36.00 LB
CAD: 6994779/SSFE2021
DIMS: 15x12x10 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

28 qt.

UNIVERSITY PARK IL 60484
(708) 534-5200 REF:
INV:
PO: DEPT:

FedEx
Express

E

1 of 3

TRK# 0201 7780 1128 6391

THU - 14 NOV 10:30A
PRIORITY OVERNIGHT

MASTER

XH JOTA

60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 45.00 LB
CAD: 6994779/SSFE2021
DIMS: 24x18x12 IN
BILL THIRD PARTY

Part # 15

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

RT 519 5 10:30
ST 16

UNIVERSITY PARK IL 60484
(708) 534-5200 REF:
INV:
PO: DEPT:

48 qt

9/20

FedEx Express

E

J192119091901uv

3 of 3
MPS# 0263 7780 1128 6417
Mstr# 7780 1128 6391
0201

THU – 14 NOV 10:30A
PRIORITY OVERNIGHT

XH JOTA

60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 65.00 LB
CAD: 6994779/SSFE2021
DIMS: 24x18x12 IN
BILL THIRD PARTY

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

500-173472

48 qt.

UNIVERSITY PARK IL 60484
(708) 534-5200 REF:
INV:
PO: DEPT:

FedE
Expre

E

2 of 3
MPS# 0263 7780 1128 6406
Mstr# 7780 1128 6391
0201

THU – 14 NOV
PRIORITY

XH JOTA

RT 519 5 10:30
ST 16

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

ST 21

18x12 IN

SSFE2021

BILL T

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(708) 534-5200
INV:
PO: REF:
DEPT:

500-173472 Waybill

FedEx
Express

E

4 of 4

MPS# 7780 3439 9763
0263
Mstr# 7780 3439 9730

FRI - 15 NOV 3:00P
STANDARD OVERNIGHT

0201

XH JOTA

60484
IL-US ORD

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-128618.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-173472-1
Address: 13715 Rider Trail North,	Due Date Requested: 11/26/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)

Other:

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
				Preservation Code:							
MW-01 (500-173472-1)	11/13/19	11:20 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-08 (500-173472-2)	11/13/19	12:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-18 (500-173472-3)	11/13/19	13:50 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-19 (500-173472-4)	11/13/19	14:42 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-17 (500-173472-5)	11/13/19	15:11 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
Duplicate (500-173472-6)	11/13/19	Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify) | Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 11/14/19 1600	Company: TA	Received by: [signature]	Date/Time: 11/15/19 08:55	Company: TASTL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks:		

Ver: 01/16/2019

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

eurofins Environment Testing TestAmerica

Chain of Custody Record

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-128687.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-173472-1
Address: 3355 McLemore Drive, ,	Due Date Requested: 11/27/2019			
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM4500_SO4_E	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-01 (500-173472-1)	11/13/19	11:20 Central		Water			X	1	
MW-08 (500-173472-2)	11/13/19	12:30 Central		Water			X	1	
MW-18 (500-173472-3)	11/13/19	13:50 Central		Water			X	1	
MW-19 (500-173472-4)	11/13/19	14:42 Central		Water			X	1	
MW-17 (500-173472-5)	11/13/19	15:11 Central		Water			X	1	
Duplicate (500-173472-6)	11/13/19	Central		Water			X	1	
MW-09 (500-173472-7)	11/14/19	08:32 Central		Water			X	1	
MW-11 (500-173472-8)	11/14/19	09:30 Central		Water			X	1	
MW-12 (500-173472-9)	11/14/19	10:17 Central		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ________ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:		Method of Shipment:
Relinquished by: [signature]	Date/Time: 11/18/19 1500	Company: TA	Received by: [signature]	Date/Time: 11-19-19 906	Company: TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 0.3°C IR7		

Ver: 01/16/2019

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins | Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-128687.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-173472-1
Address: 3355 McLemore Drive, ,	Due Date Requested: 11/27/2019			
City: Pensacola	TAT Requested (days):			
State, Zip: FL, 32514				
Phone: 850-474-1001(Tel) 850-478-2671(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SM4500_SO4_E	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
MW-15 (500-173472-10)	11/14/19	11:53 Central		Water			X	1	

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. I

Possible Hazard Identification

Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:	Method of Shipment:	
Relinquished by: [signature]	Date/Time: 11/18/19 1500	Company: TA	Received by: [signature]	Date/Time: 11.19.19 906	Company: TA
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 0.3°C IR7		

Ver: 01/16/2019

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14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Part # 159469-434 RIT EXP 07/20

0.3°c Ecs IR7

ORIGIN ID:JOTA (708) 534-5200
SAMPLE LOGIN
TESTAMERICA LABS
2417 BOND ST

UNIVERSITY PARK, IL 60484
UNITED STATES US

SHIP DATE: 18NOV19
ACTWGT: 23.00 LB MAN
CAD: 33264/CAFE3211

BILL RECIPIENT

TO **SAMPLE RECEIVING**
TESTAMERICA PENSACOLA
3355 MCLEMORE DR.

PENSACOLA FL 32514
(850) 474-1001
REF: 173472 SS

551C1/FE330/104C

FedEx
Express

E

J181118080501uv

TUE - 19 NOV 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **4059 7183 8407**

XH PNSA

32514
FL-US **BFM**

SIGNATURE

DATE

eurofins

Enviror
TestAm

Custody Seal

956823

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. Job Number: 500-173472-1

Login Number: 173472 **List Source: Eurofins TestAmerica, Chicago**
List Number: 1
Creator: James, Jeff A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.3,3.9,1.7, 1.3
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. | Job Number: 500-173472-1

Login Number: 173472
List Number: 4
Creator: Brown, Nathan

List Source: Eurofins TestAmerica, Pensacola
List Creation: 11/19/19 05:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.3°C IR7
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing
TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-173472-2
Client Project/Site: Powerton CCR

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Therese Hargraves

Authorized for release by:
12/11/2019 2:52:36 PM
Therese Hargraves, Project Manager I
(708)793-3461
therese.hargraves@testamericainc.com

Designee for

Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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1 2 3 4 5 6 7 8 9 10 11 12 13 14

Job ID: 500-173472-2

Laboratory: Eurofins TestAmerica, Chicago

Narrative

Job Narrative
500-173472-2

Comments
No additional comments.

Receipt
The samples were received on 11/14/2019 9:40 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 4 coolers at receipt time were 1.3º C, 1.7º C, 3.3º C and 3.9º C.

RAD
Method 903.0: Radium-226 Prep Batch 160-450986
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

MW-01 (500-173472-1), MW-08 (500-173472-2), MW-18 (500-173472-3), MW-19 (500-173472-4), MW-17 (500-173472-5), Duplicate (500-173472-6), MW-09 (500-173472-7), MW-11 (500-173472-8), MW-12 (500-173472-9), MW-15 (500-173472-10), (LCS 160-450986/1-A), (MB 160-450986/21-A), (440-254611-T-1-A) and (440-254611-U-1-A DU)

Method 904.0: Radium-228 Prep Batch 160-450991

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
MW-01 (500-173472-1), MW-08 (500-173472-2), MW-18 (500-173472-3), MW-19 (500-173472-4), MW-17 (500-173472-5), Duplicate (500-173472-6), MW-09 (500-173472-7), MW-11 (500-173472-8), MW-12 (500-173472-9), MW-15 (500-173472-10), (LCS 160-450991/1-A), (MB 160-450991/21-A), (440-254611-T-1-B) and (440-254611-U-1-B DU)

Method PrecSep_0: Radium 228 Prep Batch 160-450991:

This observation narrative is for the following samples:MW-08 (500-173472-2), MW-18 (500-173472-3), MW-17 (500-173472-5), MW-09 (500-173472-7) and MW-11 (500-173472-8). Samples 500-173472-2, 3, 5, and 7 had light yellow discoloration with tiny particles. Sample 500-173472-1 was reduced due to sediment and cloudy yellow discoloration. Sample 500-173472-8 was reduced due to sediment and pale yellow discoloration. Sample 440-254626-1 was reduced due to insufficient volume.

Method PrecSep-21: Radium 226 Prep Batch 160-450986:

This observation narrative is for the following samples:MW-01 (500-173472-1), MW-08 (500-173472-2), MW-18 (500-173472-3), MW-17 (500-173472-5), Duplicate (500-173472-6), MW-09 (500-173472-7) and MW-11 (500-173472-8). Samples 500-173472-2, 3, 5, and 7 had light yellow discoloration with tiny particles. Sample 500-173472-1 was reduced due to sediment and cloudy yellow discoloration. Sample 500-173472-8 was reduced due to sediment and pale yellow discoloration. Sample 440-254626-1 was reduced due to insufficient volume.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
500-173472-1	MW-01	Water	11/13/19 11:20	11/14/19 09:40	
500-173472-2	MW-08	Water	11/13/19 12:30	11/14/19 09:40	
500-173472-3	MW-18	Water	11/13/19 13:50	11/14/19 09:40	
500-173472-4	MW-19	Water	11/13/19 14:42	11/14/19 09:40	
500-173472-5	MW-17	Water	11/13/19 15:11	11/14/19 09:40	
500-173472-6	Duplicate	Water	11/13/19 00:00	11/14/19 09:40	
500-173472-7	MW-09	Water	11/14/19 08:32	11/15/19 08:55	
500-173472-8	MW-11	Water	11/14/19 09:30	11/15/19 08:55	
500-173472-9	MW-12	Water	11/14/19 10:17	11/15/19 08:55	
500-173472-10	MW-15	Water	11/14/19 11:53	11/15/19 08:55	

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-01

Lab Sample ID: 500-173472-1

Date Collected: 11/13/19 11:20

Matrix: Water

Date Received: 11/14/19 09:40

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.314**		0.180	0.182	1.00	0.243	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.0*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.569	U	0.491	0.494	1.00	0.779	pCi/L	11/18/19 18:54	11/22/19 13:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.0*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:18*	*1*
Y Carrier	*79.3*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:18*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.884**		0.523	0.526	5.00	0.779	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: MW-08

Date Collected: 11/13/19 12:30
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-2

Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.116**		0.0701	0.0708	1.00	0.0923	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.1*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0773	U	0.286	0.286	1.00	0.498	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.1*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*77.4*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.193	U	0.294	0.295	5.00	0.498	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-18

Lab Sample ID: 500-173472-3

Date Collected: 11/13/19 13:50
Date Received: 11/14/19 09:40

Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.233**		0.107	0.109	1.00	0.130	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.9*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0795	U	0.280	0.280	1.00	0.490	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.9*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*78.1*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.313	U	0.300	0.300	5.00	0.490	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-19

Date Collected: 11/13/19 14:42
Date Received: 11/14/19 09:40

Lab Sample ID: 500-173472-4
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.114**		0.0800	0.0806	1.00	0.113	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.9*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.277	U	0.276	0.277	1.00	0.447	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*83.9*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*80.0*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.391	U	0.287	0.288	5.00	0.447	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-2
Project/Site: Powerton CCR

Client Sample ID: MW-17 **Lab Sample ID: 500-173472-5**
Date Collected: 11/13/19 15:11 **Matrix: Water**
Date Received: 11/14/19 09:40

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.346**		0.112	0.117	1.00	0.114	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.7*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.297	U	0.305	0.306	1.00	0.496	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.7*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*75.1*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.643**		0.325	0.328	5.00	0.496	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-2
Project/Site: Powerton CCR

Client Sample ID: Duplicate Lab Sample ID: 500-173472-6

Date Collected: 11/13/19 00:00 **Matrix: Water**
Date Received: 11/14/19 09:40

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0767	U	0.0778	0.0781	1.00	0.124	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.9*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.381	U	0.264	0.266	1.00	0.409	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.9*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*77.0*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.458**		0.275	0.277	5.00	0.409	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc. Job ID: 500-173472-2
Project/Site: Powerton CCR

Client Sample ID: MW-09 Lab Sample ID: 500-173472-7

Date Collected: 11/14/19 08:32 **Matrix: Water**
Date Received: 11/15/19 08:55

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.113	U	0.0794	0.0800	1.00	0.114	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.302	U	0.283	0.285	1.00	0.457	pCi/L	11/18/19 18:54	11/22/19 13:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*
Y Carrier	*76.3*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:19*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.415	U	0.294	0.296	5.00	0.457	pCi/L		12/11/19 08:45	1

Client Sample Results

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-11

Lab Sample ID: 500-173472-8

Date Collected: 11/14/19 09:30
Date Received: 11/15/19 08:55

Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	1.05		0.207	0.228	1.00	0.165	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.7*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.59		0.529	0.549	1.00	0.731	pCi/L	11/18/19 18:54	11/22/19 13:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.7*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*
Y Carrier	*75.5*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.64		0.568	0.594	5.00	0.731	pCi/L		12/11/19 08:45	1

Client Sample Results

Client Sample ID: MW-12
Date Collected: 11/14/19 10:17
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-9
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0821	U	0.0891	0.0894	1.00	0.144	pCi/L	11/18/19 17:31	12/10/19 05:41	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.7*		*40 - 110*	*11/18/19 17:31*	*12/10/19 05:41*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.486	U	0.347	0.350	1.00	0.543	pCi/L	11/18/19 18:54	11/22/19 13:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.7*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*
Y Carrier	*75.9*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.568**		0.358	0.361	5.00	0.543	pCi/L		12/11/19 08:45	1

Client Sample ID: MW-15
Date Collected: 11/14/19 11:53
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-10
Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0937	U	0.0715	0.0720	1.00	0.104	pCi/L	11/18/19 17:31	12/10/19 07:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.2*		*40 - 110*	*11/18/19 17:31*	*12/10/19 07:50*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0442	U	0.268	0.268	1.00	0.475	pCi/L	11/18/19 18:54	11/22/19 13:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.2*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*
Y Carrier	*75.1*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.138	U	0.277	0.278	5.00	0.475	pCi/L		12/11/19 08:45	1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Association Summary

Rad

Prep Batch: 450986

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	PrecSep-21	
500-173472-2	MW-08	Total/NA	Water	PrecSep-21	
500-173472-3	MW-18	Total/NA	Water	PrecSep-21	
500-173472-4	MW-19	Total/NA	Water	PrecSep-21	
500-173472-5	MW-17	Total/NA	Water	PrecSep-21	
500-173472-6	Duplicate	Total/NA	Water	PrecSep-21	
500-173472-7	MW-09	Total/NA	Water	PrecSep-21	
500-173472-8	MW-11	Total/NA	Water	PrecSep-21	
500-173472-9	MW-12	Total/NA	Water	PrecSep-21	
500-173472-10	MW-15	Total/NA	Water	PrecSep-21	
MB 160-450986/21-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-450986/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 450991

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
500-173472-1	MW-01	Total/NA	Water	PrecSep_0	
500-173472-2	MW-08	Total/NA	Water	PrecSep_0	
500-173472-3	MW-18	Total/NA	Water	PrecSep_0	
500-173472-4	MW-19	Total/NA	Water	PrecSep_0	
500-173472-5	MW-17	Total/NA	Water	PrecSep_0	
500-173472-6	Duplicate	Total/NA	Water	PrecSep_0	
500-173472-7	MW-09	Total/NA	Water	PrecSep_0	
500-173472-8	MW-11	Total/NA	Water	PrecSep_0	
500-173472-9	MW-12	Total/NA	Water	PrecSep_0	
500-173472-10	MW-15	Total/NA	Water	PrecSep_0	
MB 160-450991/21-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-450991/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

QC Sample Results

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-450986/21-A
Matrix: Water
Analysis Batch: 453777
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 450986

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.01935	U	0.0610	0.0610	1.00	0.112	pCi/L	11/18/19 17:40	12/10/19 07:50	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.2*		*40 - 110*	*11/18/19 17:40*	*12/10/19 07:50*	*1*

Lab Sample ID: LCS 160-450986/1-A
Matrix: Water
Analysis Batch: 453777
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 450986

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-226	11.3	10.72		1.10	1.00	0.0992	pCi/L	94	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*92.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-450991/21-A
Matrix: Water
Analysis Batch: 451601
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 450991

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.08470	U	0.248	0.249	1.00	0.431	pCi/L	11/18/19 18:54	11/22/19 13:20	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.2*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*
Y Carrier	*78.9*		*40 - 110*	*11/18/19 18:54*	*11/22/19 13:20*	*1*

Lab Sample ID: LCS 160-450991/1-A
Matrix: Water
Analysis Batch: 451695
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 450991

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits
Radium-228	9.37	10.48		1.26	1.00	0.573	pCi/L	112	75 - 125

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*92.8*		*40 - 110*
Y Carrier	*76.3*		*40 - 110*

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-01

Lab Sample ID: 500-173472-1

Date Collected: 11/13/19 11:20
Date Received: 11/14/19 09:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:18	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-08

Lab Sample ID: 500-173472-2

Date Collected: 11/13/19 12:30
Date Received: 11/14/19 09:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-18

Lab Sample ID: 500-173472-3

Date Collected: 11/13/19 13:50
Date Received: 11/14/19 09:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-19

Lab Sample ID: 500-173472-4

Date Collected: 11/13/19 14:42
Date Received: 11/14/19 09:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-17 Lab Sample ID: 500-173472-5
Date Collected: 11/13/19 15:11 Matrix: Water
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: Duplicate Lab Sample ID: 500-173472-6
Date Collected: 11/13/19 00:00 Matrix: Water
Date Received: 11/14/19 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-09 Lab Sample ID: 500-173472-7
Date Collected: 11/14/19 08:32 Matrix: Water
Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:19	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-11 Lab Sample ID: 500-173472-8
Date Collected: 11/14/19 09:30 Matrix: Water
Date Received: 11/15/19 08:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:20	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Lab Chronicle

Client: KPRG and Associates, Inc.
Project/Site: Powerton CCR

Job ID: 500-173472-2

Client Sample ID: MW-12
Date Collected: 11/14/19 10:17
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 05:41	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:20	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Client Sample ID: MW-15
Date Collected: 11/14/19 11:53
Date Received: 11/15/19 08:55

Lab Sample ID: 500-173472-10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep-21			450986	11/18/19 17:31	ORM	TAL SL
Total/NA	Analysis	903.0		1	453777	12/10/19 07:50	KLS	TAL SL
Total/NA	Prep	PrecSep_0			450991	11/18/19 18:54	ORM	TAL SL
Total/NA	Analysis	904.0		1	451601	11/22/19 13:20	KLS	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	453917	12/11/19 08:45	SMP	TAL SL

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Laboratory: Eurofins TestAmerica, Chicago

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Illinois	NELAP	100201	04-30-20

Laboratory: Eurofins TestAmerica, St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Illinois	NELAP	200023	11-30-19 *

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
903.0	PrecSep-21	Water	Radium-226
904.0	PrecSep_0	Water	Radium-228
Ra226_Ra228		Water	Combined Radium 226 + 228

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Report To (optional)	Bill To (optional)
Contact:	Contact:
Company:	Company:
Address:	Address:
Address:	Address:
Phone:	Phone:
Fax:	Fax:
E-Mail:	PO#/Reference#

500-173472 COC

Chain of Custody Record

Lab Job #: 500-173472

Chain of Custody Number:

Page 1 of 1

Temperature °C of Cooler: 3.3, 2.9 (Dr-1.7)

Client: KPRG
Client Project #: 12313.1
Project Name: Powerton CCR
Project Location/State: Pekin, IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM:

Preservative							3	8	8	3					
Parameter							Total Metals	Sulfate	TDS, Cl, Fl	Rad 226/228					
Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix									Comments
1		MW-01	11/13/19	1120	6	GW	X	X	X	X					
2		MW-08	↓	1230	↓	↓	↓	↓	↓	↓					
3		MW-18		1350											
4		MW-19		1442											
5		MW-17		1511											
6		Duplicate	↓	—	↓	↓	↓	↓	↓	↓					

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
__ 1 Day __ 2 Days __ 5 Days __ 7 Days __ 10 Days __ 15 Days ____ Other
Requested Due Date ______

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	11/13/19	1630	FEDEX		11/13/19	1630
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier ☐
Shipped ☐
Hand Delivered ☐

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

Report To (optional)
Contact:
Company:
Address:
Address:
Phone:
Fax:
E-Mail:

Bill To (optional)
Contact:
Company:
Address:
Address:
Phone: 500-173472 COC
Fax:
PO#/Reference#

Lab Job #: 500-173472
Chain of Custody Number:
Page 1 of 1
Temperature °C of Cooler:

Client: KPRG
Client Project #: 12313.1
Project Name: Powerton CCR
Project Location/State: Pekin IL
Lab Project #:
Sampler: Mitchel Dolan
Lab PM: Eric Lang

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Total Metals (Preservative 3)	Sulfate (Preservative 8)	TDS, Cl, Fl (Preservative 8)	Rad 226/228 (Preservative 3)						Comments
1		MW-09	11/14/19	0832	6	GW	X	X	X	X						
2		MW-11	↓	0930	↓	↓	↓	↓	↓	↓						
3		MW-12	↓	1017	↓	↓	↓	↓	↓	↓						
4		MW-15	↓	1153	↓	↓	↓	↓	↓	↓						

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days _______ Other
Requested Due Date ____________

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
[signature]	KPRG	11/14/19	1400	FEDEX		11/14/19	1400
				[signature]	TA	11-15-19	0855

Lab Courier:
Shipped:
Hand Delivered:

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)
12/11/2019

500-173472 Waybill

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA

414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 36.00 LB
CAD: 6994779/SSFE2021
DIMS: 15x12x10 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484

28 gt.

(708) 534-5200 REF:
INV:
PO: DEPT:

FedEx
Express

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1 of 3

TRK# 0201 7780 1128 6391

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PRIORITY OVERNIGHT

MASTER

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60484
IL-US ORD

ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA

414 PLAZA DR STE 106

WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 45.00 LB
CAD: 6994779/SSFE2021
DIMS: 24x18x12 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

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UNIVERSITY PARK IL 60484
(708) 534-5200 REF:
INV:
PO: DEPT:

48 qt

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3 of 3

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Mstr# 7780 1128 6391

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PRIORITY OVERNIGHT

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ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA

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WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 13NOV19
ACTWGT: 65.00 LB
CAD: 6994779/SSFE2021
DIMS: 24x18x12 IN

BILL THIRD PARTY

TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

500-173472

48 qt

UNIVERSITY PARK IL 60484
(708) 634-5200 REF:
INV:
PO: DEPT:

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2 of 3

MPS# 0263 7780 1128 6406

Mstr# 7780 1128 6391

THU – 14 NOV
PRIORITY

0201

XH JOTA

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ORIGIN ID:PIAA (262) 622-1143
TEST AMERICA
414 PLAZA DR STE 106
WESTMONT, IL 60559
UNITED STATES US

SHIP DATE: 21

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SSFE2021

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TO SAMPLE RECEIVING
TEST AMERICA
2417 BOND ST

UNIVERSITY PARK IL 60484
(708) 534-5200

INV:
PO: REF:

DEPT:

500-173472 Waybill

Part # 156297-435 RIT2 EXP 09/20

FedEx
Express

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J192119091901uv

4 of 4

MPS# 7780 3439 9763
0263
Mstr# 7780 3439 9730
0201

FRI - 15 NOV 3:00P
STANDARD OVERNIGHT

XH JOTA

60484
IL-US ORD

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information (Sub Contract Lab)

Client Contact:	Shipping/Receiving	Sampler:	
Company:	TestAmerica Laboratories, Inc.	Phone:	
Address:	13715 Rider Trail North,	Lab PM:	Lang, Eric A.
City:	Earth City	E-Mail:	eric.lang@testamericainc.com
State, Zip:	MO, 63045	Carrier Tracking No(s):	
Phone:	314-298-8566(Tel) 314-298-8757(Fax)	State of Origin:	Illinois
Email:		COC No:	500-128618.1
Project Name:	Powerton CCR	Page:	Page 1 of 1
Site:	MWG - Powerton	Job #:	500-173472-1
Due Date Requested:	11/26/2019	Accreditations Required (See note):	NELAP - Illinois
TAT Requested (days):		PO #:	
WO #:		Project #:	50011612
SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-01 (500-173472-1)	11/13/19	11:20 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-08 (500-173472-2)	11/13/19	12:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-18 (500-173472-3)	11/13/19	13:50 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-19 (500-173472-4)	11/13/19	14:42 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-17 (500-173472-5)	11/13/19	15:11 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
Duplicate (500-173472-6)	11/13/19	Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Deliverable Requested: I, II, III, IV, Other (specify)
Primary Deliverable Rank: 2

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Special Instructions/QC Requirements:

Empty Kit Relinquished by: Date: Time: Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	11/14/19 1600	TA	[signature]	11/15/19 08:55	TASTL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No
Custody Seal No.:
Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Phone: 708-534-5200 Fax: 708-534-5211

Chain of Custody Record

eurofins Environment Testing TestAmerica

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Lang, Eric A.	Carrier Tracking No(s):	COC No: 500-128655.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: eric.lang@testamericainc.com	State of Origin: Illinois	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note): NELAP - Illinois		Job #: 500-173472-2
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/26/2019			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Powerton CCR	Project #: 50011612			
Site: MWG - Powerton	SSOW#:			

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_21 Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-09 (500-173472-7)	11/14/19	08:32 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-11 (500-173472-8)	11/14/19	09:30 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-12 (500-173472-9)	11/14/19	10:17 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs
MW-15 (500-173472-10)	11/14/19	11:53 Central		Water			X	X	X	3	Full QC needed (dups, etc) Batch QC must be performed (dup, spikes, etc) - no NCMs

Note: Since laboratory accreditations are subject to change, TestAmerica Laboratories, Inc. places the ownership of method, analyte & accreditation compliance upon out subcontract laboratories. This sample shipment is forwarded under chain-of-custody. If the laboratory does not currently maintain accreditation in the State of Origin listed above for analysis/tests/matrix being analyzed, the samples must be shipped back to the TestAmerica laboratory or other instructions will be provided. Any changes to accreditation status should be brought to TestAmerica Laboratories, Inc. attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said compliance to TestAmerica Laboratories, Inc.

Possible Hazard Identification
Unconfirmed

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ______ *Months*

Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:	Time:		Method of Shipment:
Relinquished by: [signature]	Date/Time: 11/15/19 1700	Company: TA	Received by: [signature]	Date/Time: 11-16-19 08:50	Company: TA STL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. Job Number: 500-173472-2

Login Number: 173472 **List Source: Eurofins TestAmerica, Chicago**
List Number: 1
Creator: James, Jeff A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	3.3,3.9,1.7, 1.3
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc. | Job Number: 500-173472-2

Login Number: 173472
List Number: 2
Creator: Harris, Lorin C

List Source: Eurofins TestAmerica, St. Louis
List Creation: 11/15/19 01:49 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Login Sample Receipt Checklist

Client: KPRG and Associates, Inc.

Job Number: 500-173472-2

Login Number: 173472
List Number: 3
Creator: Hellm, Michael

List Source: Eurofins TestAmerica, St. Louis
List Creation: 11/16/19 10:16 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	24.0
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: KPRG and Associates, Inc.
Job ID: 500-173472-2
Project/Site: Powerton CCR

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)
500-173472-1	MW-01	86.0
500-173472-2	MW-08	90.1
500-173472-3	MW-18	77.9
500-173472-4	MW-19	83.9
500-173472-5	MW-17	85.7
500-173472-6	Duplicate	97.9
500-173472-7	MW-09	94.0
500-173472-8	MW-11	93.7
500-173472-9	MW-12	82.7
500-173472-10	MW-15	87.2
LCS 160-450986/1-A	Lab Control Sample	92.8
MB 160-450986/21-A	Method Blank	95.2

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba Carrier (40-110)	Y Carrier (40-110)
500-173472-1	MW-01	86.0	79.3
500-173472-2	MW-08	90.1	77.4
500-173472-3	MW-18	77.9	78.1
500-173472-4	MW-19	83.9	80.0
500-173472-5	MW-17	85.7	75.1
500-173472-6	Duplicate	97.9	77.0
500-173472-7	MW-09	94.0	76.3
500-173472-8	MW-11	93.7	75.5
500-173472-9	MW-12	82.7	75.9
500-173472-10	MW-15	87.2	75.1
LCS 160-450991/1-A	Lab Control Sample	92.8	76.3
MB 160-450991/21-A	Method Blank	95.2	78.9

Tracer/Carrier Legend

Ba Carrier = Ba Carrier
Y Carrier = Y Carrier

eurofins | Environment Testing TestAmerica

1 2 3 4 5 6 7 8 9 10 11 12 13 14

ANALYTICAL REPORT

Eurofins TestAmerica, Chicago
2417 Bond Street
University Park, IL 60484
Tel: (708)534-5200

Laboratory Job ID: 500-175686-1
Client Project/Site: Powerton CCR

For:
KPRG and Associates, Inc.
14665 West Lisbon Road,
Suite 1A
Brookfield, Wisconsin 53005

Attn: Richard Gnat

Authorized for release by:
1/7/2020 6:54:04 AM

Eric Lang, Manager of Project Management
(708)534-5200
eric.lang@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

ATTACHMENT 5

2nd January
Lucha de las comunidades logra convertir en ley prohibición del depósito de cenizas

Lucha de las comunidades logra convertir en ley prohibición del depósito de cenizas

El DRNA tendrá tres meses para aprobar un reglamento basado en el nuevo estatuto

[https://1.bp.blogspot.com/-zjMeUu-WpbM/Xg58_7cyHCI/AAAAAAAACwc/hHE11gRqhaQtgjyBTupJRmz0phZvUZ44wCLcBGAsYHQ/s1600/Dile%2BNO%2Bal%2Bhijo%2Bdel%2Bcarb%25C3%25B3n%2B4ago19%2B%252810%2529.jpg]

Peñuelas, Puerto Rico – Luego de años de luchas, persecución y represión por parte del gobierno, violación de derechos civiles por parte de la policía y casi 100 arrestos, activistas comunitarios y ambientales lograron que el actual gobierno convirtiera en ley el proyecto que finalmente prohíbe en Puerto Rico el depósito de cenizas tóxicas de carbón, incluyendo su mezcla hidratada.

El Proyecto del Senado 1221, ahora convertido en ley, enmendó la controversial Ley 40 aprobada en el 2017 por Ricardo Rosselló Nevares, la cual causó las mayores confrontaciones en Peñuelas y Guayama, entre activistas y la policía de Puerto Rico quien fungió como protectora y escolta de los camiones repletos de cenizas tóxicas provenientes de la carbonera AES.

Yanina Moreno Febre, portavoz del Campamento contra Cenizas en Peñuelas, catalogó como un gran logro para el pueblo la aprobación de esta ley.

“Con muchos sacrificios, de tantas personas que se unieron a esta lucha, hemos logrado cambiar la posición del gobierno sobre el depósito de cenizas tóxicas en Puerto Rico. Esta ley es un logro de todos y todas. Ahora hay que presionar al Departamento de Recursos Naturales y Ambientales (DRNA) para que en tres meses apruebe el reglamento mandato por la ley. Esa agencia, que en este momento no tiene a nadie dirigiéndola, en el pasado no ha cumplido con los parámetros de tiempo que se le han dado. Nosotros la haremos cumplir en esta ocasión”, aseguró Moreno.

Por su parte, José Manolo Díaz Pérez, líder ambiental de Peñuelas, reseñó la participación nefasta que tuvieron los gobernantes en la contaminación causada por las cenizas en la isla.

"Gobernadores del PPD y del PNP permitieron el depósito de millones de toneladas de cenizas de carbón cercano a residencias, sobre acuíferos y cercanos a cuerpos de agua, ocasionando un daño terrible a la salud de las personas y residentes cercano a estos lugares. Las administraciones de Alejandro García Padilla y de Ricardo Rosselló Nevares permitieron llevar esa basura tóxica a los vertederos Humacao y Peñuelas, que no están capacitados para manejar esos desperdicios", expresó.

"Otros personajes que no podemos olvidar son: Eduardo Bhatia y el actual presidente del PPD, Anibal José Torres, quienes, mientras fueron presidente del Senado y presidente de la Comisión de Reglas y Calendarios del Senado, respectivamente, engavetaron el PS 340 para prohibir las cenizas; Pedro Pierlusi, que fue cabildero de AES; Ramón Rosario y Alfonso Orona, quienes usaron su poder en Fortaleza para favorecer a AES. Todos ellos le hicieron mucho daño a nuestra gente, mientras protegían los intereses de la carbonera. A pesar de ellos, logramos dar un giro hacia la dirección correcta con el nuevo proyecto", añadió Díaz.

Por último, Víctor Alvarado Guzmán, del Comité Diálogo Ambiental de Salinas, dijo que la lucha contra la quema de carbón aun no finaliza.

"La lucha no termina aquí, la lucha comienza aquí porque la finalidad es que la planta de carbón cierre. Además, hay que monitorear y remediar las áreas en 14 pueblos donde AES desparramó 2 millones de toneladas de cenizas tóxicas; obligar a AES asumir su responsabilidad en el desastre humanitario causado en nuestras comunidades y medio ambiente; luchar para que el gobierno no otorgue ni un contrato más a esta empresa delincuente y sacarlos del país", enfatizó Alvarado.

Los líderes de la lucha contra las cenizas están invitando a todos a celebrar la firma del PS 1221, en la 4ta Promesa de Reyes realizada en Peñuelas, en el área donde alberga el campamento contra las cenizas, a la entrada del municipio peñolano, este viernes 3 de enero desde la 1pm.

###

Publicado 2nd January por Víctor Alvarado Guzmán

1 Ver comentarios

Juan y Belén Colón 3 de enero de 2020, 7:04

Un hito más en nuestra lucha para sacar la planta carbonera, asesina ambiental de nuestra isla.No estaremos felices hasta que cierre finalmente sus puertas y repare todo el daño ambiental y humano ocasionado en nuestra patria.

Responder

Introduce tu comentario...

Comentar como: fbugel@gmail.c

Cerrar sesión

Publicar Vista previa Avisarme

ATTACHMENT 6

GEO-HYDRO, INC.
Consulting in Geology and Hydrogeology

16 Mesa Oak
Littleton, Colorado 80127
(303) 948-1417

Responses to EPA Solicitation for Comments on: Enhancing Public Access to Information; Reconsideration of Beneficial Use Criteria and Piles

Docket Number: EPA-HQ-OLEM-2018-0524

Prepared for:
Earthjustice

October 14, 2019

The United States Environmental Protection Agency (EPA) recently published a Solicitation for Comments on, among other topics, Reconsideration of Coal Combustion Residual (CCR) piles. At the request of Earthjustice I have reviewed the subject request for information and prepared this report that describes my responses to EPA questions pertaining to CCR piles.

1. Background

CCR is managed at electric generating stations in several ways including storage of wet ash in surface impoundments, disposal of dry ash in landfills, collection and sale for beneficial use, and unfortunately, by creating ash piles. Unlike other forms of solid waste such as municipal solid waste (MSW), inorganic coal combustion residuals and the metals they contain do not biodegrade. Coal ash that is present in waste piles, lined landfills, or ash basins will be capable of leaching toxic metals into the environment at any time in the present, or the near or distant future for as long as soluble metals contained in ash are allowed to come into contact with water. Therefore, effective management of coal ash requires that the waste be isolated from water: including precipitation, surface water, and groundwater.

Failure to isolate coal ash waste from water will result in leaching of contaminants, i.e. formation of leachate. "Leachate" "includes liquid, including any suspended or dissolved constituents in the liquid, that has percolated through or drained from waste or other materials placed in a landfill, or that passes through the containment structure (e.g., bottom, dikes, berms) of a surface impoundment."[1] If released to soils, groundwater, or surface water, coal ash leachate impairs and degrades soil and/or water quality and the environment.

Piles of CCR have the potential to impact environmental quality similarly to the well-known and documented impacts from lined and unlined CCR landfills and impoundments. Precipitation that falls on the pile can cause erosion of CCR sediments which can then be transported to adjacent areas. Precipitation can infiltrate into the waste causing generation of leachate. Leachate can run off and transport contaminants off-site and/or can infiltrate into underlying soils and/or groundwater. In addition to impacts to soils, groundwater and surface water, storage of CCR in waste piles carries an additional elevated risk related to dispersal of CCR dust from the pile and subsequent exposure to nearby receptors.

Dust emissions from CCR piles are generated by various processes including loading CCR onto the pile, loading CCR out of the pile, and wind erosion of the CCR while in the pile. Transport of CCR to the pile through the use of trucks, conveyors, or other equipment, involve one or more "drop operations" that generate dust emissions at uncontained CCR piles. At a number of generating stations with CCR piles the CCR is transported onto the pile via conveyors. At these locations emissions result from the release of CCR onto the piles, particularly, when the drop height from the conveyor and the moisture content are not properly controlled.[2] Unloading CCR from a conveyor onto a CCR pile is an example of a continuous drop operation. Depending on

[1] EPA, 2015, at 67,838 and 67,847

[2] Pless Environmental, 2010, Appendix A

the transport system employed, drop operations may occur several times for each load of CCR removed from the pile. Loading waste onto the pile, redistributing waste in the pile, and loading waste off the pile could all be emission points for one load of CCR eventually removed from the pile.

CCR that is dropped onto an outside pile unprotected from wind and precipitation is subject to higher erosion and resultant transport as particulate matter than is a similar volume of CCR placed in an impoundment or landfill. Increased wing erosion is related to both increased surface area and impinging wind velocity. The elevated portions of a CCR pile present a considerably larger surface area that is subject to wind erosion than the footprint of a similarly sized landfill or impoundment. For example, a circular active working face of a coal ash landfill that is 10 meters (m) across has an exposed surface of 78.5 square meters (m^2).[3] A cone-shaped storage pile of the same diameter (10 m) and a height of 3 m has the same footprint (78.5 m^2) but an exposed surface area of 91.6 m^2, a 17% increase.[4,5] In addition, landfilled ash is generally compacted and covered on a regular basis to minimize dust releases and surface water transport. These operational procedures are not applicable to waste stored in piles.

Exposed CCR placed in a pile is subject to higher wind speeds than is contained waste or waste placed in a landfill or impoundment. Wind speed is known to increase with elevation above the surrounding ground surface. Increasing wind velocity with elevation above ground surface causes ash piled high on a waste pile to be subject to increased wind erosion. The erosion potential for most materials tends to decay during a high wind event as easily erodible material is removed from the pile, leaving larger particle sizes to armor the surface. The small size of CCR, however, provides an unending supply[6] of erodible material that can sustain dust emissions for substantial periods without decreasing emission rates. In addition, CCR is continuously added to many piles so there is a constant supply of readily erodible source materials.

Dispersal of CCR dust by the wind can transport CCR in different directions than CCR transported through surface or groundwater transport. Wind dispersed dust can be inhaled or ingested, contaminate the top of the soil layer, and be incorporated into topsoil soil to contaminate plants and animals.

USEPA makes several specific requests for information, including:

- Are there cases where it is acceptable to manage releases retroactively?
- Are there situations where piles are placed for a short period of time, are then removed, and that present no reasonable probability of adverse effects?

[3] Area of a circle: $A = \pi r^2$
[4] Pless Environmental, 2010, Appendix A
[5] Footprint of cone: $\pi * r^2 = \pi (5m^2)^2 = 78.5 m^2$;
exposed surface area of cone: $\pi * r \times \sqrt{(r^2 + h^2)} = \pi\sqrt{(5m^2 + 3m^2)} = 91.6 m^2$
[6] The supply can be thought of as unending as new CCR is continuously being placed on the pile to replace what has been removed

- Is a requirement that a pile be temporary a key element of controlling risks of releases from piles of CCR?
- Is there data documenting instances in which releases from temporary CCR piles have caused adverse effects?
- EPA solicits comments on whether to retain a mass-based threshold.

My comments on each of these requests are provided in Section 3 of this report.

2. Qualifications

I express the opinions in this letter based on my formal education in geology and over thirty-nine years of experience on a wide range of environmental characterization and remediation sites. My education includes Bachelor of Science and Masters of Science degrees in geology from Northern Illinois University and the University of Illinois at Chicago, respectively. I am a registered Professional Geologist (PG) in Kansas, Nebraska, Indiana, Wisconsin, and North Carolina, a Certified Professional Geologist by the American Institute of Professional Geologists, and am a Past President of the Colorado Ground Water Association.

My entire professional career has been focused on regulatory, site characterization, and remediation issues related to waste handling and disposal practices and facilities, for regulatory agencies and in private practice. I have worked on contaminated sites in over 35 states and the Caribbean. My site characterization and remediation experience includes activities at sites located in a full range of geologic conditions, including soil and groundwater contamination in both consolidated and unconsolidated geologic media, and a wide range of contaminants. I have served in various technical and managerial roles in conducting all aspects of site characterization and remediation, including definition of the nature and extent of contamination (including developing and implementing monitoring plans to accurately characterize groundwater contamination), directing human health and ecological risk assessments, conducting feasibility studies for selection of appropriate remedies to meet remediation goals, and implementing remedial strategies. Much of my consulting activity over the last 13 years has been related to groundwater contamination and permitting issues at coal ash storage and disposal sites in numerous states, including Alabama, Arizona, Colorado, North Carolina, Illinois, Indiana, Kansas, Maryland, Minnesota, Mississippi, Montana, New Mexico, Nevada, North Carolina, South Carolina, Pennsylvania, Virginia, Wisconsin.

3. Discussion of Requested Items

The following are my responses to requests for information from USEPA:

3.1 Are there cases where it is acceptable to manage releases retroactively?

The EPA asks if in some cases, it is acceptable to manage releases retroactively. For example, are there situations in which CCR will only enter the topmost layer of soil over the time the CCR is in place at the site, in which retroactive management of these *releases combined with an active management of releases to air and water, could avoid all reasonable probability of adverse effects on human health and the environment. For example, commenters may have information to show that the placement of CCR at a construction site, which typically occurs over a brief, one- time period, is precisely one such situation in which releases to soil and groundwater can retroactively be managed by removing the CCR and the contaminated soil beneath it, at the completion of the project.*

A central tenet of responsible waste management is that it be prevention-based. The EPA articulated this tenet in its 1993 guidance for owners and operators of solid waste disposal facilities stating: "Ground water is … used extensively for agricultural, industrial, and recreational purposes. Landfills can contribute to the contamination of this valuable resource if they are not designed to prevent waste releases into ground water … Cleaning up contaminated ground water is a long and costly process and in some cases may not be totally successful."[7]

Unfortunately, environmental and human health impacts from placing CCR on a property, even temporarily, are not restricted to contamination of localized on-site materials. Wind-blown dust from temporarily placed CCR is readily transported from the site and creates opportunities for off-site exposures. Once dust leaves the property, it may enter homes, lungs, etc., producing harm that cannot be remedied.

The Illinois Pollution Control Board recently found that a temporary CCR pile contributed to exceedances of state groundwater standards for arsenic, boron, sulfate, and total dissolved solids, as well as boron and sulfate pollution in excess of state background levels.[8] The extent of soil, groundwater, and particulate dust contamination resulting from even temporary storage of CCR in an uncontained pile would be unknown until testing was completed and may prove to be irreversible. The operator would not be able to assume that removal of, for instance, the top six-inches of soil would retroactively manage the waste. Remediation of groundwater contamination is often a long-term commitment of time, effort and money that often continues for decades. Even once closure is achieved, some residual groundwater impacts remain. A more cost-effective regulatory strategy is to prevent releases to the environment and avoid potential exposures to local human and biological populations. Also, see response to section 3.2, below.

3.2 <u>Are there situations where piles are placed for a short period of time, are then removed, and that present no reasonable probability of adverse effects?</u>

The EPA also seeks comment and data on whether there are additional situations where piles are commonly in place for a short period of time (e.g., 90 days or less), at the end of

[7] EPA, 1993, p.3

[8] Illinois Pollution Control Board, 2019, Sierra Club et al v. Midwest Generation, LLC, PCB No. 2013-15, at 42, 48-51, 86 (Illinois Pollution Control Board June 20, 2019)

> *which the CCR is fully removed and presents no reasonable probability of adverse effects on human health or the environment, thus supporting an exemption from having to meet the requirement to control releases. The EPA also asks for information about key characteristics of such piles that would make them readily identifiable in practice.*

There are no CCR pile characteristics or situations that would dependably render a CCR waste pile safe to leave exposed to the environment for even a short period of time. In fact, the Illinois Pollution Control Board recently found that a temporary ash pile – in existence for a mere "two to three" months – contributed to exceedances of state groundwater standards for arsenic, boron, sulfate, and total dissolved solids, as well as boron and sulfate pollution in excess of state background levels.[9]

In practice, the ability to pile CCR on the ground surface for a "short" period of time and remove said pile and contaminated underlying soils without leaving lasting environmental effects is highly contingent on a variety of factors including:

- The type and amount of CCR as well as the type and concentrations of environmental contaminants contained within the waste.
- Leaching of some contaminants such as boron from CCR can be highest as the first few pore volumes of water pass through the waste. A pile of CCR that contains rapidly leaching contaminants could conceivably lose a considerable volume of contaminants during even very short-term storage in a waste pile, especially if a period of significant precipitation occurs before the CCR is removed.
- The physical characteristics of the ground surface upon which the waste would be placed. Waste piled on a substantial naturally occurring clay bed would be much less likely to spread subsurface contamination than would a pile placed on a sandy surface.
- Weather and environmental factors would also play an important part in determining the extent of redistribution of piled CCR. A significant rain or wind event that occurred while CCR was piled on the ground surface could cause significant mobilization and transport of waste from the original location.

The above bullets provide examples of just a few of the many site–specific variables that impact the potential for adverse effects from CCR piles. These examples should provide an indication of the folly of proposing a blanket authorization to store CCR in an uncontained pile on the ground and why such an authorization would not be protective of the environment. Requiring an Environmental Determination[10], at the very least, causes operators to think about and plan to avoid potential problems with short-term storage of CCR in waste piles and should continue to be required as well as specific and meaningful safeguards preventing releases from short-term storage piles.

[9] Illinois Pollution Control Board, 2019, p. 42.
[10] Campbell, 2019

3.3 *<u>Is a requirement that a pile be temporary a key element of controlling risks of releases from piles of CCR?</u>*

EPA requests comment on whether requiring that a pile must be temporary is a key element of controlling risks associated with the potential releases from piles of CCR; for example, do commenters have information to show that the size of a pile is sufficiently controlled by the ability to use pollution control measures to control releases of CCR and that the temporary element is not needed.

"Temporary" piles of CCR are constant or nearly-constant features at sites that manage their CCR in waste piles. In practice CCR stored in piles is routinely added-to and taken-from as new waste is added to the pile and other waste is loaded out. Releases of CCR contaminants are nearly inevitable at sites where a large uncontained accumulation of CCR is allowed; whether or not there are records available indicating that each cubic yard of ash has been present in a pile for a defined period of time. Examples of sites that handle CCR in "temporary' CCR piles and have documented groundwater contamination as a result of these waste handling practices include the AES –Puerto Rico Guayama Plant, the Southwestern Electric Power Company Pirkey Plant, and the Powerton Coal Ash Pile. Descriptions of environmental impacts from CCR piles at these facilities are provided in my response to item 3.4, below.

3.4 *<u>Is there data documenting instances in which releases from temporary CCR piles have caused adverse effects?</u>*

The EPA also solicits comment on the existence of any data documenting instances in which releases from temporary placement of CCR on the land caused adverse effects even though releases had been managed consistently with current regulatory standards.

There are numerous sites that store, or have stored, CCR in uncontained piles. Unfortunately the environmental monitoring practices required by EPA are commonly insufficient to definitively attribute detected environmental contaminants to waste piles rather than adjacent or nearby CCR landfills or waste impoundments that are monitored together as one unit. In effect, EPA has allowed monitoring systems to collect data covering multiple CCR units and is now asking for waste pile specific data, data that EPA has not generally required be collected. Despite the difficulty of attributing environmental contamination solely to CCR piles, there are examples of CCR waste piles that do show documented impacts to groundwater. Short descriptions of documented environmental impacts from CCR stored in temporary piles are provided below.

<u>AES Puerto Rico - Guayama, Puerto Rico</u>
AES-PR has stored a mixture of fly ash and bottom ash formed into a material called AGREMAX in piles on the plant site since approximately 2005. According to AES inspection reports posted in 2016, 2017 and 2018, the volume of the CCR pile maintained at the power plant site and regulated under the CCR rule was 120,000, 430,000 and 400,000 tons,

respectively. The height of the pile was approximately 120 feet. Air pollution and groundwater contamination has been documented in required groundwater monitoring reports and annual site inspection reports.

Groundwater monitoring required by the federal CCR rule at the AES-PR Power Plant indicates statistically significant increases of several coal ash constituents including boron, chloride, fluoride, sulfate, pH, and TDS in downgradient groundwater. In addition, the 2017 Site Inspection Report posted to the CCR compliance website documents the presence of fugitive dust on the west slope of the CCR stockpile. The report indicates that the water truck that is reportedly used to moisten CCR and control dust was not operational at the time of the inspection. Both the statistically significant increases in CCR-related groundwater contamination and observable blowing dust issues documented on the AES-PR CCR compliance website directly result from uncontained storage of CCR in piles on the site.

<u>H.W. Pirkey Power Station, Hallsville, TX</u>
Southwest Electric Power Company operates an approximately 7-acre Flue Gas Desulfurization (FGD) sludge storage area to collect and temporarily store CCR materials in piles. The FGD Stackout area is utilized as a temporary staging area for CCR material, including fly ash and FGD Sludge.[11] Reports of inspections conducted on the Stack-Out Pad in 2016, 2017, and 2018 indicate that the waste volume in storage at the time of the inspections were 30,000 cubic yards; 10,000 cubic yards; and 500 cubic yards, respectively. A photograph of CCR piles at the Pirkey stakeout area taken during the 2016 CCR inspection[12] is provided below.

Photograph #13	September 28, 2016
Direction:	Facing south southwest
Description:	Typical CCR material pile staged on FGD Stackout Area.

[11] Braun Intertec, 2016
[12] Braun Intertec, 2016

Runoff from the Stackout Area drains by gravity to surge ponds where the runoff is supposedly collected and recirculated back to the plant. A photograph of the Stackout Area Surge Pond taken during the 2016 CCR inspection[13] is provided below.

Photograph #9	September 28, 2016
Direction:	Facing northwest
Description:	Discharge pipe in Surge pond north of FGD Stackout Area.

The Annual Groundwater Monitoring Report for the Pirkey FGD Stackout Area[14] showed statistically significant increases in concentrations of the Appendix III constituents boron, chloride, and sulfate in downgradient groundwater. In addition, Southwestern Electric Power Company recently placed a notice of Statistically Significant Levels above the Groundwater Protection Standards for the Appendix IV constituent Beryllium in groundwater at the FGD Stackout Area. These results provide documentation of impacts to groundwater quality from a CCR waste pile.

<u>Powerton Coal Ash Pile</u>

Even very short-duration coal ash piles are sources of contamination. In June 2019, the Illinois Pollution Control Board found that a temporary ash pile – in existence for a mere “two to three” months – contributed to exceedances of state groundwater standards for arsenic, boron, sulfate, and total dissolved solids, as well as boron and sulfate pollution in excess of state background levels.[15] The Board likewise concluded that the temporary coal ash pile constituted a “water pollution hazard.”[16]

Examples of sites where the monitoring systems are or were insufficient to distinguish between contamination from CCR waste piles and other CCR units include the Prairie Creek Generating Station in Cedar Rapids, IA; the Lewis & Clark Station located near Sidney, MT; and the Healey

[13] Braun Intertec, 2016
[14] American Electric Power Service Corporation, 2019
[15] *See* In the Matter of: Sierra Club et al v. Midwest Generation, LLC, PCB No. 2013-15, at 42, 48-51, 86 (Illinois Pollution Control Board June 20, 2019)
[16] Id. at 86

Power Plant, in Healy, AK. Short descriptions of these sites coal ash piles for which current monitoring is ineffective are provided below.

Prairie Creek Generating Station

CCR piles at the Prairie Creek Generating Station originally included a Fly Ash Stockpile, Bottom Ash Pile, and a Beneficial Use Storage Area. The fly ash stockpile has not received CCR since October 19, 2015 and is therefore not counted as a CCR unit. The PCS Bottom Ash Pile was located immediately east of the where the sluiced CCR entered Pond 1. After the CCR was dewatered at the Bottom Ash Pile, the CCR was either hauled directly offsite or transported to the Beneficial Use Storage Area. The Closure Plan[17] for these waste piles estimated quantity of CCR in the inactive fly ash stockpile as 58,000 cubic yards. The estimated quantity of CCR in the Bottom Ash Pile and Beneficial Use Storage Area were estimated as 2,500 cubic yards and 7,000 cubic yards, respectively. The closure footprint likely does not theoretically include the former waste pile footprints, but the waste piles could have contributed to contamination. Notification of Closure Completion for the Bottom Ash Pile and Beneficial Use Storage Area was posted to the site operating record in December, 2018.

The Prairie Creek Generating Station posted a notification of concentrations of arsenic and molybdenum groundwater at statistically significant levels above Groundwater Protection Standards (GWPS).[18] The Bottom Ash Pile was located outside of the monitoring network, but the Fly Ash Pile and Beneficial Use Storage Area were located between the upgradient and downgradient wells along with other closure units, so contaminants from the units may have been detected along with overall site contamination.

Lewis & Clark Station

CCR from two scrubber ponds at the Lewis & Clark Station was stockpiled, until 2018, on a temporary CCR storage pad located adjacent to the scrubber ponds until it could be transported to the permanent ash disposal facility. As operations permit, the stockpiled CCR was loaded into trucks and transported offsite for disposal at an abandoned coal mine. The Lewis & Clark station posted a notification of concentrations of lithium and selenium in groundwater at statistically significant levels above Groundwater Protection Standards (GWPS).[19] Other groundwater contaminants detected at concentrations above background included boron, cobalt, molybdenum, and sulfate. Attribution of the detected groundwater contamination to either the scrubber ponds or the temporary storage pad has not been made since the ponds and pad are located within the same groundwater monitoring network.

Healy Power Plant

CCR handling and storage at the Healy Power Plant consisted of dredging settled ash from the Ash Pond and its subsequent placement in piles on the Ash Drying Area where excess water

[17] Alliant Energy 2018
[18] Alliant Energy, 2019
[19] BARR, 2019

infiltrated to the subsurface and evaporated. Once dry, the ash was then transported for disposal in the mine that supplied the coal. A photograph of the of the groundwater monitoring results reported in 2019[20] showed that seven appendix IV constituents (antimony, arsenic, chromium, fluoride, lithium, molybdenum, and selenium) were detected in at least one monitoring well at concentrations above the GWPS. The exceedances in groundwater appeared to originate from suspected source areas including the Ash Pond, Recirculating Pond, and Ash Drying Area. Attribution of the detected groundwater contaminants to a specific source location has not been made since the ponds and Ash Drying Area are located within the same groundwater monitoring network.

3.5 EPA solicits comments on whether to retain a mass-based threshold.

> EPA is proposing to eliminate *the mass-based numerical threshold and replace it with specific location-based criteria, derived from the existing location criteria for CCR disposal units, to trigger an environmental demonstration. As discussed further below the available information does not appear to provide strong support for a single numerical mass-based threshold as a general matter; however, EPA solicits comments on whether to retain a mass-based threshold. Assuming EPA determines a threshold to be appropriate, EPA also solicits comments on whether an appropriate value for a mass threshold to trigger and environmental demonstration should be based on the state beneficial use programs' lower tonnage thresholds, discussed above, or to retain the current 12,400-ton numerical criterion.*

Placement and storage of CCR in piles should trigger an environmental demonstration regardless of the size of the pile or duration of the planned storage. All waste piles should also be subject to meaningful storage regulations that prevent releases of CCR to the environment, regardless of the size of the pile or duration of storage. The requirement for an environmental demonstration causes CCR users to actively consider their plans and procedures for containment of CCR prior to potential impacts to human health or the environment. I hold this opinion based on my previous experience as a technical advisor for the citizen's group at the Town of Pines Groundwater Plume Alternative Superfund Site in Town of Pines, IN. Sampling conducted during a Remedial Investigation in Town of Pines identified that fly ash was used as landscaping fill in and around the town. Concentrations of CCR constituents that presented and unacceptable exposure risk to human health were found on at least 45 properties. CCR used as fill on residential and public properties had created risks for residents who unknowingly lived with waste at or very near the surface of their properties.

Residents of the Town of Pines were exposed to elevated risks from CCR through direct exposure to soils, CCR-contaminated groundwater in their wells, and exposure to CCR dust. Laboratory analysis of surficial soil samples collected at the Pines Town Hall playground showed arsenic concentrations of up to 430 milligrams per kilogram (mg/kg), nearly an order of

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[20] Golden Valley Electric Association, 2019

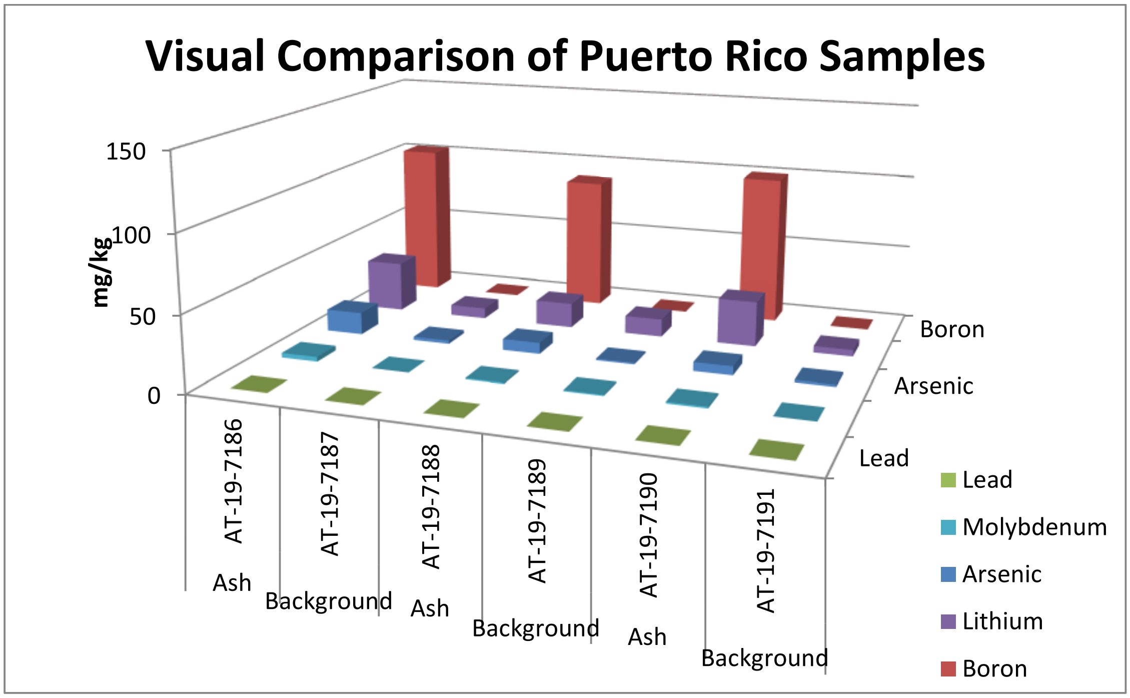
magnitude above the 67 mg/kg USEPA Removal Management Level for arsenic. In some cases residents had consumed vegetables produced in gardens and allowed children to play and dig in CCR contaminated areas. None of the residential properties would likely have triggered the 12,400-ton numerical criterion to trigger a demonstration, yet the risk posed by these wastes was sufficient to trigger an EPA removal action. Soil removal in progress at the Town of Pines Park is shown in the photograph below.[21]

A current example of human health and environmental exposures through small volume use of CCR as fill material can be found in Puerto Rico, near the AES-PR plant in Guayama, PR. Materials reported by residents to be CCR obtained from the AES-PR plant have been spread as fill in many public areas, including roadways, and remain on the surface where human and animal receptors are directly exposed, and contaminants are spread by wind and precipitation. I have examined and reviewed chemical analyses of these materials. The tested samples are amorphous solids that are enriched in arsenic, boron, and lithium (see below) as compared to local background soils, consistent with CCR from a fluidized bed generating station.

The concentration of arsenic detected in samples of CCR exposed on the ground surface were found to exceed the USEPA Regional Screening Level and thus, would pose a human health hazard in residential areas, where some of the materials are in fact located. None of the many dispersed areas where CCR has been spread on the surface around Guayama, PR would likely trigger the need for a demonstration at the current 12,400-ton trigger volume. Maintaining and strengthening a requirement for an environmental demonstration before CCR can be used as fill,

[21] Picture from South Bend Tribune, June 27, 2016

in any volume, and applying CCR landfill standards to all fill projects, would help to avoid drive these types of exposures in the future.



The reported CCR deposits located around the Guayama area are shown in the following photographs.

The above findings are based on my review of the USEPA request for information, available sources including previous USEPA policies and guidance, available information and data about example sites, and my education, qualifications, experience, and expertise.

I would be happy to discuss my thoughts on these or other CCR–related issues with USEPA at any time.

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References

Data and information sources reviewed included the following documents:

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Pless Environmental, 2010, Review of EPA's Inhalation of Fugitive Dust: A Screening Assessment of Risks Posed by Coal Combustion Waste Landfills, prepared for Environmental Integrity Project.

APPENDICES

Pless Report

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BY EMAIL

November 16, 2010

Eric Schaeffer
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Washington, DC 20005

Re: Review of EPA's Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills

Dear Mr. Schaeffer,

Per your request, I have reviewed *Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills* (hereafter "Screening Assessment") published by the U.S. Environmental Protection Agency ("EPA") for review in September 2009.[1] My review concentrates on EPA's assumptions for the development of emission factors for airborne particulate emissions from coal combustion waste ("CCW") landfills.

My qualifications as an environmental expert include a doctorate in Environmental Science and Engineering ("D. Env.") from the University of California Los Angeles. My résumé is attached to this letter.

Background

In 2009, EPA published the *Human and Ecological Risk Assessment of Coal Combustion Wastes* ("2009 Risk Assessment"). During the peer review and notice of data availability to the public for the draft of this document, EPA received comments pointing out that health risks from fugitive dust particulate matter emissions during operation of a CCW landfill via the inhalation pathway were not addressed. In response, the EPA prepared the Screening Assessment as a companion document to the 2009 Risk Assessment intended to examine the potential for uncontrolled fugitive dust emissions from dry handling of CCW to lead to significant human health risks.[2]

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[1] U.S. Environmental Protection Agency, Inhalation of Fugitive Dust: A Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills, Draft, September 2009.

[2] *Ibid*, p. 2.

The stated purpose of the Screening Assessment is "to assess whether the national ambient air quality standards … for particulate matter could be violated through CCW landfilling operations without fugitive dust controls ... via a conservative screening analysis."[3]

Executive Summary

After reviewing the Screening Assessment, I find that the methodology employed is overly simplistic, not sufficiently conservative and contains several errors. As a result, the Screening Assessment generally underestimates risks to receptors. For example, it is nonsensical to analyze the percentiles of landfill sizes and distances to receptors without acknowledging the extreme variability of emission factors for wind erosion, drop operations, and entrained road dust from equipment travel on unpaved landfill roads and their considerable contribution to total emissions of airborne particulates from a CCW landfill.

My comments should be viewed as suggestions regarding how the Screening Assessment could be improved and best used by the EPA in developing recommendations for CCW landfill management. Revision of the Screening Assessment taking into account the issues in my following comments would considerably improve the reliability of its results and conclusions. However, since the Screening Assessment for the most part underestimates risks to receptors, its conclusion to require daily controls as a safeguard for not causing excess levels of particulates at CCW landfills can be upheld without further review. In particular, daily landfill cover, rather than watering, is recommended for the best control, as watering alone is not sufficiently effective.

In addition, because of the substantial risks for residents living near CCW landfills, I recommend that the EPA conduct a full-scale health risk assessment that addresses both toxic constituents of fugitive dust emissions from landfills and emissions of diesel particulate matter from haul trucks, on-site heavy-duty landfill equipment, and diesel-powered pumps and generators.

Sincerely,

Petra Pless, D.Env.

[3] *Ibid*, p. 3.

Comments

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I. Summary of Screening Assessment Methodology and Results

The Screening Assessment includes the following steps to determine whether airborne particulate matter from CCW landfills would potentially exceed the national ambient air quality standards ("NAAQS") for particulate matter smaller than or equal to 10 micrometers ("PM10") and smaller than or equal to 2.5 micrometers ("PM2.5"):

Initial Scenario (Uncontrolled Landfill)

1. Determined the receptors with the highest exposure to CCW particulate emissions as residents living near CCW landfills and the most important source of particulate matter at the CCW landfill as wind erosion. Emissions from unloading of CCW at the landfill were excluded assuming they would have an increasingly lower contribution relative to total emissions from the entire landfill area exposed to wind erosion as the landfill approaches capacity over its useful life. (Section 2.1.)
2. Determined an emission factor for particulates resulting from wind erosion of CCW landfills based on the equation for "Continuous Fugitive/Windblown Dust Emissions" in EPA's 1992 *Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants*. Calculation of the emission factor is based on the assumption that the CCW consists of fly ash and the landfill is not covered does not have any controls to reduce wind erosion. (Section 2.2.)
3. As conservative assumptions for modeling, determined the 50th through 90th percentiles of landfill sizes and side length assuming that the landfills were square; determined the 10th through 50th percentiles of landfill distances to residential receptors based on available data on the distance of residential wells to landfills. The maximum size of landfills and minimum distance from landfill to receptor were excluded as being too conservative to be considered reasonable. Taken together, the combination of sizes and distances do be modeled were assumed to provide both a true median (50th/50th) and upper tail (90th/10th) of the input distribution that would be modeled in a probabilistic assessment. (Section 2.3.)
4. Determined other input parameters for SCREEN3, a single-source Gaussian plume screening model which provides maximum ground-level concentrations for point, area, flare, and volume sources. (Section 2.4.)
5. SCREEN3 modeling for both 50th percentile values for landfill side length and distance to receptors found that uncontrolled particulate matter emissions from wind erosion of CCW landfills (13,390 μg/m^3) would exceed the 24-hour NAAQS for PM10 (150 μg/m^3) by almost two orders of magnitude. Thus, risks posed by fugitive dust cannot be screened out if no dust controls are applied to the landfill before closure. (Section 2.5.)

Secondary Scenarios (Controlled Landfill)

6. Assumed that only a fraction of the CCW landfill would be exposed to wind erosion and the other remaining portion of the landfill would be controlled 100% assuming yearly, monthly, weekly, or daily control via spraying or covering over the landfill's useful life of 40 years. It was assumed that the exposed fraction of the landfill would be square and located in the center of the landfill. (Section 3.0.)
7. SCREEN3 modeling for both 50th percentile values for landfill side length and distance to receptors found that fugitive dust emissions with yearly and monthly controls of the landfill

would exceed the 24-hour NAAQS for PM10. Since emission estimates for weekly and daily controls for fugitive dust were below the 24-hour NAAQS for PM10, further permutations of inputs were entered into the model to determine the likelihood that operating with those frequencies of controls would be adequate to protect human health. (Section 3.1.)

8. The Screening Assessment concludes that only daily controls of landfills would guarantee particulate matter concentrations below the NAAQS for PM10 and PM2.5. (Sections 4.0 and 5.0.)

II. Discussion of Screening Assessment Methodology

In general, the Screening Assessment's approach to evaluating the potential of airborne particulate matter from CCW landfills exceeding the NAAQS is reasonable. However, the methodology relies on several overly simplistic or not sufficiently conservative assumptions and contains a number of errors. A revision of the Screening Assessment to address these issues would greatly improve the reliability of its conclusions and any recommendations for CCW landfill management that can be derived from them.

II.A Assumption of Wind Erosion of CCW Landfill as Sole Source of Particulate Matter Emissions Is Not Adequate

Total fugitive dust emissions into the air from dry-handling CCW result from several distinct source activities: loading onto trucks, conveyors, railcars, or barges; emissions during transport from the power plant to a landfill; direct unloading from trucks or conveyors or unloading of railcars or barges via mobile equipment; wind erosion of piles in open trucks, railcars or conveyors; wind erosion from a landfill; and entrained road dust from truck and heavy-duty equipment traffic on paved and unpaved roads to and at a landfill. Potential receptors of airborne emissions include residents near the power plant, along the transportation route and at the landfill.

The Screening Assessment concludes that residents living near a CCW landfill would be exposed to higher emissions and for longer periods of time than residents living near power plants where CCW is handled or near roads where CCW is transported because residents near landfills would be exposed to emissions from both unloading and windblown emissions of CCWs. The Screening Assessment therefore only further considers residents near landfills as a highly exposed receptor population. The Screening Assessment further reasons that, the closer an uncovered landfill gets to capacity towards the end of its operating life, the less relative influence unloading emissions would have on total (uncontrolled) emissions. Consequently, the Screening Assessment considers windblown emissions as representative for its preliminary scenarios because they would dominate and, thus, only quantifies windblown emissions.[4] This assumption is overly simplistic and not supported by evidence as discussed in the following comments.

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[4] Screening Assessment, p. 4.

First, the Screening Assessment fails to provide even a preliminary estimate for sources of fugitive dust emissions other than windblown erosion and their relative contribution to total emissions from the landfill to verify that its assumption that wind erosion is the dominating emission source and other sources of emissions are negligible is defensible.

These other sources, *e.g.*, fugitive dust emissions associated with unloading of fly ash[5] at a CCW landfill, entrained road dust from equipment travel on unpaved roads at the landfill, and unloading can be substantial.

The Screening Assessment fails to even recognize entrained road dust emissions from equipment travel on unpaved roads at the landfill as a potential source of airborne particulates. Equipment at the landfill includes both haul trucks and mobile equipment such as dozers or scrapers. At CCW landfills the temporary roads frequently consist of the deposited material, *i.e.*, flyash, and are therefore, without proper management, prone to releasing clouds of dust when equipment travels over them. Entrained road dust emissions can be a major contributor to airborne fugitive dust, as shown in the photographs below. (Note plumes of dust emanating from vehicle tires.)

Figure 1: Dust clouds from vehicle travel on unpaved road at CCW landfill in Bokoshe, OK
Photo courtesy of Linda Evans, EarthJustice

[5] Fly ash is fine powder with a mean particle size of 50 micrometers ("µm"); between 60 and 90 percent of fly ash particles are finer than 75 µm.

Figure 2: Dust clouds from vehicle travel on unpaved road at a surface mine

From: Reed WR, Organiscak JA, Haul Road Dust Control Fugitive Dust Characteristics from Surface Mine Haul Roads and Methods of Control; http://www.cdc.gov/Niosh/mining/pubs/pdfs/hrdcf.pdf

The following photograph shows clouds of dust released during unloading of fly ash at a CCW landfill.

Figure 3: Fly ash dumping at CCW landfill in Bokoshe, OK

Source: Fly Ash in the Air We Breathe; http://www.intheairwebreathe.com/html/what_is_fly_ash_.html

In addition, dust is released when on-site equipment such as dozers and scrapers move, compact and contour the deposited fly ash. The following photographs show the variety of heavy-duty equipment operating simultaneously at a CCW landfill.

Figure 4: Fly ash management at Arrowhead Landfill, AL
Photo courtesy of John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

Figure 5: Fly ash management at Arrowhead Landfill, AL,
From: New York Times, Clash in Alabama Over Tennessee Coal Ash, August 29, 2009;
http://www.nytimes.com/2009/08/30/us/30ash.html?_r=2&ref=earth

Clearly, emissions of entrained road dust from equipment travel on unpaved roads, unloading, and compacting and contouring the landfill can be substantial and should not be excluded from the Screening Assessment without a quantitative demonstration that these emissions are indeed negligible compared to the total emissions from wind erosion. This is particularly important for the daily and weekly control scenarios evaluated in the Screening Assessment's Section 3.0 when emissions associated with wind erosion are restricted to a small active portion of the landfill and entrained road dust emissions and emissions from unloading and entrained road dust from vehicle travel on unpaved roads will contribute a larger percentage to total emissions.

At a number of coal-fired power plants, the landfill is directly adjacent and CCW is transported via conveyor belts to the landfill. At such landfills, emissions result from the release of fly ash onto the piles at the landfill, particularly, when the drop height from the conveyor and the moisture content of the material are not properly controlled. Railcar transport results in emissions at the landfill from unloading railcars into dozers or other landfill equipment and unloading of that equipment.

The following sections provide estimates of particulate matter emission factors for equipment traffic on unpaved roads and drop operations and compare them to the emission factor developed by the Screening Assessment for particulate matter emissions from wind erosion.

1. Entrained Road Dust from Equipment Traffic on Unpaved Roads

Emission Factors Based on Vehicle Distance Traveled

Emission factors for entrained road dust from equipment traffic (trucks, front-end loaders, dozers, etc.) on unpaved roads to the active section of the landfill can be estimated using an equation in EPA's *Compilation of Air Pollutant Emission Factors* ("AP-42") for *Unpaved Roads* at industrial sites, *i.e.*, sites that are not publicly accessible:

$$E_{VMT} = k\,(s/12)^{a}\,(W/3)^{b} \qquad \textbf{Equation 1}$$

where:

E_{VMT} = particle size-specific emission factor (lb/VMT)
k = particle size-specific empirical constant (lb/VMT)
s = surface material silt content (%)
a = particle size-specific empirical constant (dimensionless)
W = mean vehicle weight (tons)
b = particle size-specific empirical constant (dimensionless)[6]

Because many landfills build their internal temporary roads out of the deposited material itself, the silt content of the fly ash can be assumed as a worst-case estimate for the unpaved road surface material silt content at a CCW landfill. For the following estimate, a

[6] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 13.2.2 Unpaved Roads, updated November 2006.

lower-end value for the surface material silt content, 20%, was chosen based on the silt content determined for various roads in western surface coal mining, including haul roads to/from pit, plant road, scraper route, and freshly graded haul road (range 2.8%-29%; mean 5.1%-24%).[7] An upper-end value for the surface material silt content, 80%, was based on the silt content of fly ash as assumed by the Screening Assessment. Thus, based on Equation 1 and assuming a surface material silt content of 20% or 80% and a mean vehicle weight of 30 or 40 tons (average of vehicle weight full/vehicle weight empty) as lower and upper end variables, and the respective particle size-specific constants k, a, and b[8] for particulate matter equal to or smaller than 30 micrometers ("PM30")[9], PM10 and PM2.5, emission factors ("E_{VMT}") for the respective particle sizes in pounds per vehicle mile traveled ("lb/VMT") and grams per vehicle kilometer traveled ("g/VKmT") can be estimated as shown in Table 1 and Table 2 below.

Table 1: Particle size-specific emission factors for PM30, PM10, and PM2.5 for entrained road dust from unpaved roads (mean vehicle weight 30 tons)

Particulate Size	A Surface material silt content 20% E_{VMT}		B Surface material silt content 80% E_{VMT}	
	(lb/VMT)	(g/VKmT)[a]	(lb/VMT)	(g/VKmT)[a]
PM30	19.7	5,567	52.1	14,690
PM10	6.7	1,887	23.3	6,572
PM2.5	0.7	189	2.3	657

a 1 lb/VMT = 281.9 g/VKmT

Table 2: Particle size-specific emission factors for PM30, PM10, and PM2.5 for entrained road dust from unpaved roads (mean vehicle weight 40 tons)

Particulate Size	C Surface material silt content 20% E_{VMT}		D Surface material silt content 80% E_{VMT}	
	(lb/VMT)	(g/VKmT)[a]	(lb/VMT)	(g/VKmT)[a]
PM30	22.5	6,336	59.3	16,721
PM10	7.6	2,148	26.5	7,480
PM2.5	0.8	215	2.7	748

a 1 lb/VMT = 281.9 g/VKmT

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[7] *Ibid*, Table 13.2.2-1.

[8] *Ibid*, Table 13.2.2-2:

Constant	PM30	PM10	PM2.5
k	4.9	1.5	0.15
a	0.7	0.9	0.9
b	0.45	0.45	0.45

[9] Particulate matter with an aerodynamic diameter less than or equal to 30 micrometers is sometimes termed "suspendable particulate" and is often used as a surrogate for total suspended particulate matter ("TSP").

As shown in Table 1 and Table 2, emissions per vehicle mile traveled increase proportionally with silt content. As shown, the surface material silt content of the road has greatly influences the emission factors: from 20% to 80% silt content, emission factors rise by a factor of 2.6 for PM10 and 3.5 for PM10 and PM2.5. (*See* Table 1, Columns A and B, and Table 2, Columns C and D.)

A higher mean vehicle weight also increases emission factors: at 20% silt content, the emission factors rise by 43% for PM30 and 33% for PM10 and PM2.5 with increasing mean vehicle weight from 30 to 40 tons. (*See* Table 1, Column A, and Table 2, Column C.) At higher silt contents, the influence of mean vehicle weight on emission factors is not as pronounced: at 80% silt content, an increase in mean vehicle weight increases emission factors by 14%. (*See* Table 1, Column B, and Table 2, Column D.)

Area-specific Emission Factors

The following provides estimates for area-specific emission factors for fugitive dust emissions from unpaved roads that can be compared to the area-specific emission factor determined by the Screening Assessment for wind erosion:

On an area (unit square meter)-basis, it depends how many vehicles travel over the same road on a given day. Conservatively assuming that each vehicle travels twice over the same portion of the road while driving to and from the active portion of the landfill as landfill roads are often narrow, *i.e.*, traveling a distance of two meters ("m") on each square meter unit road, and assuming that vehicles would access the landfill over the entire 24-hour day, the unit emission factors ("E"), in grams per second and square meter ("g s^{-1} m^{-2}") for the respective particle sizes for 1, 10, 20, and 50 vehicles per day can be estimated as shown in Table 3 for a road surface material silt content of 20% and assuming the landfill operates 24 hours per day and in Table 4, as a worst-case assumption, for a road surface material silt content of 80% and assuming the landfill operates 8 hours per day.

Table 3: Particle size-specific unit emission factors for PM30, PM10, and PM2.5 for entrained road dust from unpaved roads based on 20% silt content, mean vehicle weight of 30 tons, and 24 hours/day landfill operation

Particulate Size	E[a]			
	1 vehicle/day (g s^{-1} m^{-2})	10 vehicles/day (g s^{-1} m^{-2})	20 vehicles/day (g s^{-1} m^{-2})	50 vehicles/day (g s^{-1} m^{-2})
PM30	1.29E-04	1.29E-03	2.58E-03	6.44E-03
PM10	4.37E-05	4.37E-04	8.74E-04	2.18E-03
PM2.5	4.37E-06	4.37E-05	8.74E-05	2.18E-04

a E = (E_{VMT} in g/VKmT) x (2 m traveled/vehicle) x (number of vehicles/day) x (Km/1,000 m) x (day/24 hours) x (hours/28,800 seconds) x (m^{-2})

Table 4: Particle size-specific unit emission factors for PM30, PM10, and PM2.5 for entrained road dust from unpaved roads based on 80% silt content, mean vehicle weight of 40 tons, and 8 hours/day landfill operation

	E[a]			
Particulate Size	**1 vehicle/day ($g\ s^{-1}\ m^{-2}$)**	**10 vehicles/day ($g\ s^{-1}\ m^{-2}$)**	**20 vehicles/day ($g\ s^{-1}\ m^{-2}$)**	**50 vehicles/day ($g\ s^{-1}\ m^{-2}$)**
PM30	1.16E-03	1.16E-02	2.32E-02	5.81E-02
PM10	5.19E-04	5.19E-03	1.04E-02	2.60E-02
PM2.5	5.19E-05	5.19E-04	1.04E-03	2.60E-03

a E = (E_{VMT} in g/VKmT) x (2 m traveled/vehicle) x (number of vehicles/day) x (Km/1,000 m) x (day/8 hours) x (hours/28,800 seconds) x (m^{-2})

As the results in Table 3 and Table 4 show, the fugitive dust emission factors for PM30 for a unit square meter of road range from the same order of magnitude (1.29E-04 g s^{-1} m^{-2} for one vehicle per day, a silt content of 20%, and 24-hours of landfill operation per day; *see* shaded cell in Table 3) to being two orders of magnitude higher (5.10E-02 g s^{-1} m^{-2} for 50 vehicles per day, a silt content of 80%, and 8-hours of landfill operation per day compared to the Screening Assessment's unit emission factor (2.43E-04 g s^{-1} m^{-2}) for wind erosion; *see* shaded cell in Table 4). These emission factors are based on the mean vehicle weight of haul trucks only and do not take into account that the mean vehicle weight could be considerably higher due to operation of heavy-duty equipment on those roads, which would further increase emission factors.

Based on a three meter wide road leading to the active portion of a landfill (conservatively assumed at the opposite end of the landfill) and assuming a) 20% surface material silt content, a mean vehicle weight of 30 tons, and 24 hours of landfill operations per day as the lower bound variables and b) 80% surface material silt content, a mean vehicle weight of 40 tons, and 8 hours of landfill operation per day as the upper bound variables for one or 50 vehicles traveling the unpaved road per day, uncontrolled entrained road dust emissions in grams per second ("g/s") for the 50^{th} and 90^{th} percentile size landfills for PM30, PM10 and PM2.5 can be estimated as shown in Table 5.

Table 5: Uncontrolled entrained dust emissions from unpaved road assuming daily cover of landfill

	Landfill		**Road**		**Emissions (g/s)**					
					PM30		**PM10**		**PM2.5**	
	Total	Active portion	Length	Area	20% 30 tons 24 hours	80% 40 tons 8 hours	20% 30 tons 24 hours	80% 40 tons 8 hours	20% 30 tons 24 hours	80% 40 tons 8 hours
Percentile	Side (m)	Side (m)	(m)	(m^2)	1 vehicle	50 vehicles	1 vehicle	50 vehicles	1 vehicle	50 vehicles
50^{th}	518.8	4.3	515	1,544	1.99E-01	2.99E+01	6.74E-02	1.34E+01	6.74E-03	1.34E+00
90^{th}	1097.4	9.1	1,088	3,265	4.21E-01	6.32E+01	1.43E-01	2.83E+01	1.43E-02	2.83E+00

Based on the Screening Assessment's assumptions, airborne particulate emissions due to wind erosion of the active portions of landfill with daily cover for the 50^{th} and 90^{th} percentile can be estimated at 4.37E-03 to 1.99E-02 g/s.[10] Compared to these estimates for wind erosion from active portions of a landfill with daily cover, entrained road dust PM30 emissions are orders of magnitude higher for both the 50th and 90th percentile size landfills and assuming either one or 50 vehicles traveling the unpaved road. (*See* shaded cells in Table 5).

This comparison illustrates the necessity of including fugitive emissions from unpaved roads in the estimates of fugitive dust emissions from CCW landfills and providing sound management requirements for their control. For further discussion of wind erosion from the active portion of a landfill, *see* Comment II.E.

These emission estimates do not account for trackout and re-entrainment of particulates through vehicle travel on paved roads. These emissions should be estimated separately with EPA's AP-42, Section 13.2.1, for *Paved Roads*.

2. Emissions Associated with Drop Operations

Unloading of CCW from trucks, conveyors, railcars, or barges at a landfill involves one or more so-called "drop operations," *i.e.*, dropping materials onto receiving surfaces. For example, truck dumping onto a pile is an example of a batch drop operation. Barge and railcar unloading requires loadout via on-site mobile equipment which then unload the materials at the active portion of the landfill in a batch drop operation. Unloading materials from a conveyor is an example of a continuous drop operation. Drop operations occur more or less instantaneously, often resulting in large clouds of dust released into the atmosphere, particularly, if the fly ash is uncontrolled, as shown in Figure 3.

The quantity of particulate emissions generated by a drop operation (*e.g.*, unloading of truck at landfill), in kilogram per metric ton ("kg/metric ton") of material transferred, may be estimated using the following empirical expression:

$$E = k\,(0.0016)\,(U/2.2)^{1.3} / (M/2)^{1.4} \qquad \textbf{Equation 2}$$

where:

E = particle size-specific emission factor (kg/metric ton)
k = particle size-specific multiplier (dimensionless)
U = mean wind speed, meters per second (m/s)
M = material moisture content (%)

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[10] Emissions from 50th percentile landfill area with daily cover: (2.43E-04 g s^{-1} m^{-2}) × (18 m^2 active landfill area) = 4.37E-03 g/s;
emissions from 90th percentile landfill area with daily cover: (2.43E-04 g s^{-1} m^{-2}) × (82 m^2 active landfill area) = 1.99E-02 g/s.

Equation 2 requires the assumption of wind speed for determining the emission factor. Table 6 shows the Beaufort wind force scale including a description of various wind speeds in meters per second ("m/s") and the resulting conditions on land.

Table 6: Beaufort wind force scale

Beaufort number	Wind speed (m/s)	Description	Land conditions
0	<0.3	Calm	Calm. Smoke rises vertically.
1	0.3-1.5	Light air	Smoke drift indicates wind direction, still wind vanes.
2	1.6-3.4	Light breeze	Wind felt on exposed skin. Leaves rustle, vanes begin to move.
3	3.4-5.4	Gentle breeze	Leaves and small twigs constantly moving, light flags extended.
4	5.5-7.9	Moderate breeze	Dust and loose paper raised. Small branches begin to move.
5	8.0-10.7	Fresh breeze	Branches of a moderate size move. Small trees in leaf begin to sway.
6	10.8-13.8	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	13.6-17.1	High wind, moderate gale, near gale	Whole trees in motion. Effort needed to walk against the wind.
8	17.2-20.7	Gale, fresh gale	Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.
9	20.9-24.4	Strong gale	Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.
10	24.5-28.4	Storm, whole gale	Trees are broken off or uprooted, saplings bent and deformed. Poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	28.5-32.6	Violent storm	Widespread damage to vegetation. Many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	≥32.7	Hurricane force	Very widespread damage to vegetation. Some windows may break; mobile homes and poorly constructed sheds and barns are damaged. Debris may be hurled about.

Adapted from Wikipedia; http://en.wikipedia.org/wiki/Beaufort_scale

For purposes of establishing emission factors for drop operations, wind speeds of 5, 10, 20, and 30 m/s were chosen to demonstrate the influence of wind speed on emissions at the landfill. Based on these wind speeds and assuming a fly ash moisture content of 27%[11] and the particle size-specific multipliers k[12], the particle size-specific emission factors E can be estimated as shown in Table 7.

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[11] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 13.2.4 Aggregate Handling and Storage Piles, updated November 2006: mean moisture content for fly ash from four samples.

[12] *Ibid*, p. 13.2.4-4: k = 0.74 for PM30, 0.35 for PM10 and 0.053 for PM2.5.

Table 7: Particle size-specific emission factors for PM30, PM10, and PM2.5 for drop operations at various wind speeds

Particulate Size	E (kg/metric ton) at wind speed 5 m/s	10 m/s	20 m/s	30 m/s
PM30	9.00E-05	2.22E-04	5.46E-04	9.25E-04
PM10	4.26E-05	1.05E-04	2.58E-04	4.37E-04
PM2.5	6.45E-06	1.59E-05	3.91E-05	6.62E-05

As shown in Table 7, particulate matter emission factors increase by an order of magnitude for wind speeds between 5 m/s and 30 m/s. The wind speeds of interest for determining whether fugitive dust emissions from the landfill would potentially exceed the short-term NAAQS for PM10 and PM2.5 are those that provide a worst-case scenario, *i.e.*, windy or stormy conditions above 10 m/s.

Based on the emission factors Table 7 particulate matter emissions for one drop operation can be estimated assuming a 20 ton[13] load of CCW per truck as shown in Table 8.

Table 8: Particle size-specific emissions for PM30, PM10, and PM2.5 for 1 drop operation (20 tons) at various wind speeds

Particulate Size	Emissions (kg) at wind speed 5 m/s	10 m/s	20 m/s	30 m/s
PM30	1.63E-03	4.02E-03	9.90E-03	1.68E-02
PM10	7.73E-04	1.90E-03	4.68E-03	7.94E-03
PM2.5	1.17E-04	2.88E-04	7.09E-04	1.20E-03

As an example of the magnitude of drop operation emissions: A 1,000 Megawatt ("MWe") power plant with an average daily consumption of 12,000 tons of sub-bituminous coal produces about 2,400 tons of fly ash per day.[14] Since capture efficiencies range from 95% to 99.95%, most of this fly ash is captured for either landfilling (or reuse). Thus, assuming 2,300 tons of fly ash would be disposed of per day and assuming a 20-ton load for each truck, about 115 drop operations would occur every day at a landfill to dispose of the fly ash from one 1,000-MWe power plant (in addition, the power plant generates bottom ash and other CCW wastes).[15] Some landfills receive CCW from several facilities; some of the largest commercial landfills receiving industrial waste are permitted to receive up to 15,000 tons of

[13] 1 ton = 0.907 metric tons; 20 tons = 18.1 metric tons.

[14] Chen Y, Shah N, Huggins EE, Huffman GP, and Dozier A, Characterization of Ultrafine Coal Fly Ash Particles by Energy-filtered TEM, Journal of Microscopy, Vol. 217, Pt. 3, March 2005, pp. 225-234.

[15] (2,300 tons fly ash) / (20 ton load/truck) = 115 trucks/day.

waste per day.[16] Table 9 summarizes particulate emissions in kilogram per day ("kg/day") for drop operations of 2,300 tons of fly ash per day via 20 ton loads.

Table 9: Particle size-specific emissions for PM30, PM10, and PM2.5 for drop operation of 2,300 tons* of fly ash per day via 20 ton loads at various wind speeds

Particulate Size	Emissions (kg/day) at wind speed 5 m/s	10 m/s	20 m/s	30 m/s
PM30	1.88E-01	4.63E-01	1.14E+00	1.93E+00
PM10	8.88E-02	2.19E-01	5.39E-01	9.13E-01
PM2.5	1.35E-02	3.31E-02	8.16E-02	1.38E-01

* (2,300 tons) × (0.907 metric tons/ton) = 2,087 metric tons

As Table 9 shows, at wind speeds of 5 to 30 m/s, PM30 emissions attributable to truck drop operations at a landfill to dispose of fly ash from one 1000-MW coal-fired power plant range from 0.2 to 1.9 kg/day; PM10 emissions range from 0.09 kg/day to 0.9 kg/day. These emissions, which occur only during the operating hours of the landfill, must be added to the emission factors from wind erosion and entrained road dust from vehicle travel on unpaved roads.

Drop operations may occur several times for disposal of one load of fly ash: for example, if delivered via railcar or barge, the material will be dumped into a transfer vehicle (*see* Figure 4), moved to the active portion of the landfill and dropped off there. Thus, there will be two emission points (loading and unloading) for one load of CCW.

Figure 6: Fly ash unloading from rail cars at Arrowhead Landfill, AL
Photo courtesy of John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

[16] *See*, for example, the Arrowhead Landfill in Alabama: http://www.arrowheadlandfill.com/.

3. Emissions Associated with Landfill Equipment

Typically at a landfill, trucks dump their loads onto piles and then large off-road equipment, such as scrapers or dozers, move and compact the materials and smooth and contour the landfill. (*See* Figure 4, Figure 5, and Figure 7.)

Figure 7: Heavy-duty equipment at fly ash landfills
Left: from Center for Environment, Commerce and Energy;
http://cenvironment.blogspot.com/2010/03/constellation-energy-proposing-fly-ash.html
Right: from The Star Online: Grappling with Garbage, May 27, 2008;
http://snipurl.com/1fci88 [thestar_com_my]

Fugitive dust emissions from material handling with off-road equipment can be substantial and must be included in the estimates of total emissions from disposal of CCW at landfills. Emissions can be estimated following the instructions in EPA's AP-42, Section 11.9, for *Western Surface Coal Mining*.

II.B Assumptions for Estimating Particulate Emissions due to Wind Erosion Are Not Sufficiently Conservative

The Screening Assessment determined the emission factor for windblown particulate emissions from a CCW landfill using the equation for "Continuous Fugitive/Windblown Dust Emissions" in EPA's 1992 *Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants*:[17]

[17] Screening Assessment, pp. 4-5.

E = 1.9 (s/1.5) (365-p) / (235) (w/15) **Equation 3**

where:

E = emission factor (kg day^{-1} $hectare^{-1}$)
s = material silt content (%)
p = number of days per year with more than 25 mm of precipitation (dimensionless)
w = percent of time wind speed exceeds 5.4 m/s (%)

The Screening Assessment assumed a material silt content for fly ash of 80% and the default values in EPA's workbook of 0 for p and 20% for w to determine an emission factor of 2.43E-04 g s^{-1} m^{-2}.[18] Neither the Screening Assessment's assumptions nor the equation used provide a sufficiently conservative estimate for emissions from fly ash landfills.

Equation Is Only of Limited Value for Determining Worst-Case Emissions from CCW Landfills

First, the equation used by the Screening Assessment is of limited value for determining worst-case emissions from large-scale wind erosion of a CCW landfill. The equation had been developed to determine fugitive dust releases from "process losses, generated by mechanical action in material handling or windblown dust" originating "from a surface or a collection of small, poorly defined point sources," as shown in the following Figure.[19]

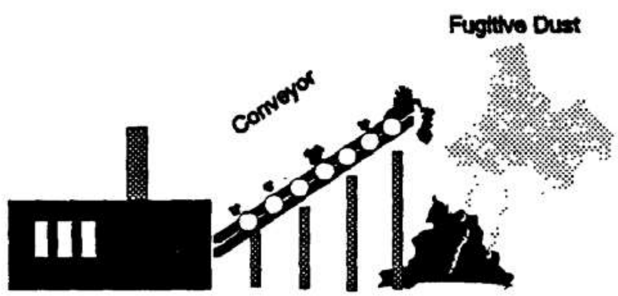

Figure 8: Fugitive dust from material handling or windblown dust
from: EPA, Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants, 1992, p. 4-11

The equation developed for this purpose is independent of wind speed (*see* Equation 3), assuming only a threshold wind speed at which particulates become airborne (5.4 m/s). Erosion potential has been found to increase rapidly with higher wind speeds resulting in considerably more airborne dust. Therefore, emissions should be related to wind gusts of highest magnitude.[20]

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[18] *Ibid*.

[19] U.S. Environmental Protection Agency, Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants, 1992, p. 4-11.

[20] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 13.2.5 Industrial Wind Erosion, updated November 2006, p. 13.2.5-1.

While for most materials the erosion potential, *i.e.*, the finite availability of erodible material (mass/area), tends to decay during an erosion event, fly ash due to its small size can act as an *unlimited reservoir of erodible material* and can sustain emissions for periods of hours without substantial decreases in emission rates. Some natural crusting of the surface may bind available erodible material, thereby reducing the erosion potential when fly ash is stored without disturbance. However, at most landfills, the piles of fly ash are continuously added to, moved, compacted, etc.

Percentage of Wind Speed Exceeding 5.4 m/s Is Not Sufficiently Conservative

Second, while the Screening Assessment's assumptions may be acceptable for determining whether airborne particulate matter emissions through wind erosion of CCW landfills may lead to a violation of the *annual* NAAQS for PM10; the assumption for w of 20%, *i.e.*, the percent of time wind speed exceeds 5.4 m/s, is not acceptable for determining whether emissions would exceed short-term NAAQS, *i.e.*, the *24-hour* standards for PM10 and PM2.5. As shown in Table 6, a wind speed of 5.4 m/s is only a gentle breeze. A conservative screening assessment for this purpose must therefore assume that the wind speed exceeds 5.4 m/s for the entire 24-hour period of a day, *i.e.*, 100%. Thus, the Screening Assessment underestimated potential emissions from wind erosion at a CCW landfill by a factor of five.[21]

Terrain Assumptions for Wind Erosion from Landfill Are Not Representative

The Screening Assessment calculates emissions and models dispersion of fugitive dust based on the emission factor of 2.43E-04 g s^{-1} m^{-2} and based on the 50th through as 90th percentiles of landfill sizes. The Screening Assessment calculates these emissions as if the landfill were a flat, even grade area, *i.e.*, it assumes the footprint of the landfill for emission estimates.

In reality, a landfill is rarely a flat, even grade area but typically consists of elevated areas with piles of recently dumped material that are then moved, compacted, and contoured by off-road equipment, as shown in Figure 4 through Figure 5 and Figure 7.

The elevated portions of the landfill and the piles of fly ash present a considerably larger surface area subject to wind erosion than the footprint of the landfill alone. For example, a cone-shaped storage pile with a diameter of 10 meters and a height of 3 meters has a footprint of 78.5 square meters ("m^2")[22] but an exposed surface area of 91.6 m^2, a 17% increase.[23]

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[21] (100%) / (20%) = 5.

[22] Footprint of cone: $\pi \times r^2 = \pi \times (5\ m^2)^2 = 78.5\ m^2$;
exposed surface area of cone: $\pi \times r \times \sqrt{(r^2 + h^2)} = \pi \times (5\ m) \times \sqrt{(5\ m^2 + 3\ m^2)} = 91.6\ m^2$.

[23] $(91.6\ m^2) \times (78.5\ m^2) = 1.17$.

Use of AP-42, Industrial Wind Erosion, Appears to Be More Representative for Estimating Wind Erosion from Fly Ash Storage Piles

The EPA's AP-42, Section 13.2.5, provides a methodology to estimate emissions from frequently disturbed storage piles and exposed areas within an industrial facility. This section takes into account the shapes of the piles (conical and oval with flattop), the surface area created by piles, and the frequency of disturbance of piles, amongst other variables. This methodology appears to be more representative to determine worst-case emissions for particulate emissions due to wind erosion from CCW landfill than the equation used by the Screening Assessment.

The Screening Assessment's Conclusion that Elevated Landfills Result in Fewer Fugitive Particulate Emissions Is Incorrect

The Screening Assessment determines maximum emissions from the landfill for two scenarios: a) at zero meters height and b) at 10 meters height. The Screening Assessment finds "that landfills that are built up, as opposed to dug into the ground, would actually lead to lower particulates nearby."[24] As explained above, the Screening Assessment's assumptions and calculations are not representative of actual landfill conditions and, thus, the modeling fails to provide accurate results. If emissions are calculated as detailed above, ambient concentrations of particulate matter resulting from wind erosion of CCW landfills will be higher for elevated rather than for at-grade landfills.

II.C The Choice of 10th Percentile of Landfill Distance to Nearest Receptor Is Not Acceptable

The Screening Assessment determined distances of landfills to residential receptors based on available data on the distance of residential wells to landfills. The Screening Assessment determined that the closest recorded distance between a resident (well) and the landfill is 0.6 meters (2 feet) and recognizes that some residences may be even closer.[25] Yet, the Screening Assessment excluded the minimum distance from landfills to receptors as being too conservative to be considered reasonable.[26] In my opinion, excluding the potential receptors who reside directly adjacent to a landfill from a risk assessment is unconscionable. These receptors exist and their risk from exposure to airborne dust from the landfill should therefore be evaluated.

The conventional way of evaluating potential violations of NAAQS for industrial facilities is to determine pollutant concentrations in ambient air at the fence line. This convention should be used here as well.

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[24] Screening Assessment, p. 10.

[25] Screening Assessment, p. B-1.

[26] Screening Assessment, p. 5.

II.D Assumed Control Efficiency for Wind Erosion via Cover or Spraying of Active Portion of Landfill Is Unrealistic

For its secondary scenarios, the Screening Assessment estimated emissions due to wind erosion from a landfill assuming that only a portion of the landfill would be active and the inactive portion would be controlled by covering or spraying on a regular basis. The Screening Assessment calculates emissions from the active portion of the landfill assuming a 40-year operating life of the landfill and daily, weekly, monthly, or annual control via covering or spraying of the inactive portions assuming 100% control. These assumptions are overly simplistic and fail to provide a worst-case scenario of fugitive dust emissions from wind erosion of fly ash at a landfill.

Covering the inactive portions of the landfill or spraying on a regular basis does not result in 100% control of fugitive dust emissions. For example, continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, has been estimated to reduce total particulate emissions by up to 90 percent.[27] The control efficiency of watering an exposed area before high winds has been estimated at 90%. Further, spraying with water is only effective as long as the surface material is sufficiently wetted: in dry climates or high wind conditions, watering during the operating hours of the landfill may be insufficient to control fugitive dust during the night and result in increasing emissions as the surface material dries out again. The efficiency of using dust suppressants or gravel has been estimated at 84%. For landfill covers, depending on the type and the timing of its application, control efficiencies may also be far lower than 100%. For example, the effect of revegetation on wind erosion has been estimated at only 90%.[28] Thus, the Screening Assessment underestimates emissions from the active portion of the landfill for its daily, weekly, monthly, and annual scenarios.

II.E Assumed Sizes of Active Portions of Landfill Are Unrealistic

For its controlled exposure scenarios, the Screening Assessment assumed that only a fraction of the CCW landfill would be exposed to wind erosion and the other remaining portion of the landfill would be controlled 100% assuming yearly, monthly, weekly, or daily control via spraying or covering over the landfill's useful life of 40 years. It was assumed that the exposed fraction of the landfill would be square and located in the center of the landfill. The Screening Assessment determined the following distributions of areas in square meters (m^2) and sides in meters (m) for the active portions of landfills:

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[27] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 13.2.4 Aggregate Handling and Storage Piles, updated November 2006, p. 13.2.4-5.

[28] Western Governors' Association, WRAP Fugitive Dust Handbook, September 7, 2006, p. 3; http://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf.

	Yearly		Monthly		Weekly		Daily	
%ile	Area	Side	Area	Side	Area	Side	Area	Side
50th	6,728	82.0	561	23.7	129	11.4	18	4.3
60th	8,600	92.7	717	26.8	165	12.9	24	4.9
70th	12,282	110.8	1024	32.0	236	15.4	34	5.8
80th	21,084	145.2	1757	41.9	405	20.1	58	7.6
90th	30,109	173.5	2509	50.1	579	24.1	82	9.1

[29]

Review of these estimates shows that at least some of the exposure scenarios evaluated in the Screening Assessment are unrealistic. For example, the 50th and 90th percentiles for the sides of an active portion of the landfills assuming daily control are only 18 to 82 square meters (194 to 883 square feet) with side lengths of 4.3 to 9.1 meters (14 to 30 feet). An area of 18 square meters can basically be covered by unloading the contents of one haul truck onto a pile. Managing this pile would involve spreading and compacting the CCW, resulting in a larger active area than 18 square meters. Clearly, the areas considered in the Screening Assessment for daily cover are too small to be managed with heavy-duty equipment on site and are orders of magnitude smaller than what is typically managed as an active portion at CCW landfills even with daily controls. Thus, the Screening Assessment underestimates wind erosion from landfills. As discussed in Comment II.A, emissions from drop operations, entrained road dust and managing the CCW on site would by far exceed emissions from those small areas. Consequently, daily cover should definitively be recommended to minimize fugitive dust emissions and resulting risks to receptors.

II.F Assumption of Active Portion in Center of Landfill Does Not Constitute Worst Case Scenario

To simplify modeling, the Screening Assessment assumes that the operating or active portion is at the very center of the landfill to "give results that estimate an average concentration over the entire lifetime of the landfill for a receptor located in any direction."[30] This assumption, which would be acceptable for determining long-term impacts of fugitive dust emissions from the landfill, *e.g.*, for determining cancer risks over the lifetime of nearby receptors, is *not* sufficiently conservative as a worst-case scenario to determine whether fugitive dust emissions would lead to exceedances of short-term 24-hour ambient air quality standards. In order to assess short-term exceedances, the Screening Assessment should be revised to assume that the operating portion of the landfill is at the fence line closest to a potential receptor.

For example, landfill operators frequently fill in a portion of the landfill nearest to the fence line first before moving to the more central portions of the landfill. For example, at the Arrowhead Landfill in Perry County, AL, where over three million tons of fly ash from the 2008 Tennessee Valley Authority ("TVA") Kingston Plant fly ash pond spill are currently being

[29] Screening Assessment, Table 5, p. 8.

[30] Screening Assessment, p. 9.

disposed off, the landfill operator started unloading in an area nearest to residents, as shown in the photographs below. (Note the proximity of residences to the active (black) portion of the landfill. The dust and odor from this fly ash disposal were so noxious that nearby residents filed suit against the landfill owners.)

Figure 9: Arrowhead Landfill, AL, disposal of fly ash from TVA Kingston pond spill
Photo courtesy of John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

Figure 10: Arrowhead Landfill, AL, disposal of TVA fly ash waste
Photo courtesy of John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

Figure 11: Proximity of Arrowhead Landfill, AL, to residence
Courtesy: John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

Figure 12: Arrowhead Landfill, AL, TVA fly ash waste with remnants of plastic cover as seen from a resident's porch
Courtesy: John Wathen, Hurricane Creekkeeper, Waterkeeper Alliance

Thus, the risks of fugitive dust emissions from the landfill leading to violations of the 24-hour NAAQS for PM10 and PM2.5 should be based on the active portion of the landfill being at the fence line to the closest receptor.

III. Potential Human Health Risks from Fugitive Dust via Inhalation Pathway Have Not Been Adequately Assessed

As summarized above, the Screening Assessment limits its analysis to the incremental risks of human exposure to particulate emissions in excess of NAAQS resulting from dry handling of CCW at landfills. As such, it addresses neither background concentrations of particulate matter nor a constituent-based exposure pathway.[31] In addition, it ignores the substantial emissions of carcinogenic diesel particulate emissions from haul trucks, on-site landfill equipment, and diesel-powered pumps and generators.

Coal combustion waste consists of fly ash, bottom ash, boiler slag, flue gas desulfurization ("FGD") residues, and fluidized bed combustion ("FBC") wastes and contains varying levels of toxic constituents, including metals such as arsenic, lead, mercury, cadmium, chromium, selenium and varying levels of alkalinity and crystalline silica. Trace element content also varies with the individual types of CCWs from a single boiler. Fly ash in particular, tends to be enriched in arsenic, boron, mercury, and lead. Table 10 shows concentration data in various CCWs in parts per million ("ppm").

Table 10: Concentrations of trace elements in various CCWs

	Fly Ash (ppm)		Bottom Ash (ppm)		Boiler Slag (ppm)	
Constituent	Median	Range	Median	Range	Median	Range
Aluminum[a]	—	—	—	—	—	—
Antimony[b]	4.6	0.2-205	4.0	0.18-8.4	0.8	0.25-1.0
Arsenic[b]	43.4	0.0003-391.0	4.7	0.80-36.5	4.5	0.01-254
Barium[b]	806.5	0.02-10,850	633	24-9,630	413	6.19-1,720
Beryllium[b]	5.0	0.200-2,105	2.2	1.4-2.9	7.0	7.0-7.0
Boron[b]	311	2.98-2,050	90.0	1.79-390	49.5	0.10-55.0
Cadmium[b]	3.4	0.01-76.0	3.1	0.050-5.5	40.5	0.01-40.5
Chromium[c]	136	3.6-437	120	3.4-350	—	—
Chromium VI[b]	90	0.19-651	121.0	3.41-4,710	158	1.43-5,981
Cobalt[c]	35.9	4.90-79.0	24	7.1-60.4	—	—
Copper[c]	112	0.20-655	61.1	2.39-146.3	32.0	1.37-156
Fluorine[c]	29.0	0.40-320	50.0	2.5-104	—	—
Iron[a]	—	—	—	—	—	—
Lead[b]	56.8	0.02-273	13.2	0.86-843.0	8.0	0.40-120
Manganese[c]	250	24.5-750	297	56.7-769	—	—
Mercury[b]	0.1	0.013-49.5	0.009	0003-0.040	9.5	0.016-9.5
Molybdenum[a]	—	—	—	—	—	—
Nickel[b]	77.6	0.1-1,270	79.6	1.9-1,267	83.0	3.3-177
Potassium[a]	—	—	—	—	—	—
Selenium[b]	7.7	0.0003-49.5	0.8	0.007-9.0	4.5	0.10-14.0
Silver[b]	3.2	0.01-49.5	3.0	0.06-7.1	37.0	0.01-74.0
Strontium[c]	775	30.0-3,855	800	170-1,800	—	—
Thallium[b]	9.0	0.15-85.0	na	2.0	38.5	33.5-40.0
Vanadium[b]	252	43.5-5,015	141	24.0-264	75.0	75.0-320.0
Zinc[b]	148	0.28-2,200	52.6	3.80-717	35.8	4.43-530

[31] Screening Assessment, p. 3.

Table 10 contd.: Concentrations of trace elements in various CCWs

FGD (ppm)		FBC: Fly Ash (ppm)		FBC: Bed Ash (ppm)	
Median	Range	Median	Range	Median	Range
—	—	42,300	20-88,900	18,000	9-68,800
6.0	3.65-90.0	7.75	0.125-259	10	0.125-361
32.5	0.0075-341.0	27.55	2.8-176	14.6	2.5-80
162.5	0.08-2,280	348	31.3-2,690	184	7.3-453
29.3	0.900-49.5	2.23	1.08-11.5	1.21	0.5-8
60.0	5.00-633	39.1	0.025-2,470	14.1	0.025-304
3.9	0.005-81.9	1.25	0.013-6.68	1.02	0.0125-7.16
—	—	44.8	5.17-97.1	37	4.1-86
73.0	0.17-312	—	—	—	—
—	—	19	2.5-79.8	11.3	1.4-75.8
46.1	0.04-251.0	41.1	2-99	13.8	1.65-37.1
—	—	—	—	—	—
—	—	25,300	22.2-76,500	11,100	6.2-19,300
25.3	0.01-527.0	25	1.03-105	12.5	0.848-58
—	—	165	0.05-548	241	52.2-751
4.8	0.073-39.0	0.323	0.00005-129	0.05	0.00005-16.2
—	—	6.25	2.35-48.6	14.7	6-63.4
68.1	3.7-191.0	41.4	6.25-923	22	1-945
—	—	3510	1.13-10,200	584	1.3-8,980
4.5	0.0150-162.0	8.36	0.47-166	0.952	0.152-45
3.3	0.01-10.3	1.03	0.05-11.6	1	0.05-87.6
—	—	—	—	—	—
9.0	9.0-9.0	3.28	1.25-39	3.03	0.5-25
65.0	0.01-302.0	194	36.4-3,830	69	12-5,240
90.9	0.01-5,070	38.5	25-143	34	17.4-399

From: National Research Council, Managing Coal Combustion Residues in Mines, 2006, p. 42; http://www.nap.edu/openbook.php?record_id=11592&page=42#, pp. 42 and 43.

EPA recently published total metal concentration ranges in CCWs, which for some constituents, *e.g.*, arsenic ("As") are higher than shown in Table 10.

Table 11: Total metals concentration in CCWs (ppm)

Constituent	Mean	Minimum	Maximum
Antimony	6.32	0.00125	3100
Arsenic	24.7	0.00394	773
Barium	246.75	0.002	7230
Beryllium	2.8	0.025	31
Cadmium	1.05	0.000115	760.25
Chromium	27.8	0.005	5970
Lead	25	0.0074	1453
Mercury	0.18	0.000035	384.2
Nickel	32	0.0025	54055
Selenium	2.4075	0.0002	673
Silver	0.6965	0	3800
Thallium	1.75	0.09	100

From: U.S. Environmental Protection Agency, 40 CFR Parts 257, 261, 264 et al., Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals From Electric Utilities; Proposed Rule, Fed. Reg. Vol. 75, No. 118, June 21, 2010, p. 35169

Risks from exposure to these hazardous materials, including cancer risks and chronic and acute health risks, must be assessed in order to adequately characterize human health risks resulting from dry handling of CCW. The Screening Assessment does not evaluate these risks, nor were they adequately assessed in other EPA documents.

In response to a comment by peer reviewer Dr. William Hopkins, Virginia Polytechnic Institute and State University, regarding the lack of inhalation risks in the 2009 Risk Assessment, the EPA referred the commenter to a 1998 human and ecological risk analysis (*Non-groundwater Pathways, Human Health and Ecological Risk Analysis for Fossil Fuel Combustion Phase 2*; hereafter "1998 Risk Analysis") that evaluated cancer and chronic risks via the inhalation pathway by modeling chronic exposures to constituents in airborne CCW erosion from landfills. However, that assessment did not evaluate acute exposures to particulates. The EPA stated that it conducted the Screening Assessment to correct this deficiency.[32] There are several problems with this approach.

First, the potential exceedance of NAAQS due to airborne particulate matter from CCW landfills evaluated in the Screening Assessment is not an adequate substitute for assessing acute risks from exposure to toxic constituents of particulate matter.

Second, the 1998 Risk Analysis analyzed emissions from an active portion in the center of the landfill. While acceptable for long-term analyses, *i.e.*, cancer and chronic health impacts, this assumption is not acceptable for assessing short-term acute impacts.

Third, the 1998 Risk Analysis analyzed only non-mercury metals associated with emissions of particulates. The major reason for not including mercury in the analysis was that the risk assessment methodology for mercury is much more complex than for other metal constituents and that the methodology was, at the time under review by EPA's Office of Research and Development.[33] Yet, emissions of mercury are of particular concern due to its toxicity and its accumulation in fly ash. Implementation of the Clean Air Mercury Rule will further increase mercury content in fly ash. For example: according to EPA's *Preamble to the National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry* published December 20, 2006, sorbent injection processes significantly increase the mercury content of fly ash. Testing to date reveals that mercury in fly ash increases by a median factor of 8.5 and, in one case, the mercury content increased by a factor of 70. At the same time, other contaminant in fly ash such as arsenic and selenium also increase also increase concurrently increasing risks to human health via inhalation of fugitive dust.[34]

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[32] U.S. Environmental Protection Agency, Responses to Review Comments on Human and Ecological Risk Assessment for Coal Combustion Wastes, Final Draft, September 1, 2009, pp. 41-42.

[33] *Ibid*, pp. 24 and 45.

[34] U.S. Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants from the Portland Cement Manufacturing Industry, Federal Register, Vol. 71, No. 244, December 20, 2006.

Fourth, the 1998 Risk Analysis did not analyze another fly ash component of concern, lime ("CaO"). This chemical reacts with water to form calcium hydroxide ("$Ca(OH)_2$"), giving fly ash a pH somewhere between 10 and 12, a medium to strong base. The presence of lime in fly ash can cause lung damage if present in sufficient quantities.[35]

Fifth, 1998 Risk Analysis did not analyze the presence of fine crystalline silica in fly ash which has been linked with lung damage, in particular silicosis. The Occupational Health and Safety Administration ("OSHA") allows a maximum concentration of crystalline silica in ambient air of 0.10 milligram per cubic meter ("mg/m^3").

The 1998 Risk analysis found incremental cancer risks from hexavalent chromium of 3.5 in one million, below the threshold of 10 in one million; all other contaminants did not have appreciable cancer risks, *i.e.*, incremental cancer risks were below one in one million. However, as mentioned above, this health risk assessment did not take into account mercury, crystalline silica, or diesel particulate matter emissions from haul trucks, landfill mobile equipment, and diesel-powered pumps and generators at the landfill. Thus, cancer risks can be assumed to be considerably higher than estimated by the 1998 Risk Analysis and may well exceed the 10 in one million cancer threshold.

The Screening Assessment should be revised and used as a companion document for an in-depth health risk assessment examining inhalation exposure to airborne particulate emissions associated with CCW landfill operations.

IV. Recommendations for Landfill Management

Based on the above discussion and the risks found by Screening Assessment for airborne fugitive dust emissions associated with dry handling of fly ash at CCW landfills, daily cover should be recommended for all landfills. In addition, enclosure, watering and the use of chemical wetting agents are recommended as the principal means for control of temporary emissions at the landfill. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from storage operations by up to 90 percent.[36]

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[35] National Research Council, Managing Coal Combustion Residues in Mines, 2006, p. 36.

[36] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, 13.2.4 Aggregate Handling and Storage Piles, updated November 2006, p. 13.2.4-5.

The following summarizes recommendations for landfill management:

- Cover active areas of landfill daily;
- Stabilize, cover, or water exposed CCW piles at landfill;
- Place windbreaks upwind of storage piles;
- Stabilize or water unpaved roads at landfill;
- Minimize CCW freefall distance from drop operations from trucks, conveyors, or loaders;
- Avoid overloading of onsite equipment.
- Keep two feet of freeboard on trucks and cover during transport; and
- Avoid trackout onto public streets by installing wheel washers.

Additional recommendations for dry handling of materials can be found in the Western Governors' Association's *WRAP Fugitive Dust Handbook*, which is in part based on EPA's AP-42.[37]

V. Typographical Errors

The following typographical errors in the Screening Assessment should be corrected:

- In Section 4.4, Controls Applied Daily, the Screening Assessment incorrectly refers to "*weekly* fugitive dust control," rather than "*daily* fugitive dust control."[38]
- In Section 5.0, Conclusions, the Screening Assessment concludes that "*even* the most conservative evaluation of daily dust controls led to particulate concentrations well below the NAAQS," instead of "*only* the most conservative evaluation..."[39]

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[37] Western Governors' Association, WRAP Fugitive Dust Handbook, September 7, 2006; http://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf.

[38] Screening Assessment, p. 11.

[39] Screening Assessment, p. 11.

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Dr. Pless is a court-recognized expert with over 10 years of experience in environmental consulting conducting and managing interdisciplinary environmental research projects and preparing and reviewing environmental permits and other documents for U.S. and European stakeholder groups. Her broad-based experience includes air quality and air pollution control; water quality, water supply, and water pollution control; biology; public health and safety; and noise studies; California Environmental Quality Act ("CEQA"), Clean Air Act ("CAA"), and National Environmental Policy Act ("NEPA") review; industrial ecology and risk assessment; and use of a wide range of environmental software.

EDUCATION

Doctorate in Environmental Science and Engineering (D.Env.), University of California Los Angeles, 2001

Master of Science (equivalent) in Biology, Technical University of Munich, Germany, 1991

PROFESSIONAL HISTORY

Pless Environmental, Inc., Principal, 2008–present

Environmental Consultant, Sole Proprietor, 2006–2008

Leson & Associates (previously Leson Environmental Consulting), Kensington, CA, Environmental Scientist/Project Manager, 1997–2005

University of California Los Angeles, Graduate Research Assistant/Teaching Assistant, 1994–1996

ECON Research and Development, Environmental Scientist, Ingelheim, Germany, 1992–1993

Biocontrol, Environmental Projects Manager, Ingelheim, Germany, 1991–1992

REPRESENTATIVE EXPERIENCE

Air Quality and Pollution Control

Projects include CEQA/NEPA review; attainment and non-attainment new source review ("NSR"), prevention of significant deterioration ("PSD") and Title V permitting; control technology analyses (BACT, LAER, RACT, BARCT, BART, MACT); technology evaluations and cost-effectiveness analyses; criteria and toxic pollutant emission inventories; emission offsets; ambient and source monitoring; analysis of emissions estimates and ambient air pollutant concentration modeling. Some typical projects include:

— Critically reviewed and prepared technical comments on the air quality, biology, noise, water quality, and public health and safety sections of CEQA/NEPA documents for numerous commercial, residential, and industrial projects (*e.g.*, power plants, airports, residential developments, retail developments, hospitals, refineries, slaughterhouses, asphalt plants, food processing facilities, printing facilities, quarries, and mines) and provided litigation support in a number of cases filed under CEQA.

— Critically reviewed and prepared technical comments on the air quality and public health sections of the Los Angeles Airport Master Plan (Draft, Supplement, and Final Environmental Impact Statement/Environmental Impact Report) for the City of El Segundo. Provided technical comments on the Draft and Final General Conformity Determination for the preferred alternative submitted to the Federal Aviation Administration.

— For several California refineries, evaluated compliance of fired sources with Bay Area Air Quality Management District Rule 9-10. This required evaluation and review of hundreds of source tests to determine if refinery-wide emission caps and compliance monitoring provisions were being met.

— Critically reviewed and prepared technical comments on Draft Title V permits for several refineries and other industrial facilities in California.

— Evaluated the public health impacts of locating big-box retail developments in densely populated areas in California and Hawaii. Monitored and evaluated impacts of diesel exhaust emissions and noise on surrounding residential communities.

— In conjunction with the permitting of several residential and commercial developments, conducted studies to determine baseline concentrations of diesel exhaust particulate matter using an aethalometer.

— For an Indiana steel mill, evaluated technology to control NOx and CO emissions from fired sources, including electric arc furnaces and reheat furnaces, to establish BACT. This required a comprehensive review of U.S. and European operating experience. The lowest emission levels were being achieved by steel mills using selective catalytic reduction ("SCR") and selective non-catalytic reduction ("SNCR") in Sweden and The Netherlands.

— For a California petroleum coke calciner, evaluated technology to control NOx, CO, VOCs, and PM10 emissions from the kiln and pyroscrubbers to establish BACT and LAER. This required a review of state and federal clearinghouses, working with regulatory agencies and pollution control vendors, and obtaining and reviewing permits and emissions data from other similar facilities. The best-controlled facilities were located in the South Coast Air Quality Management District.

— For a Kentucky coal-fired power plant, identified the lowest NOx levels that had been permitted and demonstrated in practice to establish BACT. Reviewed operating experience of European, Japanese, and U.S. facilities and evaluated continuous emission monitoring data. The lowest NOx levels had been permitted and achieved in Denmark and in the U.S. in Texas and New York.

— In support of efforts to lower the CO BACT level for power plant emissions, evaluated the contribution of CO emissions to tropospheric ozone formation and co-authored report on same.

— Critically reviewed and prepared technical comments on applications for certification ("AFCs") for numerous natural-gas fired, solar, biomass, and geothermal power plants in California permitted by the California Energy Commission. The comments addressed construction and operational emissions inventories and dispersion modeling, BACT determinations for combustion turbine generators, fluidized bed combustors, diesel emergency generators, etc.

- Critically reviewed and prepared technical comments on draft PSD permits for several natural gas-fired power plants in California, Indiana, and Oregon. The comments addressed emission inventories, greenhouse gas emissions, BACT, case-by-case MACT, compliance monitoring, cost-effectiveness analyses, and enforceability of permit limits.
- For a California refinery, evaluated technology to control NOx and CO emissions from CO Boilers to establish RACT/BARCT to comply with BAAQMD Rule 9-10. This required a review of BACT/RACT/LAER clearinghouses, working with regulatory agencies across the U.S., and reviewing federal and state regulations and State Implementation Plans ("SIPs"). The lowest levels were required in a South Coast Air Quality Management District rule and in the Texas SIP.
- In support of several federal lawsuits filed under the federal Clean Air Act, prepared cost-effectiveness analyses for SCR and oxidation catalysts for simple cycle gas turbines and evaluated opacity data.
- Provided litigation support for a CEQA lawsuit addressing the pollution control equipment at a proposed biomass cogeneration plant.
- Prepared comments and provided litigation support on several proposed regulations including the Mojave Desert Air Quality Management District Rule 1406 (fugitive dust emission reduction credits for road paving); South Coast Air Quality Management District Rule 1316, San Joaquin Valley Air Pollution Control District Rule 2201, Antelope Valley Air Quality Management District Regulation XIII, and Mojave Desert Air Quality Management District Regulation XIII (implementation of December 2002 amendments to the federal Clean Air Act).
- Critically reviewed draft permits for several ethanol plants in California, Indiana, Ohio, and Illinois and prepared technical comments.
- Reviewed state-wide average emissions, state-of-the-art control devices, and emissions standards for construction equipment and developed recommendations for mitigation measures for numerous large construction projects.
- Researched sustainable building concepts and alternative energy and determined their feasibility for residential and commercial developments, *e.g.*, regional shopping malls and hospitals.
- Provided comprehensive environmental and regulatory services for an industrial laundry chain. Facilitated permit process with the South Coast Air Quality Management District. Developed test protocol for VOC emissions, conducted field tests, and used mass balance methods to estimate emissions. Reduced disposal costs for solvent-containing waste streams by identifying alternative disposal options. Performed health risk screening for air toxics emissions. Provided permitting support. Renegotiated sewer surcharges with wastewater treatment plant. Identified new customers for shop-towel recycling services.
- Designed computer model to predict performance of biological air pollution control (biofilters) as part of a collaborative technology assessment project, co-funded by several major chemical manufacturers. Experience using a wide range of environmental software, including air dispersion models, air emission modeling software, database programs, and geographic information systems ("GIS").

Water Quality and Pollution Control

Experience in water quality and pollution control, including surface water and ground water quality and supply studies, evaluating water and wastewater treatment technologies, and identifying, evaluating and implementing pollution controls. Some typical projects include:

- Evaluated impacts of on-shore oil drilling activities on large-scale coastal erosion in Nigeria.
- For a 500-MW combined-cycle power plant, prepared a study to evaluate the impact of proposed groundwater pumping on local water quality and supply, including a nearby stream, springs, and a spring-fed waterfall. The study was docketed with the California Energy Commission.
- For a 500-MW combined-cycle power plant, identified and evaluated methods to reduce water use and water quality impacts. These included the use of zero-liquid-discharge systems and alternative cooling technologies, including dry and parallel wet-dry cooling. Prepared cost analyses and evaluated impact of options on water resources. This work led to a settlement in which parallel wet dry cooling and a crystallizer were selected, replacing 100 percent groundwater pumping and wastewater disposal to evaporation ponds.
- For a homeowner's association, reviewed a California Coastal Commission staff report on the replacement of 12,000 linear feet of wooden bulkhead with PVC sheet pile armor. Researched and evaluated impact of proposed project on lagoon water quality, including sediment resuspension, potential leaching of additives and sealants, and long-term stability. Summarized results in technical report.

Applied Ecology, Industrial Ecology and Risk Assessment

Experience in applied ecology, industrial ecology and risk assessment, including human and ecological risk assessments, life cycle assessment, evaluation and licensing of new chemicals, and fate and transport studies of contaminants. Experienced in botanical, phytoplankton, and intertidal species identification and water chemistry analyses. Some typical projects include:

- Conducted technical, ecological, and economic assessments of product lines from agricultural fiber crops for European equipment manufacturer; co-authored proprietary client reports.
- Developed life cycle assessment methodology for industrial products, including agricultural fiber crops and mineral fibers; analyzed technical feasibility and markets for thermal insulation materials from natural plant fibers and conducted comparative life cycle assessments.
- For the California Coastal Conservancy, San Francisco Estuary Institute, Invasive Spartina Project, evaluated the potential use of a new aquatic pesticide for eradication of non-native, invasive cordgrass (*Spartina spp.*) species in the San Francisco Estuary with respect to water quality, biological resources, and human health and safety. Assisted staff in preparing an amendment to the Final EIR.
- Evaluated likelihood that organochlorine pesticide concentrations detected at a U.S. naval air station are residuals from past applications of these pesticides consistent with manufacturers' recommendations. Retained as expert witness in federal court case.
- Prepared human health risk assessments of air pollutant emissions from several industrial and commercial establishments, including power plants, refineries, and commercial laundries.

- Managed and conducted laboratory studies to license pesticides. This work included the evaluation of the adequacy and identification of deficiencies in existing physical/chemical and health effects data sets, initiating and supervising studies to fill data gaps, conducting environmental fate and transport studies, and QA/QC compliance at subcontractor laboratories. Prepared licensing applications and coordinated the registration process with German environmental protection agencies. This work led to regulatory approval of several pesticide applications in less than six months.
- Designed and implemented database on physical/chemical properties, environmental fate, and health impacts of pesticides for a major multi-national pesticide manufacturer.
- Designed and managed experimental toxicological study on potential interference of delta-9-tetrahydrocannabinol in food products with U.S. employee drug testing; co-authored peer-reviewed publication.
- Critically reviewed and prepared technical comments on applications for certification for several natural-gas fired, solar, and geothermal power plants and transmission lines in California permitted by the California Energy Commission. The comments addressed avian collisions and electrocution, construction and operational noise impacts on wildlife, risks from brine ponds, and impacts on endangered species.
- For a 180-MW geothermal power plant, evaluated the impacts of plant construction and operation on the fragile desert ecosystem in the Salton Sea area. This work included baseline noise monitoring and assessing the impact of noise, brine handling and disposal, and air emissions on local biota, public health, and welfare.
- Designed research protocols for a coastal ecological inventory; developed sampling methodologies, coordinated field sampling, determined species abundance and distribution in intertidal zone, and conducted statistical data analyses.
- Designed and conducted limnological study on effects of physical/chemical parameters on phytoplankton succession; performed water chemistry analyses and identified phytoplankton species; co-authored two journal articles on results.
- Organized and conducted surveying and mapping of aquatic plant species in several lakes and rivers in Sweden and Germany as ecological indicators for the health of limnological ecosystems.

PRO BONO ACTIVITIES

Founding member of "SecondAid," a non-profit organization providing tsunami relief for the recovery of small family businesses in Sri Lanka. (www.secondaid.org.)

PROFESSIONAL AFFILIATIONS

Association of Environmental Professionals

PUBLICATIONS

Available upon request

ATTACHMENT 7

Other Coal Ash Sites
September 2011

In addition to the coal ash impoundments at coal fired electric power plants, the Illinois Environmental Protection Agency (Illinois EPA) also works with a number of other sites with coal combustion residues. Illinois EPA also coordinates with the Department of Natural Resources (DNR) Office of Mines and Minerals (OMM) on the coal mine related sites. The following provides a synopsis of and status of Illinois EPA activities at some of these other sites:

U.S. Minerals, Montgomery County - U.S. Minerals is located on the south side of Coffeen and receives boiler slag from the Coffeen Power Plant, grinds and sizes the granules and ships them to facilities that make asphalt roofing shingles and blasting media. We received dust complaints from Coffeen citizens in 2004, 2005, 2006 and a violation notification letter (VNL) was sent in 2006. The company installed bag houses on the process and the facility currently has a Bureau of Air (BOA) state operating permit. We have not recently received any complaints about operations at this location. Storm water discharges from the site are covered by the general National Pollution Discharge Elimination System (NPDES) Permit for storm water associated with industrial activity (ILR005838)

Springfield Coal Company's Crown III Mine Site, Macoupin County - This mine is located west of Farmersville and coal trucks backhaul fly ash and coal ash to the mine. Trucks dump the ash into an enclosed shed equipped with multiple water sprays to capture dust. The ash is sluiced out to a pond. A truck driver complained about blowing dust in 2004 and an Illinois EPA Bureau of Land – Bureau of Air (BOL-BOA) multimedia inspection was performed. BOL sent a VNL 9/28/04 for BOL violations. No other complaints have been received by BOA Field Operations Section (FOS). The mine currently has a BOA State operating permit.

The Crown III Mine is also inspected by OMM a minimum of once a month. Per OMM, dust is not normally observed blowing from the permit area, but when it is, the operator is required to water down the disposal areas using water trucks. Runoff from the disposal areas is directed to the sediment ponds found on the mine site. DNR has not received any complaints concerning dust for the Crown III Mine.

Certain contaminant concentrations in the Toxicity Characteristics Leaching Potential (TCLP) leachate analysis may exceed the Class II groundwater standards. However, it is noted that in general, the TCLP analysis is an acid leachate test the results from which are considered to be a "worse-case" scenario since the coal combustion waste (CCW) material will be maintained in an alkaline environment. Therefore, for most constituents the TCLP analysis results will provide an overstatement of actual concentrations expected to be experienced under field conditions. As these analyses overstate anticipated actual leachate concentrations, these materials are anticipated to pose no threat to the nearby water resources.

As part of the recent NPDES permit renewal process for this facility, the applicant has been required to develop and implement an updated fugitive dust control plan. Prior to re-issuance of a renewed NPDES permit for this facility, appropriate conditions will be incorporated to address fugitive dust issues based on the good mining practices of 35 Ill. Adm. Code 406.204 and the dust control plan currently being developed.

An inspection of this facility was conducted on July 12, 2011. Discharge Monitoring Reports (DMR's) showed compliance with NPDES Permit No. IL0059471 limits. No significant issues with regulated outfalls or runoff were noted during the inspection. No evidence was observed of "coal ash being distributed onto the land, eventually draining into streams." Runoff from the ash disposal area and the coal mine waste areas appeared to be tributary to sedimentation ponds and the permitted outfalls. It was reported that there were 23 groundwater monitoring wells onsite per a Subtitle D permit; however, monitoring well data was not reviewed as part of this inspection. No water related complaints regarding this facility have been received by Springfield Regional Office in the past 20 years. No problems with dust were noted on July 12, 2011 BOW FOS inspection, but the wind was less than 5 mph and dust was not an issue being specifically evaluated during the inspection. The closest residences to the mine and the ash and coal waste piles/impoundments are located to the north and southwest. The closest residence is approximately 900 feet northwest of the ash pile/impoundment and about 1100 feet from the "dry ash." Runoff water impoundments are located on the part of the pile nearest that residence. A topsoil stockpile and offsite runoff diversion channel is located between the residence and ash pile.

A request for a hydrogeologic assessment schedule and well survey within 2,500 feet of the permit boundary was submitted to the Crown III Mine on November 24, 2010. The goals of the assessment are to identify any impacts to groundwater quality at the site, determine the nature and extent of any groundwater impacts identified and identification of potential remedial alternatives for any impacts identified. Crown III committed to a well survey by February 28, 2011, and a hydrogeologic assessment schedule by April 1, 2011. The well survey was submitted March 8, 2011. The schedule for a hydrogeologic assessment was not submitted. Springfield Coal Company's has not responded to a July 15, 2011 letter from Illinois EPA requesting the submission of a completed hydrogeologic assessment by September 14, 2011. Illinois EPA is considering issuing a Violation Notice for the Springfield Coal Company's Crown III Mine Site

Springfield Coal Company's Industry Mine, McDonough & Schuyler Counties - OMM/DNR - OMM has approved Coal Combustion By-product (CCBP) utilization at the mine site. The CCBP meets the requirements for beneficial use during reclamation to help achieve the permitted post-mining land use. The Industry Mine is inspected by OMM a minimum of once a month. Because of the large area under permit, dust has not been noted blowing from the permit area. The nearest resident lives more than one mile away from the area of coal combustion material placement. Runoff from the disposal areas is directed to the numerous sediment ponds found on the mine site. OMM has not received any complaints concerning dust for the Industry Mine.

Certain contaminant concentrations reported in the TCLP leachate analysis of the CCW may exceed the Class II groundwater standards. However, it is noted that in general, the TCLP analysis is an acid leachate test the results from which are considered to be a "worse-case" scenario since the CCW material will be maintained in an alkaline environment. Therefore, for most constituents the TCLP analysis results will provide an overstatement of actual concentrations expected to be experienced under field conditions. As these analyses overstate anticipated actual leachate concentrations, these materials are anticipated to pose no threat to the nearby water resources.

There is ~8 acre beneficial use coal CCW disposal area at this site. The exposed rock faces are reportedly sealed with compacted clay. Runoff from this area is diverted to a reclamation pond. Dust control in the areas appeared marginal during this inspection.

A ~10.4 acre OMM Permit 16 coal combustion waste CCW disposal area is also located at this located at this site. An earthen containment berm was placed around this area. Runoff from the site needs to be contained; however, it appeared that some runoff would drain off site south of the stockpiles and along the access road. Springfield Coal Company indicated that they would provide containment for the entire disposal site.

Based on comments received during the recent public hearing held on the draft renewed NPDES permit for this facility, the applicant will be required to develop and implement an updated fugitive dust control plan. Prior to re-issuance of a renewed NPDES permit for this facility, appropriate conditions will be incorporated to address fugitive dust issues based on the good mining practices of 35 Ill. Adm. Code 406.204 and the dust control plan to be required.

A VNL was issued on 10/8/09 for an effluent violation and the case was subsequently referred to the Illinois Attorney General' Office (AGO) on 1/20/10.

BOW FOS staff conducted an inspection on 9/27/10: CCW is stockpiled on the ground in the beneficial use CCW disposal area. Local municipalities, townships, etc. typically use this material for road maintenance. The mine had a water truck for dust control (which reportedly worked well when used). This truck was not being operated during inspection.

No complaints have been received by the Peoria BOA/ FOS. This mine has a State operating permit.
A request for a hydrogeologic assessment to identify any impacts to groundwater quality at the site, a determination of the nature and extent of any groundwater impacts identified, and identification of potential remedial alternatives for any impacts identified has been requested as of July 27, 2011. In addition, the facility was asked to conduct a private well survey within 2,500 feet of the permit boundary of the mine. The Springfield Coal Company Industry Mine has committed to submit the well survey and a schedule for completing the assessment to Illinois EPA by October 3, 2011.

Peabody's Gateway Mine, Randolph County - OMM/DNR - OMM inspects the Gateway Mine at a minimum of once a month. OMM has not witnessed any problems with dust blowing off of the mine site during the inspections. Also per OMM, there have not been any citizen complaints of blowing dust from the mine.

Groundwater monitoring at the mine does not indicate that there is material damage to the hydrologic balance outside the mine permit area. A request for a hydrogeologic assessment schedule and well survey within 2,500 feet of the mine permit boundary were requested on September 28, 2011.

Based on comments received during the recent public hearing held on the draft renewed NPDES permit for this facility, the applicant will be required to develop and implement an updated fugitive dust control plan. Prior to re-issuance of a renewed NPDES permit for this facility, appropriate conditions will be incorporated to address fugitive dust issues based on the good mining practices of 35 Ill. Adm. Code 406.204 and the dust control plan to be required.

BOW FOS staff performed an inspection of this facility on April 2, 2010, and May 26, 2011. No fugitive dust was observed during the April 2, 2010, inspection. In addition, no discoloration or turbidity was noted at any permitted outfall. The final report for the May 26th inspection is pending completion.

Collinsville BOA FOS received a complaint from a resident in Coulterville in March, 2011 about odors from spontaneous fires in raw coal storage piles. FOS investigated and a NCA was sent in April, 2011. No complaints about blowing dust have been received in recent years. No VNLs have been sent in the last 5 years. The mine has a BOA State operating permit.

Alpena Vision Resources' Murdock Site, Douglas County - OMM/DNR -The Murdock mine is inspected on a monthly basis by the OMM's Land Reclamation Division. It has received a few dust complaints but onsite follow up inspections have found the site to be maintained properly.

Portions of the mine predate the current regulatory program. Topsoil was not required to be salvaged for that portion of the mine operation. The use of biosolids has been approved as an organic supplement to topsoil under the current regulations.

No mussel kill has been reported to the DNR. Groundwater monitoring has not revealed any groundwater issues at the site.

BOW staff conducted an inspection of the Murdock Mine on October 20, 2010, in response to a complaint of contaminated water around the perimeter of the permitted area. The inspection revealed no discharge or sedimentation in the receiving water from the permitted outfall. No other discharges were noted from the permitted area. Alleged water contamination was the result of independent water sampling from the facility's untreated water collection system. Reclamation of the site is ongoing with the permitted filling of Pond 5 using coal combustion by product, gypsum, and bio-solids. Intermittent carbon recovery occurs in Slurry Pond 1 with no recent activity noted. All mine drainage appeared to report to the treatment system and no fugitive dust was observed at the time of inspection.

A complaint was submitted to United States Environmental Protection Agency (U.S. EPA) about excessive dumping at the Murdock Mine and whether active permits were in place for this activity. The complaint was referred to the BOA-Champaign. BOA FOS investigated the site and spoke with Larry Harp of Old Ben Coal Company. He observed significant emissions of fugitive dust from the site and recommended Illinois EPA issue a VNL. On August 2, 2004 a VNL (A-2004-00276) was issued for violating Section 9(a) of the Illinois Environmental Protection Act (Act) for fugitive dust emissions.

On August 19, 2004 the Old Ben Coal Company provided a compliance commitment agreement (CCA) proposal to the Illinois EPA, which included the following:

1. No activities will be conducted during periods of high winds.
2. Old Ben will contact ADM to discuss possibility of mixing fly ash and bottom ash offsite before transporting to the mine.
3. Ash piles will be pushed as soon as possible or wetted with water to stabilize them against wind erosion.
4. Old Ben will have the trucks dump the loads as close to the fill area as possible to reduce fugitive dust emissions.
5. Water will continue to be applied as necessary to stabilize the ash material to prevent fugitive dust emissions.

On September 22, 2004 Illinois EPA issued an Acceptance of CCA for VN A-2004-00276.

On March 28, 2007 a complaint was received regarding uncontrolled dust emissions and odor from the Mine. BOA-Champaign, investigated the site and observed the dumping of coal ash at the site. The dust generated from the activity went well beyond the property boundary toward the town of Murdock to the northwest. In a file review, permits issued by Illinois EPA BOW for biosolids utilization, dated December 21, 2005 and February 7, 2007. A non-compliance advisory (NCA) for fugitive dust emissions was recommended. On April 10, 2007 an NCA letter was sent to Alpena Vision Resources for violating Section 9(a) of the Act for fugitive dust emissions.

On March 23-24, 2009 two related complaints about fly ash and odor were investigated by BOA-Champaign. The inspector observed several piles of biosolids, gypsum, and fly ash with no apparent dust control measures in place. BOA coordinated with DNR and DNR indicated that the odor problems were likely from humin that had recently been permitted and that they likely would not permit it in the future.

Then on March 1, 2010 a complaint was forwarded to BOA-Champaign from BOL-Champaign. The complaint was from the, Douglas County State's Attorney, who was calling to report a change in odor at the Murdock Mine and to verify that they are permitted for the activity. BOA spoke with OMM, who described the mine reclamation project and provided the contact information of the OMM inspector assigned to the Murdock Mine. In a conversation with the OMM inspector, he indicated that the project had a permit to receive and use biosolids from the Urbana-Champaign Sanitary District. He also provided contact information for, the project manager, who provided some more details of the scope and timeframe of the project. The BOA inspector called states Attorney and reported that the Murdock Mine was permitted to receive biosolids, which has been ongoing for about a year. The States Attorney had no specific contact of direct complainants for additional follow-up.

On April 19, 2010, BOL-Champaign, received another complaint and forwarded it to BOA-Champaign, however there was no contact information provided for follow-up.

More recently on August 5, 2011 Illinois EPA received a complaint about the odor from the mine, BOA-Champaign, responded to the complaint and discussed the issues with the complainant. The primary concerns are the odor and making sure that what is being dumped at the mine is not hazardous to the air and groundwater. The BOA consulted, BOL-Champaign, and, BOW-Champaign, who had both been working on a complaint about the mine. They went and discussed with the manager of the mine potential ways to limit odor emissions, specifically regarding the area to keep storm water from draining to the stored biosolids. The moisture plus the high heat was likely causing the increase in odor. According to BOW, Alpena completed this recommended grading work. However, the complainant still smells the foul odor. BOA is currently in the process of working with the complainant, OMM, BOW, BOL, and Alpena to resolve the current complaint.