BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT	)	
	)	PCB No-2013-015
Complainants,	)	(Enforcement – Water)
	)	
v.	)	
	)	
MIDWEST GENERATION, LLC,	)	
	)	
Respondents	)	

NOTICE OF FILING

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board the attached **COMPLAINANTS' AMENDED MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS AND TESTIMONY** and **COMPLAINANTS' MEMORANDUM IN SUPPORT OF THEIR MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS TESTIMONY**, copies of which are attached hereto and herewith served upon you.

Respectfully submitted,

Faith E. Bugel

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Dated: March 21, 2018

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT	)	
	)	PCB No-2013-015
Complainants,	)	(Enforcement – Water)
	)	
v.	)	
	)	
MIDWEST GENERATION, LLC,	)	
	)	
Respondents	)	

COMPLAINANTS' AMENDED[1] MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS AND TESTIMONY

Pursuant to 35 Ill. Adm. Code 101.500 and 101.502, Complainants Sierra Club, Environmental Law and Policy Center, Prairie Rivers Network, and Citizens Against Ruining the Environment ("Complainants") respectfully request that the Hearing Officer enter an order striking the portions of the reports and demonstrative exhibits produced by Respondent's expert, John Seymour, that describe his analysis of the "matching percentages" between leachate and groundwater (hereinafter "matching analysis"). The relevant sections include Tables 5-4 and 5-5 of the *Expert Report of John Seymour, P.E.* ("Expert Report"); all references thereto in the Expert Report, including Section 5.5.2; the *Supplement to the Expert Report of John Seymour, P.E.* ("Supplement") in its entirety; portions of the demonstrative exhibit introduced as Ex. 901; and all testimony on the matching analysis.

[1] Complainants inadvertently omitted the attachments to the original filing. All of the attachments are already in the record as exhibits or transcripts, but to assist the Hearing Officer we are filing this amended motion with the attachments. The text of the motion is unchanged.

Seymour's matching analysis violates rule 702 of the Illinois Rules of Evidence because it is based on methods that have not gained general acceptance, and because the analysis is inherently unreliable, and will therefore undermine the fact-finder's ability to understanding the evidence in this case. In support of its Motion, Complainants submit a Memorandum in Support of this Motion and state as follows:

1) On November 2, 2015, pursuant to the discovery schedule established and modified by the Hearing Officer, Respondents submitted an expert report by John Seymour ("Expert Report," Exhibit 903). In the Expert Report, Seymour purports to "match" the concentrations of various constituents in coal ash leachate and in groundwater, and to calculate "matching percentages." (Ex. 903, pp. 5, 6, 42-43, 49, 51, 52, and Tables 5-4 and 5-5).

2) On February 29, 2016, Respondents submitted a supplement to the Expert Report ("Supplemental Report," Exhibit 904), which was intended to "replace[] the original §5.5.2 in its entirety, including Tables 5-4 and 5-5." Ex. 904, p. 1.

3) Seymour testified in this matter on February 1 and 2, 2018. During his testimony, Seymour referred to a demonstrative exhibit that Respondent Midwest Generation entered as Exhibit 901. Exhibit 901 includes new versions of Table 5-4 and 5-5, using more recent data but generated using the same methods used to generate earlier versions of these tables.

4) The methods that Seymour uses to "match" constituents are inherently unreliable for two basic reasons. First, as largely conceded by Seymour in his testimony, his methods draw inaccurate conclusions from the presence of non-coal ash constituents in groundwater. Second, again as largely conceded by Seymour in his testimony, his methods make inappropriate comparisons between two sets of data to draw inaccurate conclusions that the data do not support.

5) Furthermore, again as largely conceded by Seymour in his testimony, his methods are unique, have never been used before, and have not gained acceptance in his field.

6) Since Seymour's methods are inherently unreliable, the conclusions he draws from the methods are unsupported, and both his methods and his conclusions will undermine the fact-finder's ability to understand and interpret the evidence presented in this case. This renders the evidence inadmissible under Illinois Evidence Rule 702, which establishes the *Frye* test for the admission of scientific evidence. The purpose of the *Frye* test "is to exclude new or novel scientific evidence that undeservedly creates a perception of certainty when the basis for the evidence or opinion is actually invalid." *In re Det. of New*, 2014 IL 116306, ¶ 26, 21 N.E.3d 406, 411-12 (2014) (internal citations omitted). According to Rule 702, "[w]here an expert witness testifies to an opinion based on a new or novel scientific methodology or principle, the proponent of the opinion has the burden of showing the methodology or scientific principle on which the opinion is based is sufficiently established to have gained general acceptance in the particular field in which it belongs." Ill. Rules of Evid. 702. Here, the methodology has never been used before, much less "gained general acceptance," and again, it is inherently flawed and unreliable.

7) WHEREFORE, Complainants respectfully request that the hearing officer enter an order striking Expert Report section 5.5.2 and Tables 5-4 and 5-5; all references to Tables 5-4 and 5-5 in the Expert Report; all references to Seymour's "matching" analysis in the Expert Report; the "Supplemental Report" in its entirety; Pages *37, *46, *47, *61, *62, *75, *76, *89, and *90 of Ex. 901;[2] and all testimony on Seymour's matching analysis, which includes PCB 13-

[2] These page numbers reflect the pages of the pdf document as filed by Respondent Midwest Generation on January 30, 2018. Some of these pages also have page numbers in the lower left corner; these page numbers are not the same as the corresponding page of the pdf document. To be clear, Complainants are referring to pages titled "Comparison with Groundwater" (pdf page *37, also labelled as page number 12); and all pages titled "[Site name] – Updated Table 5-4" or "[Site name] – Updated Table 5-5."

15 Hearing Transcript, Feb. 1, pages 281:4-284:4, and PCB 13-15 Hearing Transcript, Feb. 2, pages 15:4-20:17, 69:4-70:8, 92:11-93:2, 118:18-119:18, 231:2-280:22.

Respectfully submitted,

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Attorneys for ELPC, Sierra Club and Prairie Rivers Network

Dated: February 26, 2018
Amended: March 21, 2018

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter of:	)	
	)	
SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT	)	
	)	PCB No-2013-015
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MIDWEST GENERATION, LLC,	)	
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COMPLAINANTS' MEMORANDUM IN SUPPORT OF THEIR MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS TESTIMONY

Complainants Sierra Club, Environmental Law and Policy Center, Prairie Rivers Network, and Citizens Against Ruining the Environment ("Complainants") submit this Memorandum in Support of their Motion to Strike Portions of Respondent Expert's Report and Testimony.

I. FACTUAL BACKGROUND

On November 2, 2015, pursuant to the discovery schedule established and modified by the Hearing Officer, Respondents submitted an expert report by John Seymour ("Expert Report," Exhibit 903, attached in excerpted form as Attachment A). In the Expert Report, Seymour purports to "match" the concentrations of various constituents in coal ash leachate and in groundwater, and to calculate "matching percentages." (Attachment A, pp. 5, 6, 42-43, 49, 51, 52, and Tables 5-4 and 5-5). On February 29, 2016, Respondents submitted a supplement to the

Expert Report ("Supplemental Report," Exhibit 904, attached as Attachment B), which was intended to "replace[] the original §5.5.2 in its entirety, including Tables 5-4 and 5-5." Attachment B, p. 1.

Seymour testified in this matter on February 1 and 2, 2018. Excerpts of PCB 13-15 Hearing Transcript, Feb. 2 are attached hereto as Attachment C. During his testimony, Seymour referred to a demonstrative exhibit that Respondent Midwest Generation entered as Exhibit 901 (attached in excerpted form as Attachment D). Exhibit 901 included updated versions of Tables 5-4 and 5-5, generated using the same methodology as the Tables 5-4 and 5-5 found in Seymour's Supplemental Report, but with groundwater data from a different period of time. Attachment C, pp. 15:4-18:5 and 232:1-233:5.

To summarize, Seymour's initial Expert Report, his Supplemental Report, and demonstrative Exhibit 901 contain three versions of a set of tables identified as Tables 5-4 and 5-5.[2] Each of these tables, in turn, refer back to either Table 5-1 or Table 5-2 of Seymour's initial Expert Report (Attachment A), which provide the leach test data that Seymour used for his analysis.

II. LEGAL BACKGROUND

The admissibility of expert opinions is governed by Illinois Evidence Rule 702:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise. Where an expert witness testifies to an opinion based on a new or novel scientific methodology or principle, the proponent of the opinion has the burden of showing the methodology or scientific principle on which the opinion is based is

[2] Each Table 5-4 or 5-5 is in fact a series of sub-tables, one for each of the four sites at issue in this proceeding.

> sufficiently established to have gained general acceptance in the particular field in which it belongs.

Ill. Rules of Evid. 702. Rule 702 establishes the Frye standard for the admission of scientific evidence:

> Illinois law is unequivocal: the exclusive test for the admission of expert testimony is governed by the standard first expressed in *Frye v. United States,* 293 F. 1013 (D.C.Cir.1923). *Miller,* 173 Ill.2d at 187–88, 219 Ill.Dec. 43, 670 N.E.2d 721; *People v. Thomas,* 137 Ill.2d 500, 517, 148 Ill.Dec. 751, 561 N.E.2d 57 (1990); *Eyler,* 133 Ill.2d at 211–12, 139 Ill.Dec. 756, 549 N.E.2d 268; *People v. Zayas,* 131 Ill.2d 284, 293, 137 Ill.Dec. 568, 546 N.E.2d 513 (1989); *People v. Jordan,* 103 Ill.2d 192, 208, 82 Ill.Dec. 925, 469 N.E.2d 569 (1984); *People v. Baynes,* 88 Ill.2d 225, 241, 58 Ill.Dec. 819, 430 N.E.2d 1070 (1981). The *Frye* standard, commonly called the "general acceptance" test, dictates that scientific evidence is only admissible at trial if the methodology or scientific principle upon which the opinion is based is "sufficiently established to have gained general acceptance in the particular field in which it belongs." *Frye,* 293 F. at 1014.

Donaldson v. Cent. Illinois Pub. Serv. Co., 199 Ill. 2d 63, 76-77, 767 N.E.2d 314, 323-324 (2002) *abrogated on other grounds by In re Commitment of Simons*, 213 Ill. 2d 523, 821 N.E.2d 1184 (2004). Although decisions about the admissibility of scientific evidence are sometimes made after a "*Frye* hearing," the "trial court can render a decision utilizing *Frye* without actually holding a *Frye* hearing." *Donaldson v. Cent. Illinois Pub. Serv. Co.*, 313 Ill. App. 3d 1061, 1075, 730 N.E.2d 68, 78 (2000), *aff'd*, 199 Ill. 2d 63, 767 N.E.2d 314 (2002).

Reliability is an important piece of the *Frye* inquiry because it informs the extent to which a method has been established or accepted in the scientific community. Although Illinois does not apply a "Frye plus reliability" standard (*Donaldson, 199 Ill. 2d 80-81*), "a principle or technique is not generally accepted in the scientific community if it is by nature unreliable." *Id*. at 81. Put another way, "[g]eneral acceptance and reliability are not two separate questions. The determination of the reliability of an expert's methodology is naturally subsumed by the inquiry into its general acceptance in the scientific community." *In re Commitment of Field*, 349 Ill. App. 3d 830, 836, 813 N.E.2d 319, 325 (2004).

The Illinois Supreme Court recently described the purpose of Rule 702 as follows:

> The purpose of the *Frye* test is to exclude new or novel scientific evidence that undeservedly creates a perception of certainty when the basis for the evidence or opinion is actually invalid. Imposition of the test serves to prevent the jury from simply adopting the judgment of an expert because of the natural inclination of the jury to equate science with truth and, therefore, accord undue significance to any evidence labeled scientific.

In re Det. of New, 2014 IL 116306, ¶ 26, 21 N.E.3d 406, 411-12 (2014) (internal citations omitted). Here, Seymour's "matching" methodology is invalid, unreliable, "undeservedly creates a perception of certainty" (*id*.), and is not generally accepted. Seymour himself concedes that there are errors in his approach and his results, and that his methodology is not generally accepted, having been used for the first time in this proceeding. The methodology therefore plainly violates Rule 702 and must be excluded.

III. DISCUSSION

In the Expert Report, the Supplemental Report, and his testimony, Seymour attempts to evaluate whether groundwater reflects coal ash contamination by "matching" constituents found in groundwater to constituents found in the results of leach tests performed on coal ash. Attachment A, pp. 42-43; Attachment B, p. 1. Seymour approaches his "matching" analysis as follows:

> Conceptually, if all the constituents detected in groundwater samples from a monitoring well match the constituents detected in leachate from ash currently stored in ponds, and if the constituents not detected in groundwater match the constituents not detected in leachate from ash currently stored in ponds, then it would be probable that leachate from ash currently stored in ponds is impacting groundwater.

Attachment B, p. 1. Seymour quantifies the degree of matching by calculating, for each monitoring well, the "Percentage of Observed Constituents that are Not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments." *See, e.g.*, Attachment B,

Table 5-4. In other words, Seymour calculates a percentage of "mismatches." Any "mismatch" in Seymour's analysis counts against a conclusion that coal ash has contaminated the groundwater:

> BY MR. RUSS: Q. And to simplify a little, mismatches in your approach count against the possibility that groundwater has been contaminated by coal ash; is that right?
>
> MR. SEYMOUR: A. Yes, in the increase in the likelihood that it's not from the ash in the pond.

Attachment C, p. 235:8-13. The Tables 5-4 and 5-5 in Seymour's Supplemental Report and Exhibit 901 show mismatch percentages ranging from 0% to 75%. In other words, to take the inverse percentages, they show matching percentages for each well that range from 25% to 100%. Due to errors in Seymour's approach, these percentages are in error. In fact, as described in more detail below, Seymour's primary analysis, if done correctly, would show a 100% match between coal ash leachate and groundwater quality data for every monitoring well at all four sites.

Seymour's methods violate Rule 702 because they are novel, deviate significantly from standard practice, and are not used, much less generally accepted, in his field. As described in detail below, Seymour's methods are also inherently flawed and unreliable, in at least two ways. First, as Seymour largely concedes, his methods draw inappropriate conclusions from the presence of non-coal ash constituents in groundwater. Second, again as largely conceded by Seymour, his methods produce inaccurate results that skew his conclusions. The result is that Seymour's methods and conclusions are likely to "instill a false confidence," *Donaldson,* 199 Ill. 2d 86 (internal citations omitted). Allowing Seymour's analysis and conclusions to remain in the record would clearly not "assist the trier of fact to understand the evidence or to determine a fact in issue," (Ill. Rules of Evid. 702), and would in fact undermine the fact-finder's role.

A. SEYMOUR'S METHODS ARE UNRELIABLE AND BIASED

Seymour uses two sets of data to represent the content of coal ash leachate. The first is a set of leach test measurements collected by Midwest Generation from bottom ash at the Powerton, Waukegan, and Will County plants ("MWG leach test data"). Attachment A, Table 5-1; Attachment B, Table 5-5). The second is a set of leach test measurements collected by the Electric Power Research Institute (EPRI) for subbituminous or lignite coal ash in impoundments ("EPRI leach test data"). Attachment A, Table 5-2; Attachment B, Table 5-4. According to Seymour, the analysis using MWG leach test data – the Table 5-5 analysis – was his primary analysis, and the analysis using EPRI leach test data – the Table 5-4 analysis – was a "backup" analysis. Attachment C, pp. 18:17-19:16. In his Supplemental Report, Seymour compared each set of leach test data to Midwest Generation's groundwater monitoring results for 2014. Attachment B, p. 1. In his testimony, Seymour compared each set of leach test data to groundwater monitoring results from 2016-2017, with the same methodology that he used in his Supplemental Report. Attachment C, pp. 17:20-18:15 and 232:1-233:5.

As discussed in detail below, Seymour's two matching analyses, one using MWG leach test data (Table 5-5) and the other using EPRI leach test data (Table 5-4), are each associated with unique methodological flaws that lead to inaccurate results and conclusions, and are therefore unreliable.

1) SEYMOUR'S HANDLING OF NON-INDICATOR CONSTITUENTS PRODUCES CRITICAL ERRORS IN HIS ANALYSIS

Seymour identified coal ash "indicators" as anything that was detected in coal ash leach tests. Attachment A, p. 42 and Tables 5-1 through 5-3. Everything else could be described as "non-indicators." According to Seymour's description of his approach, the presence of a non-indicator in groundwater counts as a "mismatch," and counts against the possibility of contamination:

> BY MR. RUSS: Q. Okay. For purposes of this table [Attachment B, Table 5-4], you counted the presence of non-indicator[s] as evidence against the possibility of contamination, isn't that right?
>
> MR. SEYMOUR: A. Yes.

Attachment C, page 241:1-5. *See also* Attachment B, p. 1. This approach introduces an inappropriate assumption – that contaminated groundwater should look exactly like leachate – which ignores all other potential sources of non-indicators. Even naturally occurring constituents would count against the possibility of coal ash contamination. This is plainly irrational, and a critical flaw in Seymour's methodology, as Seymour concedes in his testimony:

> BY MR. RUSS: Q. A non-indicator, something that's not – a constituent that's not an indicator of coal ash, the presence or absence of that chemical in groundwater shouldn't have any bearing on your conclusion about the presence or absence of coal ash; is that right?
>
> MR. SEYMOUR: A. That's kind of complicated. I'm sorry, Mr. Russ. One more time. I'll try to concentrate very carefully.
>
> Q. What you said about benzene, I believe, is that it shouldn't have any – it shouldn't be in the analysis?
>
> A. It would not be in the analysis.
>
> Q. And why is that?
>
> A. It's not an indicator of coal ash.
>
> Q. Okay. Right. And that's what I'm asking. So something that's not an indicator of coal ash shouldn't have any bearing on your determination of whether or not there's coal ash in groundwater?
>
> A. I would think – yes, I think that would be correct.

Attachment C, pp. 237:6-238:4. In short, Seymour concedes that non-indicators should not be included in his analysis, and yet his analysis repeatedly uses non-indicators to discount the possibility of coal ash contamination. During his testimony, Seymour admitted that his approach was flawed in this regard:

> BY MR. RUSS: Q. Okay. For purposes of this table [Attachment B, Table 5-4], you counted the presence of non-indicator[s] as evidence against the possibility of contamination, isn't that right?
>
> MR. SEYMOUR: A. Yes.
>
> Q. And I believe you just said you shouldn't do that?
>
> A. You're right.

Attachment C, p. 241:1-8. This flaw in Seymour's approach critically undermines his conclusions. Taking as an example Table 5-5 of Attachment B, which showed Seymour's primary matching analysis, all of the "mismatches" in this table are the result of non-indicators being detected in groundwater, as indicated by the blue shading in that Table.[3] Again, upon looking at this table, Seymour admitted his error:

> BY MR. RUSS: Q. So all of these blue cells, though, are non-indicators that were found in groundwater and you counted that against the possibility of contamination; isn't that right?
>
> MR. SEYMOUR: A. Well, because it wasn't found in the leachate, but it was found in the groundwater, so it did not match. It's not consistent.
>
> Q. Right. But I believe you said earlier if you find a non-indicator in groundwater, you shouldn't contribute that to your analysis; is that right?
>
> A. I understand, yes.
>
> Q. So there's a series of errors in this table?

[3] "Blue shading indicates that a constituent that is not an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater event in 2014" (Attachment B, Table 5-5, p. 5).

> A. Mr. Russ, I – I would agree that it looks that way. I – as I said, I am a little bit confused. I have to kind of go back to the whole discussion in the report. It may take a while.

Attachment C, p. 243:4-24. The same observations apply equally to the versions of Table 5-5 found in Exhibit 901 (Attachment D), where all of the mismatches are the result of non-indicators being detected in groundwater. Since all of the "mismatches" in Table 5-5 are in error, there are in fact no mismatches at all. In fact, the coal ash indicators identified by Seymour – barium, boron and sulfate – were found in all wells at all four Midwest Generation sites at issue in this case; after correcting the errors admitted by Seymour, this leads to a 100% match, as Seymour concedes:

> BY MR. RUSS: Q. So the three indicators that you have in this table were found in all of the wells at the Waukegan site?
>
> MR. SEYMOUR: A. Yes.
>
> Q. So if we take the non-indicators out, that would be a 100 percent match, wouldn't it?
>
> A. Yes. In fact they did – in the analysis, the new percent is correct. But again, I have to go back and refresh my memory.

Attachment C, p. 245:14-21. The same is true for all four sites in all versions of Table 5-5. In short, despite the fact that <u>all three</u> coal ash indicators selected by Seymour – barium, boron, and sulfate – were detected <u>in every single well</u> at the four sites, Seymour's analysis leads him to conclude that the groundwater is not affected by coal ash. This is of course an absurd conclusion, and as Seymour concedes, it is the product of a critical flaw in his analytical approach. In this situation, Seymour's methods "undeservedly create[] a perception of certainty when the basis for the evidence or opinion is actually invalid." *In re Det. of New*, 2014 IL 116306, ¶ 26 (internal citations omitted).

2) SEYMOUR'S ANALYSIS OF ONSITE LEACH TEST DATA PRODUCES UNRELIABLE RESULTS AND BIASES HIS CONCLUSIONS

An additional flaw in Seymour's methodology is that he compares sources of data that are not amenable to comparison. Seymour analyzes the extent to which pollutants are detected, but the datasets being compared have very different sensitivities, as indicated by their detection limits. As described in more detail below, this produces results that are not only unreliable, but biased against the possibility of coal ash contamination.

Seymour's primary analysis uses leach test methods that are much less sensitive than the groundwater test. For example, the arsenic results for MWG leachate were all reported as "<0.05" mg/L. Attachment A, Table 5-1.[4] In this case, as Seymour admits, the true concentration of arsenic in leachate could be anything up to 0.049 mg/L. Attachment C, pp. 247:23-248:15. Midwest Generation's groundwater monitoring for 2014, by comparison, could detect arsenic concentrations down to a detection limit of 0.001 mg/L. Exhibit 268P, NRG Energy, Annual and Quarterly Groundwater Monitoring Results, Fourth Quarter 2014, Waukegan Generating Station, Ash Impoundments, Table 2 (Jan. 22, 2015), excerpt attached as Attachment E. Here, there is a wide range of arsenic concentrations – anything between 0.001 and 0.05 mg/L – that would be detected by one method (the groundwater test) and not the other (the leach test). In this situation, as explained below, the two tests would produce results that appear inconsistent even if the two samples were identical.

If arsenic is detected in groundwater at a concentration less than 0.05 mg/L, Seymour's approach counts it as a "mismatch" (because it was not detected in leachate), and counts it against the possibility of groundwater contamination. However, the data do not support this

[4] At the hearing, Seymour added an additional, slightly more sensitive leach test result, which shows arsenic in leachate at "<0.01" mg/L. Ex. 901, slide 8. This is not a material change for purposes of this motion; the four other leachate samples used by Seymour all had "<0.05" mg/L, or up to 0.049 mg/L.

interpretation. For example, arsenic in Waukegan well MW-02 ranged between 0.0062 mg/L and 0.0095 mg/L in 2014. Attachment E, Table 2. This is perfectly consistent with groundwater having the same amount of arsenic as pure, undiluted leachate (which has anywhere between zero and 0.05 mg/L of arsenic), but due to differences in the sensitivity of the tests, it is not possible to say whether the leach test data and the groundwater data are a "match" or a "mismatch;" the answer is unknown. Yet Seymour concludes, without any factual support, that the data are a "mismatch." Attachment B, Table 5-5, p. 3.[5]

Again, Seymour effectively concedes that this approach could produce inaccurate results:

> BY MR. RUSS: Q. So the question I'm asking is since the leachate [and] the groundwater could have the same concentration of arsenic given these numbers, you can't really say for sure [] that it's a mismatch; is that right?
>
> MR. SEYMOUR: A. Well, if you don't have the data, you can't say it's a match either.
>
> Q. Right. You can't say that it's a match and you can't say that it's a mismatch. I would call it unknown; is that fair?
>
> A. Okay.
>
> Q. Yet you coded it as a mismatch, I believe and…
>
> A. Yes, I understand that. And as mentioned, I think I'm confused. I have to go back and look at it.
>
> Q. So is that potentially an error in your table?
>
> A. It's possible it's an error, yes. I have to look at it. I am confused.

Attachment C, pp. 252:8-253:3. Seymour's approach takes something that he concedes is "unknown," and treats it as a "known" mismatch, in effect making an assumption that supports his preferred conclusion. Again, the leach test data and the groundwater data could be a perfect

[5] "Blue shading indicates that a constituent that is not an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater event in 2014" Attachment B, Table 5-5, p. 5.

match, with the exact same arsenic concentration, and Seymour's approach would reach the opposite conclusion.

In general, as Seymour concedes, his approach could produce a false "mismatch" whenever the two tests being compared have different sensitivities:

> BY MR. RUSS: Q. Okay. To generalize beyond arsenic, this kind of – this kind of phenomenon, when you detect a constituent in groundwater, but not a leach test, even if groundwater and the leachate [have] the same concentration, it's possible [when]ever the groundwater test is, it's more sensitive than the leach test; isn't that right?
>
> MR. SEYMOUR: A. That's – yes, it could be.
>
> Q. Do you know how many of the results in your Table 5-5 might be affected by that circumstance?
>
> A. I would have to add them, but you know that it would be quite a few.
>
> Q. Okay. Thanks.
>
> A. Presuming, in fact, I'm – I'm a little confused. If it's correct, there would be errors in the table.

Attachment C, pp. 256:12-257:5. In fact, the same error illustrated above is repeated for multiple constituents at each site.[6] For example, the MWG leach test could not detect selenium below 0.05 mg/L, Attachment A, Table 5-1, but the groundwater test could detect concentrations as low as 0.0025 mg/L. Attachment E, Table 2. Anything between those two concentrations would only be detected by one method, and not by the other, giving the appearance of a mismatch even if the samples were identical.

In short, Seymour's methods frequently assume "mismatches," and count these mismatches against the possibility of contamination, when the data do not support such a

[6] Arsenic, copper, lead, manganese, nickel, and selenium all had lower detection limits in groundwater than in MWG leach tests, making them all susceptible to the flaw in Seymour's methodology (Attachment A, Table 5-1, Attachment E, Table 2).

conclusion. This renders his approach unreliable and biased toward finding no contamination, and creates "false confidence" and a "misleading sense of scientific infallibility." *Donaldson,* 199 Ill. 2d 86 (internal citations omitted).

3) SEYMOUR'S ANALYSIS OF EPRI LEACH TEST DATA PRODUCES UNRELIABLE RESULTS AND BIASES HIS CONCLUSIONS

Seymour's methods produce the inverse error with respect to his "backup" analysis of EPRI leachate data. In this case, the EPRI leach test was much <u>more</u> sensitive than the test that Midwest Generation used to analyze groundwater. For example, the EPRI leach test was able to detect antimony concentrations as low as 0.00024 mg/L (Attachment A, Table 5-2), while the 2014 groundwater monitoring could not detect antimony at concentrations below 0.003 mg/L – a difference of more than an order of magnitude. Attachment E, Table 2. As a result, there is a wide range of antimony concentrations – anything between 0.00024 and 0.003 mg/L – that would be detected by one method (the EPRI leach test) and not the other (the groundwater test).

Seymour observes that antimony was detected in EPRI leach test data, but not in any groundwater monitoring data, and concludes that the two datasets do not match. This can be seen, for example, in Table 5-4 of Attachment B, where the antimony cells are all shaded green.[7] Antimony is one of the constituents that Seymour includes in his tally of "constituents that are not consistent with indicators of leachate." *Id*. In short, Seymour concludes, for each well at the four sites, that antimony is a "mismatch," and he counts that against the possibility that coal ash has contaminated the groundwater.

[7] Green shading in Seymour's tables indicates that "a constituent that is an indicator of leachate from ash stored in the impoundments was not detected during quarterly groundwater monitoring in 2014." Attachment B, Table 5-4.

Again, Seymour's approach fails because the data do not support his results or his conclusions. Continuing with the example of the Waukegan site, the groundwater results are all reported as "ND," or "not detected." This does not mean that there is no antimony in these wells. It only means that the concentration of antimony was less than the detection limit. In this case, the detection limit was 0.003 mg/L, so the groundwater had something between zero and 0.003 mg/L of antimony. This is perfectly consistent with the range of antimony concentrations found in the EPRI leach test data – 0.00024 to 0.00062 mg/L. Given these concentrations, it is inaccurate and misleading to say that the leach test data and the groundwater data do not match. Even if the groundwater were pure, undiluted leachate with the maximum concentration of antimony (0.00062 mg/L), the antimony would not be detected by the groundwater test. In short, Seymour assumes that there is a "mismatch" without any factual support.

This flaw is made clear in Seymour's testimony, where he concedes that leachate and groundwater could have the same concentration of antimony – a situation that should be a "match" – and his analysis would nonetheless describe it as a "mismatch." Attachment C, pp. 265:16-267:4 (Seymour agreeing that 0.6 micrograms of antimony per liter would be detected in the EPRI leach test, but not in the Midwest Generation groundwater test). Again, the leachate and the groundwater could be a perfect match, with the exact same concentration of antimony, and Seymour's methods would find a "mismatch."

The same error illustrated above is repeated for several constituents at each site.[8] For example, the EPRI leach test could detect chromium concentrations as low as 0.00066 mg/L

[8] Antimony, chromium, cobalt, lead, manganese, mercury, nickel, selenium, and zinc all had detection limits and minimum concentrations in the EPRI leach test data that were lower than the detection limits in groundwater, making them all susceptible to the flaw in Seymour's methodology. Attachment A, Table 5-2, and Attachment E, Table 2.

(Attachment A, Table 5-2), but Midwest Generation's groundwater monitoring could not detect concentrations lower than 0.005 mg/L (Attachment E, Table 2). The EPRI leach test data could detect mercury concentrations as low as 0.0000054 mg/L (Attachment A, Table 5-2), but Midwest Generation's groundwater monitoring could not detect concentrations lower than 0.0002 mg/L. These are just two additional examples of a pervasive flaw in Seymour's approach.

Again, Seymour's methods frequently assume "mismatches," and count these mismatches against the possibility of contamination, when the data do not support such a conclusion. Seymour's methodology is therefore inherently unreliable in a way that biases his conclusions; this "undeservedly creates a perception of certainty when the basis for the evidence or opinion is actually invalid." *In re Det. of New*, 2014 IL 116306, ¶ 26 (internal citations omitted). As a result, Seymour's matching analysis and all discussions of his matching analysis should be excluded from expert testimony.

II. SEYMOUR'S METHODS ARE NOT ACCEPTED IN HIS FIELD

Given the multiple flaws in Seymour's methodology, it is not surprising that no one in his field, to his knowledge, has ever used this kind of "matching analysis" before, including Seymour himself:

> BY MR. RUSS: Q. Have you ever used this particular quantitative method?
>
> MR. SEYMOUR: A. Again, this is a method that looks at the numbers and accumulates a percentage and presents a percentage. I have not used that presentation before.
>
> . . .
>
> BY MR. RUSS: Q. Are you aware if anyone else using this particular quantitative method before?
>
> MS. NIJMAN: Vague.
>
> HEARING OFFICER HALLORAN: He can answer if he is able.

A. I mean, it implies a very broad understanding of what all the industry does. So I think it's a little bit – I would answer no, but I think it's – there's a lot of ideas out there and I don't know if I could know.

. . .

BY MR. RUSS: Q. Are you aware of anyone – are you – has this particular quantitative method ever been published in any journal or academic publication?

A. It's a similar question that you asked before, if I knew of anybody who had done it. There's lots of publications. I've not read all the publications. So I don't know if I – even if I say I don't know, that doesn't mean it hasn't been used.

Q. Are you aware of any?

A. As I said, I don't know. But it's a little unfair because there's lots of journals and I've not read all the journals.

Attachment C, pp. 278:11-280:17. Midwest Generation, as the proponent of the evidence in question, has the burden of showing that the methodology is "sufficiently established to have gained general acceptance in the particular field in which it belongs." Ill. Rules of Evid. 702. In this case, there is no plausible way that Midwest Generation could meet its burden, because its expert has already admitted that he is unaware of anyone (including himself) using this method before. The fact that his inherently unreliable and biased methodology is novel, untested, and not generally accepted in his field makes it inadmissible under Rule 702.

III. CONCLUSION

Seymour's "matching" analysis must be excluded from evidence because it would frustrate the purpose of expert testimony. His methodology is inherently flawed and unreliable, as he himself acknowledges. Far from "assist[ing] the trier of fact to understand the evidence" (Ill. Rules of Evid. 702), Seymour's methodology, and the results he obtains using that methodology, could only serve to confuse the fact-finder by presenting a false sense of certainty.

Moreover, Seymour's methodology is not merely unreliable, it is also inherently biased against the possibility of contamination. In this case, his results and conclusions would almost certainly mislead the fact-finder.

Using his flawed methodology, Seymour concluded that "there are substantial and widespread mismatches between the characteristics of recent groundwater analyzed near the ash ponds and the characteristics of leachate from ash currently stored in the ash basins." Attachment B, p. 3. The data do not even remotely support this conclusion. In fact, the record shows that Seymour's matching analysis, if done correctly, would have found a 100% match between coal ash leachate and groundwater quality at all four sites at issue here. The stark contrast between what Seymour should have found and his stated conclusions underscores the fact that his methodology is not just unreliable, but systematically inaccurate and biased against an honest interpretation of the data.

Furthermore, as far as Seymour is aware, this is the first time anyone has ever approached groundwater data with this methodology. Rule 702 plainly prohibits the use of novel and untested methods in expert testimony. Where Rule 702 states that "the proponent of the opinion has the burden of showing the methodology or scientific principle on which the opinion is based is sufficiently established," in this case the methodology has not been established at all.

For the aforementioned reasons, we urge the Hearing Officer to strike Expert Report section 5.5.2 and Tables 5-4 and 5-5; all references to Tables 5-4 and 5-5 in the Expert Report; all references to Seymour's "matching" analysis in the Expert Report; the "Supplemental Report" in its entirety; Pages *37, *46, *47, *61, *62, *75, *76, *89, and *90 of Ex. 901;[9] and all

[9] These page numbers reflect the pages of the pdf document as filed by Respondent Midwest Generation on January 30, 2018. Some of these pages also have page numbers in the lower left corner; these page numbers are not the same as the corresponding page of the pdf document. To be clear, Complainants are

testimony on Seymour's matching analysis, which includes PCB 13-15 Hearing Transcript, Feb. 1, pages 281:4-284:4, and PCB 13-15 Hearing Transcript, Feb. 2, pages 15:4-20:17, 69:4-70:8, 92:11-93:2, 118:18-119:18, 231:2-280:22.

Respectfully submitted,

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referring to pages titled "Comparison with Groundwater" (pdf page *37, also labelled as page number 12); and all pages titled "[Site name] – Updated Table 5-4" or "[Site name] – Updated Table 5-5."

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Dated: February 26, 2018

CERTIFICATE OF SERVICE

I hereby certify that the foregoing **NOTICE OF FILING**, **COMPLAINANTS' AMENDED MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS AND TESTIMONY**, and **COMPLAINANTS' MEMORANDUM IN SUPPORT OF THEIR MOTION TO STRIKE PORTIONS OF RESPONDENT EXPERT'S REPORTS TESTIMONY** were served electronically to all parties of record listed below, on March 21, 2018.

Respectfully submitted,

/s/Unimuke Agada

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ATTACHMENT A

Excerpts of Exhibit 903, Expert Report of John Seymour, P.E., Nov. 2, 2015

Expert Report of John Seymour, P.E.

I have prepared this Expert Report on behalf of Midwest Generation, LLC (MWG) to present my opinions and to address the two expert reports issued by M. James R. Kunkel in the Matter of:

SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT
Complainants,
v
MIDWEST GENERATION, LLC,
Respondent
PCB 2013-0015

Section 1: INTRODUCTION

1.1. Background

Since 1999, MWG has operated four electric generating stations at issue in this matter: the Joliet #29 Generating Station ("Joliet #29") located in Joliet, Will County, Illinois; the Powerton Generating Station ("Powerton") located in Pekin, Tazewell County, Illinois; the Waukegan Generating Station ("Waukegan") located in Waukegan, Lake County, Illinois; and the Will County Generating Station ("Will County") located in Romeoville, Will County, Illinois. Prior to 1999, the stations were operated by other entities and pre-1999 documents identify historic areas where ash was placed.[1]

Each of the generating stations includes active ash ponds as an integral part of the generating stations' wastewater treatment systems (MWG Facility NPDES Permits).[2] All of the ash ponds are permitted pursuant to MWG's NPDES permits (IL0064254, IL0002232, IL0002259, and IL0002208) and operate pursuant to the limits, terms, and conditions of the permits. All of the active ash ponds at the MWG facilities are fully lined with 60 mil-thick high density polyethylene (HDPE) liners.

In 2010, MWG voluntarily agreed to Illinois EPA's request to perform hydrogeological assessments around the ash ponds at its generating stations.[3] On June 11, 2012, based on the results of the hydrogeological assessments, Illinois EPA issued Violation Notices (VN) to MWG alleging violations of

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[1] MWG13-15_8502-8536, MWG13-15_11966-12040, MWG13-15_29502-29532, MWG13-15_25139-25167

[2] MWG's Answer and Defenses to Second Complaint, Answers to Complaint ¶¶1, 3, 5, 7

[3] MWG13-15_364; MWG13-15_384; MWG13-15_407; MWG13-15_421

EXHIBIT
MWG 903

groundwater quality standards purportedly caused by the ash ponds.[4] The VNs listed exceedances of the groundwater quality standards for specific constituents at each station, such as chloride, antimony, and boron.[5]

MWG responded to the VNs, disputing that the ponds were the cause of groundwater exceedances.[6] MWG explained that the ash ponds are not disposal sites because the ash is routinely removed and that the alleged groundwater exceedances were inconsistent and did not show a connection to the ash ponds. Illinois EPA and MWG agreed on a Compliance Commitment Agreement (CCA) for each MWG station to resolve the VNs.[7]

As the CCAs were finalized,[8] Complainants filed a Complaint against MWG alleging open dumping violations, violations of Section 12 of the Illinois Environmental Protection Act, and violations of the Pollution Control Board groundwater regulations (35 Ill. Adm. Code 620.115, 620.301(a), and 620.405). Complainants later amended their Complaint to include historic filled areas on the sites. In support of their Complaint, Complainants presented two reports by James R. Kunkel.[9]

1.2. Contents of Opinion

I have reviewed the Kunkel reports and provide my assessment and opinions, below. In addition, I reviewed operational information, monitoring data, construction data and other documents for each of the stations to develop my opinions. Each of my opinions is supported by a reasonable degree of scientific certainty. The following outlines my approach to support my opinion:

- Section 2: Overview of Opinions
- Section 3: Credentials of John Seymour, P.E.
- Section 4: Summary of Current Conditions and Conceptual Site Models (CSM)
- Section 5: Opinion 1—MWG's Actions are Appropriate for the Sites and are Protective of Human Health and the Environment
- Section 6: Opinion 2—The Remedial Approach Provided in the Kunkel Remedy Report is Not Warranted

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[4] MWG13-15_328-358
[5] MWG13-15_328-358
[6] MWG13-15_364-437
[7] MWG13-15_553-572, 553-575
[8] MWG13-15_795-806
[9] Kunkel, 2015a and 2015b

Section 2: Overview of Opinions

Opinion 1: MWG's Actions are Appropriate for the Sites and are Protective of Human Health and the Environment.

It is my opinion that MWG's actions at each plant site are appropriate for the measured groundwater impacts and are protective of human health and the environment. This opinion is based on the following:

- An approach that eliminates the exposure pathways to address the potential groundwater impacts is appropriate.
- Establishment of administrative controls such as Groundwater Management Zones (GMZ) and/or Environmental Land Use Controls (ELUC) are effective remedial approaches to reduce the exposure of potential groundwater impacts, are remediation industry-accepted approaches, and are approved State of Illinois methods.
    - GMZs are specified for sites undergoing corrective actions under Title 35, IAC Sections 620 (Bureau of Water) and 740 (Bureau of Land).
    - A minimum of 10 sites in Illinois currently have GMZs established by the IEPA Bureau of Water. IEPA Bureau of Water has not reported any groundwater violations for sites with GMZs.
    - The IEPA Bureau of Land has implemented on the order of 100 ELUCs.[10]
    - ELUCs and GMZs allow control of groundwater use along the exposure pathways by eliminating the ingestion pathway and dermal contact pathway while corrective action is underway.
        - The groundwater ingestion pathway is eliminated by restricting the installation of potable water wells in the area of the GMZs and ELUCs.
        - The dermal contact pathway is eliminated by restricting the access of the industrial properties to only trained workers.
- All of the active ponds were relined to eliminate a potential exposure pathway.
    - The relining of the CCR Ponds with 60-mil thick HDPE is an industry-accepted remediation approach to reduce the potential for groundwater impacts.

[10] The IEPA Bureau of Land also has approved GMZs for many sites.

  - The relining of the CCR Ponds was completed and inspected by an independent third party under construction quality assurance protocols and documented to be completed in accordance with the design documents or subsequently inspected by a qualified third party.
- The lined ponds are properly operated and maintained, which is the industry-accepted standard approach to preclude groundwater impacts. The operation and maintenance is being completed under consistent protocols.
- Groundwater monitoring is an accepted method to assess a remedial approach.
- I reviewed recent groundwater monitoring data and literature on liners to identify if liner defects were likely and if leaks of leachate through alleged liner defects could be impacting groundwater at the subject sites. It is my opinion that groundwater concentrations are not the result of leaks of leachate from the ash currently stored in lined ponds, as outlined below.
  - The leachate from bottom ash currently stored in ash ponds contains constituents at levels that do not exceed IEPA Class I groundwater standards based on neutral leaching analyses of site-specific samples, indicating that the bottom ash in the ponds is not a source of impact to groundwater.
  - The characteristics of ash leachate were identified based on site-specific impounded ash data or on published leachate data from ponds of subbituminous CCR sourced from the Powder River Basin (PRB) in Wyoming that is the source of coal ash from the Plants.
  - The profiles of the constituents in the groundwater do not match the profiles of leachate constituent indicators in the ponds at all four plant sites. This is based on a comparison of the occurrence of groundwater constituents detected in 2014 compared to minimum and maximum sets of indicators of leachate from ash stored in ponds.
- Groundwater conditions do not pose risks to surface water based on Illinois Water Quality Standards and Illinois Water Quality Criteria that are issued by the State of Illinois to be protective of human health and the environment. An assessment of human and ecological receptors in surface water indicates that there is no risk to the surface water environment at each site based on regulatory risk standards and standards of practice for risk assessments. The potential surface water risks were evaluated using a screening level

approach that compared concentrations in groundwater to Illinois Water Quality Standards (WQS) or Water Quality Criteria (WQC).

- Historical ash in fill materials outside of the ponds is not a source and is not a risk to human health and the environment.
  - Ash generated by coal combustion may be classified as CCB when there is beneficial use determined by IEPA as established in 415 Illinois Compiled Statutes 5/3.135. It is analogous to compare the current condition of CCB to the current IEPA criteria. In my opinion, the presence of CCB outside of the pond areas is acceptable for engineering considerations when compared to Illinois requirements.
  - Data obtained from recent samples of ash used as fill from multiple sites show that leachate from the ash meets IEPA Class I standards based on leaching from a soil-like environment.

Opinion 2: The Remedial Approach Provided in the Kunkel Remedy Report is Not Warranted.

It is my opinion that the remedial approach in the Kunkel Remedy Report, which is removal of all CCRs and the ash ponds, is not warranted. In addition to Opinion 1, removal is unwarranted because:

1. based on the concentrations of COIs that have been observed in groundwater around the ponds, MWG's remedial approach is protective of human health and the environment;
2. the concentrations of bottom ash indicator constituents from leachate do not match the groundwater chemistry. This shows that the constituents in groundwater are not from the ponds, the ponds are functioning in accordance with the design, and the ponds do not need to be removed;
3. there is no evidence that historical coal ash outside of the ash ponds is a current source of groundwater impact that needs to be removed; and
4. Kunkel did not follow the Illinois procedures for investigations and remedial activities.

Further, there are many inaccuracies in the Kunkel Expert Report on Ground-Water Contamination that, in general, incorrectly imply that groundwater is more threatened than supported by the data.

The following is provided to demonstrate this opinion:

5.5.1.3. Constituent Indicators for Leachate from Ash Stored in Ponds

Because there are differences between the set of constituents that leach based on site-specific data and published leachate data, I developed two sets of constituent indicators for leachate from ash currently stored in ponds. The first set is the minimum set of constituent indicators that would be expected under neutral conditions. This minimum set of constituent indicators is defined as the constituents that were observed in NLET analyses of bottom ash stored in site ponds. The second set is the maximum set of constituent indicators that may be expected based on other facility leachate data published by EPRI (2006). This maximum set of constituent indicators is defined as all constituents observed in analyses of leachate samples from other facility ponds containing CCR from subbituminous/lignite coal sources (see Table 5-2).

I reviewed the summary of leachate data in Table 5-3, and constituent indicators for leachate from ash currently stored in ponds include at a minimum: barium, boron, and sulfate, and at a maximum: antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, sulfate, and zinc.

5.5.2. Recent Groundwater Concentrations do Not Match Constituent Indicators for Leachate from Ash Stored in Ponds

I compared the occurrence of constituents during groundwater monitoring events in the most recent year, 2014, to the minimum and maximum sets of constituent indicators of leachate from ash currently stored in ponds. Conceptually, if all the constituents detected in groundwater samples from a monitoring well match the constituents detected in leachate from ash currently stored in ponds, and if constituents *not* detected in groundwater samples match the constituents *not* detected in leachate from ash currently stored in ponds, then it would be probable that leachate from ash currently stored in ponds is impacting groundwater. To evaluate whether or not groundwater concentrations match leachate constituent indicators, I calculated the percentage of constituents detected at each groundwater monitoring well that match constituent indicators of leachate from ash currently stored in the ponds ("matching percentages"). I restricted my analysis to the most recent full year of groundwater monitoring, 2014, to account for seasonal variations in constituent concentrations and to reflect groundwater concentrations after MWG's pond relining and pond decommissioning had been completed.

In summary, if the constituents match then it is likely that the leachate from the ash is impacting the groundwater. If the constituents *do not* match then it is likely that the leachate *is not* impacting the groundwater.

My results are tabulated in Tables 5-4 and 5-5 and are summarized as follows:

- At Joliet #29, the percentage of constituents at groundwater monitoring wells that match constituent indicators of leachate from ash currently stored in the ponds ranges from
  - 11 percent to 37 percent based on the minimum set of indicators, and
  - 37 percent to 53 percent based on the maximum set of indicators.
- At Powerton, the percentage of constituents at groundwater monitoring wells that match constituent indicators of leachate from ash currently stored in the ponds ranges from
  - 5 percent to 37 percent based on the minimum set of indicators, and
  - 32 percent to 58 percent based on the maximum set of indicators.
- At Waukegan, the percentage of constituents at groundwater monitoring wells that match constituent indicators of leachate from ash currently stored in the ponds ranges from
  - 16 percent to 26 percent based on the minimum set of indicators, and
  - 42 percent to 58 percent based on the maximum set of indicators.
- At Will County, the percentage of constituents at groundwater monitoring wells that match constituent indicators of leachate from ash currently stored in the ponds ranges from
  - 21 percent to 37 percent based on the minimum set of indicators, and
  - 37 percent to 53 percent based on the maximum set of indicators.

The low matching percentages demonstrate that there are substantial and widespread mismatches between the characteristics of recent groundwater analyzed near the ash ponds and the characteristics of leachate from ash currently stored in the ash basins. Thus, it is my opinion that the recent groundwater impacts are not a result of the ash currently stored in ponds at the sites, but instead are more likely than not a result of historical uses at the sites and the surrounding industrial companies and conditions.[139]

[139] IEPA, 2015 and MWG13-15_29975-29776.

Section 6: Opinion 2—The Remedial Approach Provided in the Kunkel Remedy Report is Not Warranted

It is my opinion that the remedial approach in the Kunkel Remedy Report, which is removal of all CCRs and the ash ponds, is not warranted because:

1. the concentrations of COIs that have been observed in groundwater around the ponds are low, such that MWG's remedial approach to protect human health and the environment is in accordance with Illinois standards (Section 6.1);
2. the bottom ash indicator constituents from leachate do not match the groundwater chemistry, indicating that the constituents in groundwater are not from the ponds, the ponds are functioning in accordance with the design, and the ponds do not need to be removed (Section 6.2), and
3. there is no evidence that coal ash currently outside of the ash ponds is a source of groundwater impacts (Section 6.3).

Further, Kunkel did not follow the Illinois procedures his opinions concerning remedial activities. After the completion of a site investigation, groundwater and soil remediation objectives would need to be developed that consider exposure routes and would be protective of human health and the environment. The selection of remedial technologies needs to consider the feasibility of implementation, whether the technologies will perform satisfactorily and reliably, and whether remediation objectives will be achieved within a reasonable period of time (Section 6.4).

I also found many inaccuracies in the Kunkel Report on Ground-Water Contamination that, in general, portray conditions that imply that groundwater is more threatened than is actually supported by the data.

The following is provided in support of Opinion 2:

- Ash ponds are for wastewater treatment purposes and are not landfills for permanent ash disposal (Section 6.5.1).
- Ash ponds are lined with 60-mil HDPE, which is the accepted standard of the ash pond lining industry. Further, the liner construction quality is consistent with the ash pond lining quality management standards for long-term use based on available construction documentation. (Section 6.5.2)

- O&M of the ash ponds are conducted in accordance with consistent operating protocols. (Section 6.5.3)
- Kunkel incorrectly concludes that all of the former ash ponds leaked and the current ash ponds are leaking. He asserts that the groundwater elevations are above the bottom of the ponds or pond water surface and in turn causing bottom heave. His analysis is incorrect on several bases. First, an uplift pressure argument is relative to the top of the bottom liner. Second, an uplift argument is an issue for soil liners, not geomembrane liners that are at all of the ponds. Third, groundwater levels are rarely above the top of the bottom liners and when they are above the bottom liner there are other opposing forces or controls to eliminate uplift. (Section 6.5.4)
- In addition to errors in Kunkel's groundwater elevation analysis, Kunkel fails to consider the weight of the Poz-o-Pac liner (where present), sand cushion, and limestone warning layers. An appropriate hydrostatic uplift calculation should include at a minimum the weight of sand cushion layers and limestone warning layers that provide downward forces that counteract the upward hydrostatic uplift force. The presence of bottom ash and pond water provide further downward forces that counteract the upward hydrostatic uplift force. (Section 6.5.5)
- Groundwater mounding that the Kunkel Groundwater Contamination Report concluded was an indication of an ongoing leak has not been observed at Joliet #29 monitoring well MW-9. Kunkel alleges that mounding is occurring at Joliet 29 because the groundwater elevation in downgradient MW-9 is higher than upgradient MW-8. However, the majority of the data show that the average water level in MW-9 is lower than MW-8. (Section 6.5.6)
- Kunkel incorrectly portrays background concentrations by using state-wide data for groundwater at the Joliet #29, Waukegan, and Will County sites. It is my opinion that this approach is inappropriate and fails to account for those sites where upgradient groundwater is impacted prior to migrating on-site. (Section 6.5.7)

6.1. MWG's Remedial Approach to Protect Human Health and the Environment is in Accordance with Illinois Standards

Kunkel states that his professional analyses and opinions have an "emphasis on remedy options which, if implemented, would stop or minimize the continuing ground-water contamination from MWG's ash ponds and/or other coal ash disposal areas at the four power plant sites."[148] Kunkel alleges that "[t]he remedy for continued long-term ground-water contamination at the four power plant sites is removal of the leaking ash ponds as well as all or a portion of the coal ash which has been deposited outside the ash ponds. The conclusions in my previous report ([Kunkel Groundwater Contamination Report]) form the bases for this remedy report."[149]

I conclude that further source remediation is not warranted. Observed COI concentrations in groundwater around the ponds are low, such that MWG's remedial approach to protect human health and the environment is in accordance with Illinois standards.

- Bottom ash indicator constituents from leachate do not match the groundwater chemistry (see Section 5.5).
- There is no evidence that historical ash in fill materials outside of the ash ponds is a source of groundwater impacts based on leaching analyses of the existing weathered ash in fill materials and observed groundwater concentrations (see Section 5.7.2).
- Administrative controls eliminate the completion of the groundwater ingestion pathway and dermal exposure pathway (see Section 5.2).
- Groundwater conditions do not pose unacceptable risks to surface water receptors (see Section 5.6).

6.2. Bottom Ash Indicator Constituents from Leachate Do Not Match the Groundwater Chemistry

Kunkel alleges that boron, sulfate, and manganese are valid indicators of groundwater contamination because "EPRI and IEPA deem them to be of concern at all four of the power plant sites and they are typically present in high concentrations in coal ash leachate...." However, the sources cited by Kunkel (EPRI, 2012; Kosson, 2009; and IEPA, 2010) are not specific to the four MWG sites. As demonstrated in Section 5.5.1.3, constituent indicators for leachate from ash currently stored in ponds include at a minimum: barium, boron, and sulfate, and at a maximum: antimony, arsenic, barium, boron, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, silver, sulfate, and zinc. In order to compare the constituents in the ponds with the groundwater conditions, a more complete selection of constituent indicators should be used.

[148] Kunkel Remediation Report, Page 2
[149] Kunkel Remediation Report, Page 2

Kunkel includes removal of the ash ponds as part of his remedy and alleges that "[p]oor liner construction is an initial cause of liner defects which results in leaking ponds and release of contaminated fluids into the underlying ground water."[150] This allegation would imply that recent groundwater concentrations would be substantially impacted by the leachate from bottom ash currently stored in ash ponds. If this were true, constituents that are indicator chemicals for the ash currently stored in ash ponds would match the constituents actually observed in groundwater near the ponds. However, bottom ash indicator constituents from leachate do not match the groundwater chemistry (see Section 5.5). Thus, constituents in groundwater are not from the ponds and the ponds are functioning in accordance with the design.

I conclude that the ponds do not need to be removed.

6.3. There is No Evidence That Historical Coal Ash Outside of the Ash Ponds is a Source of Groundwater Impacts

Kunkel's proposed remedy includes removal of coal ash historically deposited outside the ash ponds, which includes coal ash "utilized in the construction of roadways, pond dikes and also for general land leveling at all four power plants."[151] He further states, without supporting data, that "[t]his coal ash is subject to leaching by rainfall and snowmelt, rising and falling ground-water levels, and this leachate is transported downward causing contamination of the ground water."[152] However, Kunkel's remediation approach is inconsistent with construction practices in Illinois and ASTM standards. The appropriate approach in Illinois for the evaluation of ash used beneficially as fill is to conduct leaching evaluations on actual fill at the sites (see Section 5.7.1). There is no evidence that historical ash in fill materials outside of the ash ponds is a source of groundwater impacts based on leaching analyses of the existing weathered ash in fill materials and observed groundwater concentrations (see Section 5.7.2). I conclude that there is no evidence supporting Kunkel's allegation that leachate from ash used as fill is causing groundwater contamination.

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[150] Kunkel Remediation Report, Page 2
[151] Kunkel Remediation Report, Page 2
[152] Kunkel Remediation Report, Page 2

Table 5-1
Summary of Neutral Leachate Extraction Test (NLET) Analyses of Bottom Ash at MWG Generating Stations

	Analytical Results for Leachate Analyses Performed on Settled Coal Combustion Residuals as Reported in MWG Documents			
Generating Station:	Powerton	Waukegan		Will County
Sample Date:	March 2007	July 2004	July 2004	December 2010
Sample ID:	Powerton Bottom Ash	Bottom Ash-1	Bottom Ash-2	3 South Bottom Ash
Methods 6010B/6020/7041A/7470A/7841 (mg/L)				
Antimony	<0.0060	<0.0060	<0.0060	<0.0060
Arsenic	<0.050	<0.050	<0.050	<0.050
Barium	0.27	0.19	0.12	<0.50
Beryllium	<0.0040	<0.004	<0.004	<0.0040
Boron	<0.10	1.1	2	1.3
Cadmium	<0.0050	<0.005	<0.005	<0.0050
Chromium	<0.025	<0.050	<0.050	<0.025
Cobalt	<0.025	<0.050	<0.050	<0.025
Copper	<0.025	<0.050	<0.050	<0.025
Iron	<0.10	<0.10	<0.10	<0.10
Lead	<0.0075	<0.0075	<0.0075	<0.0075
Manganese	<0.025	<0.050	<0.050	<0.025
Mercury	<0.0020	<0.0020	<0.0020	<0.0020
Nickel	<0.025	<0.050	<0.050	<0.050
Selenium	<0.050	NA	NA	<0.050
Silver	<0.025	<0.050	<0.050	<0.025
Thallium	<0.0020	<0.0020	<0.0020	<0.0020
Zinc	<0.10	<0.10	<0.10	<0.10
Methods 8260B and 8270C				
VOCs and SVOCs	NA	NA	NA	NA
Methods 8081A and 8151A				
Pesticides	NA	NA	NA	NA
Method 9056 (mg/L)				
Sulfate	NA	NA	NA	49
SM 2540C (mg/L)				
Total dissolved solid	NA	NA	NA	200
Sources	MWG13-15_10948	MWG13-15_12809	MWG13-15_12809	MWG13-15_14713

Abbreviations:
"mg/L" = milligrams per liter
"NA" = not analyzed by the laboratory
"<" = less than the indicated analytical detection limit
"MWG" = Midwest Generation
"NLET" = Neutral Leaching Extraction Test (ASTM D3987-85)

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Leachate pH (SU)	Minimum value	6.5	8.8	4.3	**8.0**
	Median value	6.9	10.0	7.6	**8.9**
	Maximum value	7.4	11.0	11.0	**12.0**
Aluminum Leachate Concentration (mg/L)[1]	Minimum value	<0.002	0.1	<0.0059	**0.7**
	Median value	0.0	2.9	0.1	**4.2**
	Maximum value	0.1	17.5	15.1	**5.9**
Antimony Leachate Concentration (mg/L)[1]	Minimum value	0.00014	0.00067	0.00029	**0.00024**
	Median value	0.00250	0.00090	0.00610	**0.00048**
	Maximum value	0.00910	0.00520	0.05900	**0.00062**
Arsenic Leachate Concentration (mg/L)[1]	Minimum value	0.0014	0.0041	0.0051	**0.0041**
	Median value	0.0062	0.0450	0.0580	**0.0051**
	Maximum value	0.0110	0.0840	1.3800	**0.0064**
Boron Leachate Concentration (mg/L)[1]	Minimum value	11.10	6.08	0.21	**0.47**
	Median value	23.05	18.40	1.09	**0.86**
	Maximum value	89.50	41.50	112.00	**3.89**
Barium Leachate Concentration (mg/L)[1]	Minimum value	0.023	<0.018	<0.030	**0.036**
	Median value	0.045	0.018	0.141	**0.140**
	Maximum value	0.050	0.063	0.545	**0.350**
Beryllium Leachate Concentration (mg/L)[1]	Minimum value	<0.0002	<0.0002	<0.0002	**<0.0002**
	Median value	<0.0002	<0.001	<0.0004	**<0.001**
	Maximum value	<0.0008	<0.001	0.0	**<0.001**
Calcium Leachate Concentration (mg/L)	Minimum value	235.0	6.3	12.0	**<2.5**
	Median value	405.0	19.0	51.0	**43.0**
	Maximum value	431.0	596.0	681.0	**81.0**

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Cadmium Leachate Concentration (mg/L)[1]	Minimum value	0.0	0.0	<0.0002	**<0.0003**
	Median value	0.0	0.0	0.0	**<0.0003**
	Maximum value	0.0	0.1	0.0	**0.0**
Chloride Leachate Concentration (mg/L)	Minimum value	15.0	11.0	4.5	**31.0**
	Median value	29.0	28.0	15.0	**72.0**
	Maximum value	73.0	92.0	87.0	**85.0**
Cobalt Leachate Concentration (mg/L)[1]	Minimum value	0.0	<0.00042	<0.0002	**<0.00004**
	Median value	0.0	0.0	0.0	**<0.001**
	Maximum value	0.1	0.1	0.0	**0.0011**
Carbonate Leachate Concentration (mg/L)	Minimum value	0.0	2.5	<0.01	**1.1**
	Median value	0.1	50.0	0.1	**4.4**
	Maximum value	0.2	152.0	16.0	**36.0**
Chromium Leachate Concentration (mg/L)[1]	Minimum value	<0.0002	0.0005	<0.0002	**0.0066**
	Median value	0.0002	2.0000	<0.0005	**0.0028**
	Maximum value	0.0200	5.1000	0.0290	**0.1030**
Copper Leachate Concentration (mg/L)[1]	Minimum value	<0.00091	0.0016	<0.00038	**0.0024**
	Median value	0.0011	0.0430	0.0019	**0.0071**
	Maximum value	0.0028	0.4940	0.4520	**0.0120**
Iron Leachate Concentration (mg/L)[1]	Minimum value	<0.008	<0.003	<0.005	**<0.025**
	Median value	0.0	<0.050	0.0	**<0.050**
	Maximum value	0.1	0.0	14.7	**<0.050**
Lead Leachate Concentration (mg/L)[1]	Minimum value	<0.00012	<0.0002	<0.0001	**<0.00014**
	Median value	<0.00014	0.0	<0.00015	**<0.0002**
	Maximum value	0.00012	0.00029	0.00800	**0.00021**

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Lithium Leachate Concentration (mg/L)[1]	Minimum value	0.4	<0.0044	0.0	**<0.007**
	Median value	5.7	<0.020	0.2	**<0.020**
	Maximum value	23.600	0.027	1.060	**0.016**
Magnesium Leachate Concentration (mg/L)	Minimum value	69.0	0.5	0.1	**<0.05**
	Median value	188.0	6.7	6.8	**21.0**
	Maximum value	236.0	57.0	72.0	**28.0**
Manganese Leachate Concentration (mg/L)[1]	Minimum value	0.1	<0.0015	<0.0002	**<0.0002**
	Median value	2.1	0.0	0.1	**<0.004**
	Maximum value	4.110	0.008	4.170	**0.014**
Mercury Leachate Concentration (mg/L)[2]	Minimum value	0.0000021	0.0000140	0.0000004	**0.0000054**
	Median value	0.0000030	0.0000180	0.0000014	**0.0000074**
	Maximum value	0.0000038	0.0000370	0.0000052	**0.0000094**
Molybdenum Leachate Concentration (mg/L)[1]	Minimum value	0.8	2.7	0.0	**<0.030**
	Median value	3.28	5.72	0.21	**0.08**
	Maximum value	9.63	25.40	6.03	**0.52**
Nickel Leachate Concentration (mg/L)[1]	Minimum value	0.0	0.0	<0.0006	**<0.0006**
	Median value	0.0180	0.0080	0.0071	**0.0037**
	Maximum value	0.1890	0.0750	0.0720	**0.0071**
Potassium Leachate Concentration (mg/L)	Minimum value	23.0	73.0	<2.2	**5.5**
	Median value	170.0	80.0	9.2	**7.7**
	Maximum value	219.0	120.0	277.0	**40.0**
Selenium Leachate Concentration (mg/L)[1]	Minimum value	0.0007	0.0066	0.0001	**0.0018**
	Median value	0.0490	0.4130	0.0130	**0.0025**
	Maximum value	0.0910	1.7600	0.2830	**0.1810**

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Silicon Leachate Concentration (mg/L)[1]	Minimum value	2.3	0.2	0.7	**2.2**
	Median value	6.1	1.5	4.7	**3.4**
	Maximum value	9.4	9.9	18.5	**10.3**
Silver Leachate Concentration (mg/L)[1]	Minimum value	<0.0002	<0.0002	<0.0002	**<0.0002**
	Median value	<0.0002	<0.0002	<0.0002	**<0.0002**
	Maximum value	<0.0002	0.0	0.0	**<0.0002**
Sodium Leachate Concentration (mg/L)	Minimum value	80.0	840.0	3.8	**53.0**
	Median value	188.0	1700.0	19.0	**56.0**
	Maximum value	455.0	3410.0	72.0	**653.0**
Strontium Leachate Concentration (mg/L)[1]	Minimum value	1.3	<0.030	0.2	**0.5**
	Median value	4.6	0.3	0.7	**0.6**
	Maximum value	10.3	12.0	5.6	**1.8**
Thallium Leachate Concentration (mg/L)[1]	Minimum value	<0.0001	<0.0001	<0.0001	**<0.0001**
	Median value	0.0	<0.0001	0.0	**<0.0001**
	Maximum value	0.0	<0.0005	0.0	**<0.0001**
Uranium Leachate Concentration (mg/L)[1]	Minimum value	0.0	0.0	<0.0001	**<0.00002**
	Median value	0.0190	0.0057	0.0007	**0.0011**
	Maximum value	0.0370	0.0210	0.0610	**0.0012**
Vanadium Leachate Concentration (mg/L)[1]	Minimum value	<0.00083	0.004	0.003	**0.010**
	Median value	0.003	0.635	0.039	**0.017**
	Maximum value	0.044	5.020	0.754	**0.236**
Zinc Leachate Concentration (mg/L)[1]	Minimum value	<0.002	<0.002	0.0	**<0.002**
	Median value	0.0450	<0.005	0.0087	**0.0084**
	Maximum value	0.2890	0.0120	0.0900	**0.0110**

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Bicarbonate Leachate Concentration (mg/L)	Minimum value	100.0	1.0	0.0	**1.1**
	Median value	229.0	108.0	28.0	**110.0**
	Maximum value	265.0	481.0	535.0	**241.0**
Carbonic Acid Leachate Concentration (mg/L)	Minimum value	<0.01	<0.01	<0.01	**<0.01**
	Median value	<0.01	<0.01	<0.01	**<0.01**
	Maximum value	0.0	<0.01	3.4	**<0.01**
Sulfate Leachate Concentration (mg/L)	Minimum value	845.0	2870.0	45.0	**91.0**
	Median value	2350.0	3830.0	171.0	**131.0**
	Maximum value	2440.0	6690.0	1830.0	**1120.0**
Total Inorganic Carbon Leachate Concentration (mg/L)	Minimum value	24.0	1.7	0.8	**5.9**
	Median value	55.0	32.0	5.5	**22.0**
	Maximum value	80.0	105.0	115.0	**49.0**
Total Organic Carbon Leachate Concentration (mg/L)	Minimum value	1.3	5.3	<0.09	**0.4**
	Median value	4.1	49.0	0.6	**6.0**
	Maximum value	4.6	55.0	22.0	**7.9**
Dissolved Oxygen Leachate Concentration (%)	Minimum value	16.0	0.2	2.9	**1.6**
	Median value	53.0	14.0	40.0	**4.5**
	Maximum value	95.0	87.0	165.0	**35.0**
Leachate Oxidation-Reduction Potential (mV)	Minimum value	213.0	111.0	41.0	**225.0**
	Median value	247.0	240.0	240.0	**289.0**
	Maximum value	280.0	276.0	409.0	**303.0**
Leachate Electrical Conductivity (umho/cm)	Minimum value	2000.0	6174.0	174.0	**680.0**
	Median value	3682.0	7690.0	578.0	**990.0**
	Maximum value	4915.0	12760.0	2980.0	**4020.0**

Table 5-2

Summary of Ash Leachate Samples by Management Method and Coal Type (Source: EPRI, 2006)

Analytical Constituent or Parameter	**Analytical Results for Samples of Leachate Collected from Landfills and Impoundments as Reported by EPRI, 2006**				
	Facility Type:	Landfill		Impoundment	
	Coal Source Type:	Bituminous	Subbituminous/ Lignite	Bituminous	Subbituminous/ Lignite
Leachate Temperature (˚C)	Minimum value	14.0	11.0	10.0	**16.0**
	Median value	15.0	17.0	22.0	**30.0**
	Maximum value	17.0	22.0	32.0	**36.0**

1. Leachate concentration was reported in micrograms per liter (µg/L) in EPRI, 2006. The reported concentrations were converted to milligrams per liter (mg/L) by dividing the reported concentration by 1,000 µg/mg.

Table 5-3

Comparison of Ash Leachate Characteristic Values to IEPA Class I Groundwater Standards

	MWG Bottom Ash Samples		Impoundments from PRB-Sourced Coal by EPRI			IEPA Class I Groundwater Standards
	NLET		Samples of leachate			
Constituent	Min	Max	Min	Median	Max	
Antimony	<0.0060	<0.0060	0.00024	0.00048	0.00062	0.006
Arsenic	<0.050	<0.050	0.0041	0.0051	0.0064	0.01
Barium	<0.50	0.27	0.036	0.14	0.35	2
Beryllium	<0.0040	<0.0040	<0.0002	<0.001	<0.001	0.004
Boron	<0.10	2	0.47	0.86	**3.89**	2
Cadmium	<0.0050	<0.0050	<0.0003	<0.0003	0.0021	0.005
Chromium	<0.025	<0.050	0.00066	0.0028	**0.108**	0.1
Cobalt	<0.025	<0.050	<0.00004	<0.001	0.0011	1
Copper	<0.025	<0.050	0.0024	0.0071	0.012	0.65
Iron	<0.10	<0.10	<0.025	<0.05	<0.05	5
Lead	<0.0075	<0.0075	<0.00014	<0.0002	0.00021	0.0075
Manganese	<0.025	<0.050	<0.0002	<0.004	0.014	0.15
Mercury	<0.0020	<0.0020	0.0000054	0.0000074	0.0000094	0.002
Nickel	<0.050	<0.050	<0.0006	0.0037	0.0071	0.1
Selenium	<0.050	<0.050	0.0018	0.0025	**0.18**	0.05
Silver	<0.025	<0.050	<0.0002	<0.0002	<0.0002	0.05
Sulfate	49	49	91	131	**1120**	400
Thallium	<0.0020	<0.0020	<0.0001	<0.0001	<0.0001	0.002
Zinc	<0.10	<0.10	<0.002	0.0084	0.011	5

Abbreviations:

"mg/L" = milligrams per liter
"NA" = not analyzed by the laboratory
"<" = less than the indicated analytical detection limit
"MWG" = Midwest Generation
"NLET" = Neutral Leaching Extraction Test (ASTM D3987-85)
"PRB" = Powder River Basin

Notes:

Bold font indicates a detection above IEPA Class I Groundwater Standards.
Underlined values indicate detections relevant to Section 5.5.1.3 of the report text.

Table 5-4
Summary of Constituents Detectec during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash and Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] Joliet No. 29 Generating Station										
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Antimony	Yes (Table 5-2)											
Arsenic	Yes (Table 5-2)			x	x		x	x				x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Beryllium												
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)					x			x			
Chromium	Yes (Table 5-2)											
Cobalt	Yes (Table 5-2)				x		x			x		
Copper	Yes (Table 5-2)					x	x	x	x			
Iron					x				x	x		
Lead	Yes (Table 5-2)								x			
Manganese	Yes (Table 5-2)	x				x		x	x	x		
Mercury	Yes (Table 5-2)											
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Selenium	Yes (Table 5-2)		x	x		x	x	x			x	x
Silver												
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Thallium												
Zinc	Yes (Table 5-2)								x			
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		10	10	9	10	7	7	7	7	10	10	9
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		53%	53%	47%	53%	37%	37%	37%	37%	53%	53%	47%

Table 5-4

Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments

Based on Site-Specific NLET Results for Bottom Ash and Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments

		Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]															
		Powerton Generating Station															
Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Antimony	Yes (Table 5-2)																
Arsenic	Yes (Table 5-2)						x	x	x	x		x	x	x	x	x	
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Beryllium																	
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)														x		
Chromium	Yes (Table 5-2)																
Cobalt	Yes (Table 5-2)						x	x		x	x	x					
Copper	Yes (Table 5-2)			x	x	x					x						
Iron							x	x	x		x	x	x	x	x	x	
Lead	Yes (Table 5-2)		x	x				x		x	x						
Manganese	Yes (Table 5-2)				x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)																
Nickel	Yes (Table 5-2)			x	x	x	x	x		x	x	x	x		x	x	
Selenium	Yes (Table 5-2)	x				x				x	x			x	x	x	
Silver																	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Thallium															x		
Zinc	Yes (Table 5-2)			x													
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		11	11	8	9	8	9	8	11	6	7	9	10	10	9	9	11
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		58%	58%	42%	47%	42%	47%	42%	58%	32%	37%	47%	53%	53%	47%	47%	58%

Table 5-4

Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments

Based on Site-Specific NLET Results for Bottom Ash and Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring (2)						
		Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Antimony	Yes (Table 5-2)							
Arsenic	Yes (Table 5-2)	x	x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x
Beryllium								
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)							
Chromium	Yes (Table 5-2)							
Cobalt	Yes (Table 5-2)							
Copper	Yes (Table 5-2)	x					x	
Iron			x			x	x	x
Lead	Yes (Table 5-2)			x				
Manganese	Yes (Table 5-2)	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)							
Nickel	Yes (Table 5-2)					x		
Selenium	Yes (Table 5-2)	x	x	x	x		x	
Silver								
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x
Thallium								
Zinc	Yes (Table 5-2)							
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		8	10	8	9	10	9	11
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		42%	53%	42%	47%	53%	47%	58%

Table 5-4

Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments

Based on Site-Specific NLET Results for Bottom Ash and Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]									
		Will County Generating Station									
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Antimony	Yes (Table 5-2)										
Arsenic	Yes (Table 5-2)		x	x	x	x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Beryllium											
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)										
Chromium	Yes (Table 5-2)										
Cobalt	Yes (Table 5-2)	x		x	x						
Copper	Yes (Table 5-2)										
Iron		x	x	x	x		x	x	x		x
Lead	Yes (Table 5-2)										
Manganese	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)				x						
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Selenium	Yes (Table 5-2)	x		x	x	x	x	x	x	x	
Silver											
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Thallium											
Zinc	Yes (Table 5-2)										
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		9	10	8	7	8	9	9	9	8	10
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		47%	53%	42%	37%	42%	47%	47%	47%	42%	53%

Abbreviations:

"TCLP" = Toxicity Characteristic Leaching Procedure (USEPA Method 1311)

"x" = constituent was detected above analytical detection limits during at least one quarterly groundwater monitoring event in 2014

Table 5-4
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash and Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments

<u>Notes:</u>

1. Indicators of leachate from ash currently stored in impoundments are based on leachate sample results for bituminous ash stored in impoundments (Table 5-2) as denoted in this table as "Y TCLP)", and actual leachate sample results for bituminous ash stored in imp
2. Shading of cells is described below.
   - Green shading indicates that <u>a constituent that is an indicator</u> of leachate from ash currently stored in the impoundments <u>was not detected</u> during quarterly groundwater monitoring in 2014.
   - Blue shading indicates that <u>a constituent that is not an indicator</u> of leachate from ash currently stored in the impoundments <u>was detected</u> during at least one quarterly groundwater monitoring event in 2014.
   - No shading indicates that either (1) a constituent that is an indicator of leachate from ash currently stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014, or (2) a constituent that is not an indicator of leachate from ash currently stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.
3. Green and blue shading (see Note 2) demonstrate observed constituents that are not consistent with indicators of leachate from ash currently stored in impoundments.

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring (2)										
		Joliet No. 29 Generating Station										
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Antimony												
Arsenic				x	x		x	x				x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Beryllium												
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Cadmium						x			x			
Chromium												
Cobalt					x		x			x		
Copper						x	x	x	x			
Iron					x				x	x		
Lead									x			
Manganese		x				x		x	x	x		
Mercury												
Nickel		x	x	x	x	x	x	x	x	x	x	x
Selenium			x	x		x	x	x			x	x
Silver												
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Thallium												
Zinc									x			
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		2	2	3	4	5	5	5	7	4	2	3
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		11%	11%	16%	21%	26%	26%	26%	37%	21%	11%	16%

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in mpoundments
Based on Site-Specific NLET Results for Bottom Ash

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]															
		Powerton Generating Station															
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Antimony																	
Arsenic							x	x	x	x		x	x	x	x	x	
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Beryllium																	
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium															x		
Chromium																	
Cobalt							x	x		x	x	x					
Copper				x	x	x					x						
Iron							x	x	x		x	x	x	x	x	x	
Lead			x	x				x		x	x						
Manganese					x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury																	
Nickel				x	x	x	x	x		x	x	x	x		x	x	
Selenium		x				x				x	x			x	x	x	
Silver																	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Thallium															x		
Zinc				x													
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		1	1	4	3	4	5	6	3	6	7	5	4	4	7	5	1
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		5%	5%	21%	16%	21%	26%	32%	16%	32%	37%	26%	21%	21%	37%	26%	5%

Table 5-5

Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]						
		Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Antimony								
Arsenic		x	x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x
Beryllium								
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x
Cadmium								
Chromium								
Cobalt								
Copper		x					x	
Iron			x			x	x	x
Lead				x				
Manganese		x	x	x	x	x	x	x
Mercury								
Nickel						x		
Selenium		x	x	x	x		x	
Silver								
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x
Thallium								
Zinc								
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		4	4	4	3	4	5	3
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		21%	21%	21%	16%	21%	26%	16%

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring (2)									
		Will County Generating Station									
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Antimony											
Arsenic			x	x	x	x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Beryllium											
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Cadmium											
Chromium											
Cobalt		x		x	x						
Copper											
Iron		x	x	x	x		x	x	x		x
Lead											
Manganese		x	x	x	x	x	x	x	x	x	x
Mercury					x						
Nickel		x	x	x	x	x	x	x	x	x	x
Selenium		x		x	x	x	x	x	x	x	
Silver											
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Thallium											
Zinc											
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		5	4	6	7	4	5	5	5	4	4
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		26%	21%	32%	37%	21%	26%	26%	26%	21%	21%

Abbreviations:
"NLET" = neutral leaching extraction test (ASTM D3987-85)
"x" = constituent was detected above analytical detection limits during at least one quarterly groundwater monitoring event in 2014

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments Based on Site-Specific NLET Results for Bottom Ash

Notes:

1. Indicators of leachate from ash currently stored in impoundments is based on site-specific NLET results for bottom ash (Table 5-1).
2. Shading of cells is described below.

Green shading, which is not applicable ot this Table 2-6, would indicate that a constituent that is an indicator of leachate from ash currently stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.

Blue shading indicates that a constituent that is not an indicator of leachate from ash currently stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014.

No shading indicates that either (1) a constituent that is an indicator of leachate from ash currently stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014, or (2) a constituent that is not an indicator of leachate from ash currently stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.

3. Green and blue shading (see Note 2) demonstrate observed constituents that are not consistent with indicators of leachate from ash currently stored in impoundments.

ATTACHMENT B

Exhibit 904, Supplement to the Expert Report of John Seymour, P.E., Feb. 29, 2016

Supplement to the Expert Report of John Seymour, P.E.

I have prepared this Supplement to the Expert Report on behalf of Midwest Generation, LLC (MWG) to address a mathematical issue in § 5.5.2 of my Expert Report. This supplemental § 5.5.2 replaces the original §5.5.2 in its entirety, including Tables 5-4 and 5-5. This supplemental does not change my opinions presented in my Expert Report in the Matter of:

SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT
Complainants,
v
MIDWEST GENERATION, LLC,
Respondent
PCB 2013-0015

Revised Section 5.5.2: Recent Groundwater Concentrations do Not Match Constituent Indicators for Leachate from Ash Stored in Ponds

I compared the occurrence of constituents during groundwater monitoring events in the most recent year, 2014, to the minimum and maximum sets of constituent indicators of leachate from ash currently stored in ponds. Conceptually, if all the constituents detected in groundwater samples from a monitoring well match the constituents detected in leachate from ash currently stored in ponds, and if constituents *not* detected in groundwater samples match the constituents *not* detected in leachate from ash currently stored in ponds, then it would be probable that leachate from ash currently stored in ponds is impacting groundwater (i.e. as of sample dates). To evaluate whether or not groundwater concentrations match leachate constituent indicators, I calculated the percentage of constituents detected at each groundwater monitoring well that match constituent indicators of leachate from ash currently stored in the ponds ("matching percentages"). I restricted my analysis to the most recent full year of groundwater monitoring, 2014, to account for seasonal variations in constituent concentrations and to reflect groundwater concentrations after MWG's pond relining and pond decommissioning had been completed.

For the maximum set of constituent indicators, indicators included constituents that were detected by EPRI (2006) and were detected in groundwater monitoring wells. The percentage of observed constituents that are not consistent with indicators of leachate from ash that was stored in impoundments based on EPRI 2006 is based on the following formula based on a maximum set of

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MWG904

indicator parameters. A division is performed with a numerator of the number of indicator constituents that are not consistent and with a denominator of the total number of indicators and constituents detected in groundwater monitoring wells. The formula result is expressed as a percentage by multiplying by 100 percent. (See Table 5-4.)

For the minimum set of constituent indicators, detection limits for MWG site specific data meet current IEPA Class I groundwater goals with the exception of arsenic, which met the former Class I groundwater goal that was applicable at the time of analysis. The percentage of observed constituents that are not consistent with indicators of leachate from ash currently stored in impoundments is based on the following corrected formula based on a minimum set of indicator parameters. A division is performed with a numerator of the minimum number of indicator constituents and with a denominator of the total number of constituents observed at that monitoring well. The denominator includes constituents that are both consistent and not consistent with the indicator parameters. The formula result is expressed as a percentage by multiplying by 100 percent. (See Table 5-5.)

In summary, if the constituents match then it is likely that the leachate from the ash is impacting the groundwater. Moreover, if the constituents *do not* match then it is likely that the leachate from ash currently in ponds *is not* impacting the groundwater.

My results are tabulated in Tables 5-4 and 5-5 and are summarized as follows:

- At Joliet #29, the percentage of constituents at groundwater monitoring wells that do not match constituent indicators of leachate from ash currently stored in the ponds ranges from
    - 40 percent to 70 percent based on the minimum set of indicators (MWG specific data), and
    - 44 percent to 63 percent based on the maximum set of indicators (EPRI data).
- At Powerton, the percentage of constituents at groundwater monitoring wells that do not match constituent indicators of leachate from ash currently stored in the ponds ranges from
    - 25 percent to 70 percent based on the minimum set of indicators (MWG specific data), and
    - 38 percent to 69 percent based on the maximum set of indicators (EPRI data).
- At Waukegan, the percentage of constituents at groundwater monitoring wells that do not match constituent indicators of leachate from ash currently stored in the ponds ranges from

  - 50 percent to 63 percent based on the minimum set of indicators (MWG specific data), and
  - 50 percent to 69 percent based on the maximum set of indicators (EPRI data).
- At Will County, the percentage of constituents at groundwater monitoring wells that do not match constituent indicators of leachate from ash currently stored in the ponds ranges from
  - 57 percent to 70 percent based on the minimum set of indicators (MWG specific data), and
  - 44 percent to 63 percent based on the maximum set of indicators (EPRI data).

The non-matching percentages demonstrate that there are substantial and widespread mismatches between the characteristics of recent groundwater analyzed near the ash ponds and the characteristics of leachate from ash currently stored in the ash basins. Thus, it is my opinion that the recent groundwater impacts are not a result of the ash currently stored in ponds at the sites, but instead are more likely than not a result of historical uses at the sites and the surrounding industrial companies and conditions.[1]

[1] IEPA, 2015 and MWG13-15_29775-29776.

Reservation

I am reserving the ability to supplement my opinions in response to any documents or bases for Dr. Kunkel's reports that are presented by the Complainants. In addition, my opinions may be supplemented based on future changes in the construction or operation of the generating stations and in response to any future changes in groundwater conditions observed at the sites.

Signature

This supplement contains 15 pages, including tables.

John Seymour, P.E.

29 February 2016
DATE

Table 5-4
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] — Joliet No. 29 Generating Station										
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Antimony	Yes (Table 5-2)											
Arsenic	Yes (Table 5-2)			x	x		x	x				x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)					x			x			
Chromium	Yes (Table 5-2)											
Cobalt	Yes (Table 5-2)				x		x			x		
Copper	Yes (Table 5-2)					x	x	x	x			
Iron					x				x	x		
Lead	Yes (Table 5-2)								x			
Manganese	Yes (Table 5-2)	x				x		x	x	x		
Mercury	Yes (Table 5-2)											
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Selenium	Yes (Table 5-2)		x	x		x	x	x			x	x
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)								x			
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		10	10	9	10	7	7	7	7	10	10	9
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		63%	63%	56%	63%	44%	44%	44%	44%	63%	63%	56%

Table 5-4
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] – Powerton Generating Station															
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Antimony	Yes (Table 5-2)																
Arsenic	Yes (Table 5-2)						x	x	x	x		x	x	x	x	x	
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)														x		
Chromium	Yes (Table 5-2)																
Cobalt	Yes (Table 5-2)						x	x		x	x	x					
Copper	Yes (Table 5-2)			x	x	x					x						
Iron							x	x	x		x	x	x	x	x	x	
Lead	Yes (Table 5-2)		x	x				x		x	x						
Manganese	Yes (Table 5-2)				x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)																
Nickel	Yes (Table 5-2)			x	x	x	x	x		x	x	x	x		x	x	
Selenium	Yes (Table 5-2)	x				x				x	x			x	x	x	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)			x													
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		11	11	8	9	8	9	8	11	6	7	9	10	10	9	9	11
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		69%	69%	50%	56%	50%	56%	50%	69%	38%	44%	56%	63%	63%	56%	56%	69%

Table 5-4

Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments

Based on Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] — Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Antimony	Yes (Table 5-2)							
Arsenic	Yes (Table 5-2)	x	x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)							
Chromium	Yes (Table 5-2)							
Cobalt	Yes (Table 5-2)							
Copper	Yes (Table 5-2)	x					x	
Iron			x			x	x	x
Lead	Yes (Table 5-2)			x				
Manganese	Yes (Table 5-2)	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)							
Nickel	Yes (Table 5-2)					x		
Selenium	Yes (Table 5-2)	x	x	x	x		x	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)							
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		8	10	8	9	10	9	11
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		50%	63%	50%	56%	63%	56%	69%

Table 5-4
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] — Will County Generating Station									
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Antimony	Yes (Table 5-2)										
Arsenic	Yes (Table 5-2)		x	x	x	x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)										
Chromium	Yes (Table 5-2)										
Cobalt	Yes (Table 5-2)	x		x	x						
Copper	Yes (Table 5-2)										
Iron		x	x	x	x		x	x	x		x
Lead	Yes (Table 5-2)										
Manganese	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)				x						
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Selenium	Yes (Table 5-2)	x		x	x	x	x	x	x	x	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)										
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		9	10	8	7	8	9	9	9	8	10
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		56%	63%	50%	44%	50%	56%	56%	56%	50%	63%

Abbreviations:
"x" = constituent was detected above analytical detection limits during at least one quarterly groundwater monitoring event in 2014

Table 5-4
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Actual Leachate Sample Results for Bituminous Ash Stored in Impoundments (EPRI, 2006)

Notes:

1. Indicators of leachate from ash stored in impoundments are based on leachate sample results for bituminous ash stored in impoundments (Table 5-2) as denoted in this table as "Yes (Table 5-2)". Indicator include constituents that were detected by EPRI (2006) and were detected in groundwater monitoring wells.(Thallium, which was detected only at Powerton MW-14, was not included as an indicator.)
2. Shading of cells is described below.
   Green shading indicates that a constituent that is an indicator of leachate from ash stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.
   Blue shading indicates that a constituent that is not an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014.
   No shading indicates that either (1) a constituent that is an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014, or (2) a constituent that is not an indicator of leachate from ash stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.
3. Green and blue shading (see Note 2) demonstrate observed constituents that are not consistent with indicators of leachate from ash stored in impoundments.
4. The percentage of observed constituents that are not consistent with indicators of leachate from ash stored in impoundments is based on the following formula based on a maximum set of indicator parameters. A division is performed with a numerator of the number of indicator consituents that are not consistent and corrected a denominator of the total number of constituents detected at that groundwater monitoring well. The denominator includes observed constituents that are both consistent and not consistent with the indicator parameters. The formula result is expressed as a percentage by multiplying by 100 percent.

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash (Midwest Generation Site-Specific Analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2] – Joliet No. 29 Generating Station										
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Arsenic				x	x		x	x				x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Cadmium						x			x			
Cobalt					x		x			x		
Copper						x	x	x	x			
Iron					x				x	x		
Lead									x			
Manganese		x				x		x	x	x		
Nickel		x	x	x	x	x	x	x	x	x	x	x
Selenium			x	x		x	x	x			x	x
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Zinc									x			
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		2	2	3	4	5	5	5	7	4	2	3
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		40%	40%	50%	57%	63%	63%	63%	70%	57%	40%	50%

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash (Midwest Generation Site-Specific Analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]															
		Powerton Generating Station															
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Arsenic							x	x	x	x		x	x	x	x	x	
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium															x		
Cobalt							x	x		x	x	x					
Copper				x	x	x					x						
Iron							x	x	x		x	x	x	x	x	x	
Lead			x	x				x		x	x						
Manganese					x	x	x	x	x	x	x	x	x	x	x	x	x
Nickel				x	x	x	x	x		x	x	x	x		x	x	
Selenium		x				x				x	x			x	x	x	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zinc				x													
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		1	1	4	3	4	5	6	3	6	7	5	4	4	7	5	1
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		25%	25%	57%	50%	57%	63%	67%	50%	67%	70%	63%	57%	57%	70%	63%	25%

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Currently Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash (Midwest Generation Site-Specific Analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring (2) — Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Arsenic		x	x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x
Copper		x					x	
Iron			x			x	x	x
Lead				x				
Manganese		x	x	x	x	x	x	x
Nickel						x		
Selenium		x	x	x	x		x	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		4	4	4	3	4	5	3
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (4)		57%	57%	57%	50%	57%	63%	50%

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash (Midwest Generation Site-Specific Analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Stored in Impoundments [1]	Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring [2]									
		Will County Generating Station									
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Arsenic			x	x	x	x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Cobalt		x		x	x						
Iron		x	x	x	x		x	x	x		x
Manganese		x	x	x	x	x	x	x	x	x	x
Mercury					x						
Nickel		x	x	x	x	x	x	x	x	x	x
Selenium		x		x	x	x	x	x	x	x	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Stored in Impoundments [3]		5	4	6	7	4	5	5	5	4	4
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Stored in Impoundments [4]		63%	57%	67%	70%	57%	63%	63%	63%	57%	57%

Abbreviations:
"NLET" = neutral leaching extraction test (ASTM D3987-85)
"x" = constituent was detected above analytical detection limits during at least one quarterly groundwater monitoring event in 2014

Table 5-5
Summary of Constituents Detected during Most Recent Year (2014) of Quarterly Groundwater Monitoring Compared to Indicators of Leachate from Ash Stored in Impoundments
Based on Site-Specific NLET Results for Bottom Ash (Midwest Generation Site-Specific Analyses)

Notes:

1. Indicators of leachate from ash stored in impoundments is based on site-specific NLET results for bottom ash (Table 5-1). Detection limits presented in Table 5-1 meet current IEPA Class I groundwater goals with the exception of arsenic, which met the former Class I groundwater goal that was applicable at the time of analyis.

2. Shading of cells is described below.
   - Green shading, which is not applicable ot this Table 5-5, would indicate that a constituent that is an indicator of leachate from ash stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.
   - Blue shading indicates that a constituent that is not an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014.
   - No shading indicates that either (1) a constituent that is an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014, or (2) a constituent that is not an indicator of leachate from ash stored in the impoundments was not detected during quarterly groundwater monitoring in 2014.
3. Green and blue shading (see Note 2) demonstrate observed constituents that are not consistent with indicators of leachate from ash stored in impoundments.
4. The percentage of observed constituents that are not consistent with indicators of leachate from ash stored in impoundments is based on the following corrected formula based on a minimum set of indicator parameters. A division is performed with a numerator of the minimum number of observed consituents that are not consistent and with a denominator of the total number of indicators and constituents observed at that monitoring well. The denominator includes observed constituents that are both consistent and not consistent with the indicator parameters. The formula result is expressed as a percentage by multiplying by 100 percent.

ATTACHMENT C

Excerpts of PCB 13-15 Hearing Transcript, Feb. 2

THE ILLINOIS POLLUTION CONTROL BOARD

SIERRA CLUB, ENVIRONMENTAL)
LAW & POLICY CENTER & POLICY)
CENTER, PRAIRIE RIVERS)
NETWORK AND CITIZENS AGAINST)
RUINING THE ENVIRONMENT,)
)
Complainants,)
)
vs) No. PCB 13-15
)
MIDWEST GENERATION, LLC,)
)
Respondent.)

TRANSCRIPT FROM THE PROCEEDINGS

taken before HEARING OFFICER BRADLEY HALLORAN by LORI ANN ASAUSKAS, CSR, RPR, a notary public within and for the County of Cook and State of Illinois, at the James Thompson Center, Room 9-040, Chicago, Illinois, on the 2nd day of February, 2018, A.D., at 9:00 o'clock a.m.

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I N D E X

E X H I B I T S

the same coal in the same way, that's why you combined those?

A. Yes, exactly.

Q. If you turn to that next page, Page 21 of the slides, what is this table?

A. This is a data -- a presentation of the comparison of the constituents on the left that were found in groundwater and the next column is the constituent that we look at in leachate from ash that had been stored in the -- in the ponds.

And you can see where it says barium, boron and sulfate here, is what we're -- what we're focusing this table on. Then across, you see each monitoring well. So we -- we've looked at, you know, a year's worth -- the most recent year's worth of data to evaluate what was found in each -- each well, each constituent, and where you see the dark shading, that's where that -- the result was inconsistent meaning what was found in the groundwater was inconsistent with what was found in the ash leachate.

That goes to what was -- if it

was inconsistent, it was because something in the groundwater was not in leachate or something that is in leachate is not in groundwater.

And so we summed to the number of times that the data were inconsistent and then calculated a percentage. And at the bottom, you see that the percentage's range sort of focused mainly around 40 to 60 percent inconsistent. When it's inconsistent, the conclusion what we made is that what's in the groundwater is not -- the data is not consistent with what's found in the ash.

Q. And turning to the next page, there is an additional updated Table 5-4. I should say on the prior page, Page 21, updated Table 5-5, is that Table 5-5 from your expert report?

A. The expert report relied on previous data. This includes all of the updated -- the updated data obtained through the second quarter of 2017.

Q. And same for Page 22, the updated Table 5-4, is that updated with the additional 2017 data?

A. Yes. This is the same presentation with the updated groundwater data.

Q. And why did you --

MR. RUSS: Can I ask for a clarification? I'm sorry.

It says from '16 --

HEARING OFFICER HALLORAN: Let's hold on. Ask me and then go ahead, Mr. Russ. Objection?

MR. RUSS: Objection. Misstates the exhibit.

It looks like this data is from 2016 to 2014. So it's not the 2014 updated through 2017?

MS. NIJMAN: I can ask the witness --

HEARING OFFICER HALLORAN: You can clarify that. All right. Thank you.

BY MS. NIJMAN:

Q. Mr. Seymour, would you explain what data -- which years of data are included in this exhibit?

A. Yes. It begins -- it covers four quarters of data beginning in the third quarter of 2016 through the most recent data that has been admitted to this hearing, the second quarter of 2017. So that is the updated data. It does not include the previous data.

Q. And is that the same for the next slide, Slide 22?

A. Yes, it is.

Q. So your prior charts in your report deal with the pre-2016 or up to your report, the date of 2015, correct?

A. What we agreed to do is that we would have a full calendar year representing all the seasons in 2014. So that data ended December of 2014.

Q. Thank you.

Now, this Table 5-4 on Page 22, what did you do here? Why -- you site to EPRI.

What does that mean?

A. That's the Electric Power Research Institute. It's an independent corporation that does research for the power industry and they had conducted research at many different facilities as to what could be found in leachate

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from CCRs. So we took their data, which is -- and again compared their data to what was found in groundwater and so you had a dozen or so constituents in groundwater and compared it to the dozen or so constituents identified by EPRI.

Q. And did you do that, as you said yesterday, as a sort of a backup to the site data?

A. Yeah. As I mentioned yesterday, if we start with the site-specific date, that's the best data. And when we go to the lit- -- this is basically a literature study and research. You go to that as a backup or a corroboration to make sure we -- we're on target with our conclusions.

Q. And did it corroborate generally?

A. Yes, it did. We followed the same process and that -- at the bottom, you see the percentages. They're still maybe the 50 to 60 percent consistent. So actually, it's a little more -- I'd say, on average, it's a little more inconsistent with the EPRI data than with the site data.

Q. And when you --
A. But essentially, it's the same conclusion.
Q. When you say it's inconsistent, do you mean there are constituents in either the ash or groundwater that don't match the other ash, the ash that's in the EPRI report?
What are you saying?
A. Yeah. The groundwater constituents found at the site are inconsistent with the ash data constituents. As I said, that inconsistency is either when you find something in one and not the other or you don't find something in one, but you find it in the other. That's what we define inconsistent as.
Q. If you would, turn to the next slide, Page 23, of the binder in front of you.
A. Yes.
Q. That's been marked as Exhibit 901 in the hearing here. Turning to what we've been calling the historic ash filled areas at Joliet,

THE WITNESS: I'll take any compliment I can get, Mr. Hearing Officer.
BY MS. NIJMAN:
Q. Okay. If you would, turn to the next slide. There are two slides that again are -- and I think we can move a little more quickly now that you've explained what these are.
The next two slides are your updated tables 5-5 and 5-4 from your report; is that accurate?
A. Yes.
Q. And did you do the same analysis of comparing the groundwater data to the leachate data as you did with Joliet?
A. Yes, I did.
Q. Just generally, what are your conclusions here at Powerton?
A. At Powerton, again you see a lot of the data speed over a little wider range, but in general, around 50 percent or so to 60 percent are inconsistent.
So that means again that the -- what we found in groundwater compared

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to the site-specific ash leachate doesn't match meaning that the ponds aren't the source.

Q. When you say "the ponds aren't the source," this is one of the pieces of evidence you used for that conclusion?

A. Yes. As I mentioned, we also looked at the construction of the ponds and the operation of the ponds as well.

Q. Thank you.

Turning to Slide 38, this was discussed in previous testimony as identifying a former ash basin and the limestone -- former limestone runoff basin at Powerton.

Do you see that?

A. Yes.

Q. Are there any groundwater monitoring wells around the former ash basin at Powerton?

A. Yes. There's approx- -- I think there are five wells beginning with Monitor Well 1 on the far right, sort of, a little bit upgradient/sidegradient of the pond.

Going counterclockwise, you have Monitor Wells 2, 3, 4 and 5, 5 as being

Q. And generally, what did you find?
A. I found that upgradient of the ponds was higher concentrations than downgradient.
Q. What does that tell you?
A. Well, it's sort of the opposite. I mean, it tells you it's not the pond, number one. It's kind of like the -- it tells me that the source is to the west of the ponds.
Q. We've already briefly touched upon the analysis that you conducted -- the comparison of the indicators on the next two slides.
A. Yes.
Q. Turning to -- just generally your conclusions on that comparison, what did you find?
A. Well, if you look at the bottom line again, you know, 40, 50, 60 percent, kind of focus here on the mid-50 percentages, if -- the data don't match. So if I were to make a conclusion as to a source, which is a very important conclusion, I would want to

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have the groundwater data match, the ash data, much more closely.

Q. If you turn to Slide 52, and again I apologize, some of the page numbers got cut off in the photocopying, this is the Waukegan map of the established environmental land use control boundaries.

Do you see that?

A. Yes.

Q. Could you describe in the entirety where the -- well, let me ask it this way.

Does this map accurately reflect the environmental land use controls across the property at Waukegan?

A. Yes.

Q. And as you did with Powerton, did you assess the spacial trends at Waukegan?

A. Yes.

Q. And again, that's to assess a source or a plume, is that a fair description?

A. Yes.

Q. Turning to the next slide, Slide 53, what are you showing here?

A. We have a similar graph where those

1, 2, 3, 5 and 9 are upgradient; is that correct?

A. I don't think that's what --

Q. Oh, I'm sorry. Go ahead. Why don't you tell me.

A. I -- I would have said that Monitoring Wells 1, 2, 3, 4, 5 and 6 would be upgradient.

Q. Thank you.

And looking at the next slide, Slide 63, we heard Mr. Gnat discuss the groundwater flow direction. This is the groundwater contour map dated 5 of 2017 at Will County.

Did you agree or do you agree with Mr. Gnat's description of the groundwater flow as depicted here?

A. Yes, I do.

Q. And again for Will County, if you look at the next two slides, 64 and 65, you did a comparison of the ash data from ponds -- constituents from ash data and ponds with constituents in the groundwater.

What were your conclusions?

A. Well, we followed the same process

and my main conclusion was that at the bottom line, 50 to 60 percent of the data, the constituents in the groundwater do not match the constituents in the ash.

Q. In the ponds?

A. Excuse me. Yes, the ash in the ponds.

Q. And --

A. This first table is using the site-specific date at Table 5-5.

Q. And as we've said earlier, the second table at 5-4 is the comparison with the constituents of ash from the EPRI published data, correct?

A. Correct. And we found a little more consistency oddly, but it was still about 50 percent of the data are inconsistent meaning the data between the groundwater and the ash in the ponds don't match.

Q. Turning to the next slide, Slide 66.

A. Okay.

Q. We heard from Maria Race some discussion about this area at the bottom, alleged slag bottom ash placement area?

A. On the bottom southern property

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for the reader.
Q. So I want to move on to your matching analysis.
I would like you to turn to -- I think we might have to flip back and forth between your first report and your supplemental report, which I think are both in your binder.
The supplemental report, if I remember correctly, is exhibit -- I can't remember the exact numbers right now. Exhibit 904, I think, is your supplemental report?
A. What are you asking me again? I'm sorry. What? 904?
Q. Yes. I'm just going to be asking you a couple questions about your supplemental report and your original report.
Your supplemental report is Exhibit 904; is that right?
A. Yes.
Q. And your original report is Exhibit 903; is that right?
A. It's within there, yes.
Q. Sorry. I just want to make sure I have this right.

Now, the supplemental report replaced Tables 5-4 and 5-5 in your first report; is that right?

A. It looks like, yes, that's what we've done.

Q. Okay. And the updated tables that you've been talking about this morning with Ms. Nijman are an updated version of the same table; is that right?

A. Yes. With the new data with the different time series, I believe.

Q. Were the methods you used to generate the new tables the same as --

A. Excuse me. This is the -- the data in the supplement is 2014. This is a corrected data table.

Q. Right.

A. So it's not the data tables we had been presented, the updated 2017.

Q. Exactly. Thank you for clarifying.

So the data in your supplemental report from 2014, the data in the demonstrative exhibits are 2016 to 2017?

A. Correct.

Q. Were the methods you used to generate what is shown here as Table 5-4 the same methods that you used to generate the new Table 5-4?

A. The method in the Exhibit 904 is the same method that we used for the demonstratives.

Q. Okay. Thank you.

Now, the Tables 5-4 and 5-5, the reason why I was mentioning your original report here, they refer back to Tables 5-1 and 5-2 for the leachate data; is that right?

A. For the comparison data, yes.

Q. Okay. In your original report?

A. Yes.

Q. Okay. So we might have to go back and forth between the two.

Now, if you had a leachate value and a groundwater value that were identical, that would be a match in your match analysis, correct?

A. Well, even if it wasn't necessarily identical, if they are the same constituent, we -- we'd call that a match.

Q. Yeah. But if -- if you had a boron concentration of three in leachate milligrams

per liter, a boron concentration of three milligrams per liter in groundwater, that would be a match, right?

A. Yeah. I think that would be unusual. It doesn't happen quite that simply, but it would be a match.

Q. Okay. Thank you.

Now, on these tables for each well, you derived a percentage that you described as a percentage of observed constituents that are not consistent with indicators with leachate from ash currently stored in impoundment; is that right?

A. Yes.

Q. Did you intend for this matching analysis to support conclusions about ash outside of the impoundment?

A. Only to the sense that we can understand what is in it, that could be.

Q. Okay.

A. It's a good baseline to start.

Q. Would it be fair to describe the observations in the numerator of these percentages as a mismatch?

A. For this, because it's inconsistent, we're showing that -- I guess, as I said early today, it goes in a numerator if it is inconsistent, a mismatch.

Q. So a mismatch is a fair characterization?

A. I think that's okay.

Q. And to simplify a little, mismatches in your approach count against the possibility that groundwater has been contaminated by coal ash; is that right?

A. Yes, in the increase in the likelihood that it's not from the ash in the pond.

Q. Okay. In your deposition, you were asked about benzene.

Do you remember this?

A. I don't recall.

Q. And we will turn to Page 79 of your deposition to refresh your memory.

A. Page 79, did you say?

Q. Yes.

A. I see it.

Q. Without going through and reading the transcript into the record, if you could

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just look at that to refresh your memory, I'll just ask you a question about it.

Would the presence of benzene in the groundwater effect --

A. Do you want me to read this?

Q. Just to refresh your memory.

A. I haven't finished yet.

Q. Oh, okay. I'm sorry. I'm sorry.

A. Okay I've read it.

Q. Okay. Is benzene a constituent of coal ash?

A. No. I think the discussion here, though, doesn't define it.

Q. That's okay. I'm just asking -- I'm just giving you that to refresh your memory and I'm just asking you now.

So benzene is not a constituent of coal ash. Would finding benzene in groundwater affect your conclusions about the presence or absence of coal ash?

A. As long as -- I mean, to me, it's almost data that you would not consider in your analysis.

Q. Okay. Thank you.

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So a non-indicator, something that's not in coal ash, does not say anything about the presence or absence of coal ash; is that fair to say?

A. Say that again, please.

Q. A non-indicator, something that's not -- a constituent that's not an indicator of coal ash, the presence or absence of that chemical in groundwater shouldn't have any bearing on your conclusion about the presence or absence of coal ash; is that right?

A. That's kind of complicated. I'm sorry, Mr. Russ. One more time. I'll try to concentrate very carefully.

Q. What you said about benzene, I believe, is it shouldn't have any -- it shouldn't be in the analysis?

A. It would not be in the analysis.

Q. And why is that?

A. It's not an indicator of coal ash.

Q. Okay. Right. And that's what I'm asking.

So something that's not an indicator of coal ash shouldn't have any

bearing on your determination of whether or not there's coal ash in groundwater?

A. I would think -- yes, I think that would be correct.

Q. Okay. Can you turn to Table 5-4 in your supplement? You had it arranged by site. So there's a Table 5-4 in Waukegan. That site had the fewest wells so I think it will be the easiest to look at.

A. I see it.

Q. Some of these are highlighted in blue, right?

A. Yes.

Q. What does that signify?

A. It was not matching.

Q. And some of the cells are white and some of the cells are green. Can you just explain what the different colors mean?

A. The whites where they match and the green where they don't match. The data are inconsistent in the green.

Q. So what's the difference between green and blue?

A. It was flagged, as you can see, in

the ash. It was not found in the EPRI data. I believe that's why it's flagged.

Q. Okay. Okay. And --

A. It also may not have been analyzed in the EPRI data. I'd have to look.

Q. Okay. Let me -- I believe you have a legend for this table someplace. Do you remember where that was?

A. I think it's at the end.

Q. Yep. Can you -- can you read for me what the -- what you wrote that the blue cells mean?

A. Blue shading indicates the constituents had not -- that is not an indicator of leachate from ash stored in the impoundments was detected during at least one quarterly groundwater monitoring event in 2014.

Q. Right. Okay. Thank you.

And then turning back to the Waukegan table, all of the blue cells are in a row for iron; is that right?

A. Yes.

Q. And for purposes of this table, iron is not a coal ash indicator, is it?

A. It isn't.

Q. Iron can be naturally occurring; is that right?

A. It can be. And actually although it was not found in this analyses, it can come also from coal ash.

HEARING OFFICER HALLORAN: You have to speak up.

BY THE WITNESS:

A. Although iron was shaded blue here, we do also note that -- and it was not found in this EPRI data, we also find it in coal ash. It is present.

BY MR. RUSS:

Q. Okay. Now, for iron, you have an X for MW-2. You have an X for iron.

Does that mean you coded as a mismatch?

A. Yes, I believe so.

Q. Even though you just said it was in coal ash?

A. I -- I agree.

Q. Is that an error in your report?

A. I'd have to think about it.

Q. Okay. For purposes of this table, you counted the presence of non-indicator as evidence against the possibility of contamination; isn't that right?

A. Yes.

Q. And I believe you just said you shouldn't do that?

A. You're right.

Q. Okay. Thank you.

Table 5-5 for Waukegan again, there are a lot of blue cells; is that right?

A. Yes, I did see.

Q. Those are all instances in which you coded the presence of non-indicator as a mismatch and counted it against the possibility of contamination, is that right?

A. Yes. To be honest, I'm a little confused. This says that green and blue shading demonstrate observed constituents that are not consistent with indicators of leachate from ash stored in impoundments and that's what I'm relying on.

Q. Rights. So these are non-indicators

of ash for purposes of this table that you found in groundwater?

A. It says not consistent with indicators of leachate for ash stored in the impoundments.

Q. Right. If you look in the column labeled "Constituent is an indicator of leachate," there are only three where the answer is yes on Table 5-5; isn't that right?

A. That's from the ash in the ponds.

Q. Everything that's not marked yes, I assume the is answer is no and it's not an indicator?

A. I'm sorry. Say that again, please.

Q. This column purports to show indicators of coal ash -- leachate from coal ash stored in the ponds; is that right?

A. Yes.

Q. And some are marked yes and some that are blank?

A. Yes.

Q. Is it safe to call the blank row as non-indicators?

A. It was not found in the ash.

Q. There's not --

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A. It was not an indicator in this situation. But in general, it could -- you know, we find it in other places.

Q. So all of these blue cells, though, are non-indicators that were found in groundwater and you counted that against the possibility of contamination; isn't that right?

A. Well, because it wasn't found in the leachate, but it was found in the groundwater, so it did not match. It's not consistent.

Q. Right. But I believe you said earlier if you find a non-indicator in groundwater, you shouldn't contribute that to your analysis; is that right?

A. I understand, yes.

Q. So there's a series of errors in this table?

A. Mr. Russ, I -- I -- I would agree that it looks that way. I -- as I said, I am a little bit confused. I have to kind of go back to the whole discussion in the report. It may take a while.

Q. Okay. All right. Well, that's -- we'll move on for now.

Just one more question about Table 5-5 actually. Are there any mismatches in Table 5-5 other than those blue cells?

A. They're all -- I think they're blue, yes. There's lots of blue that are labeled as mismatched. Let me see. One, two, three, yes.

Q. So if we were to take the non-indicators out of this table, you would have a 100 percent match; is that right?

A. Again, I would have to go back and refresh my memory on how it was established.

Q. Okay. Let me just walk through a few of these. You have three indicators so it won't take too long.

You have barium, right? Barium was found in leachate. How many of the wells was barium found in?

A. All of them?

Q. All of them.

How many boron? Boron was found in leachate. How many wells was boron

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fond in?
A. Let me -- I'm sorry. I might not be on the right table. Waukegan. Okay.
Q. How many of those wells was boron found in?
A. All of them.
Q. How about sulfate?
A. It was found on all of them.
HEARING OFFICER HALLORAN: Could you keep your voice up, Mr. Seymour? Thank you.
THE WITNESS: Sorry.
BY MR. RUSS:
Q. So the three indicators that you have in this table were found in all of the wells at the Waukegan site?
A. Yes.
Q. So if we take the non-indicators out, that would be a 100 percent match, wouldn't it?
A. Yes. In fact, they did -- in the analysis, the new percent is correct. But again, I have to go back and refresh my memory.

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Q. Okay. Thank you.
Now, is there arsenic in coal ash?
A. It has been found in coal ash.
Q. Is arsenic in coal ash leachate?
A. I believe so. In general, it has been found.
Q. How much arsenic was there in the leachate that was used for Table 5-5? You might have to refer back to Table 5-1 of your original report.
A. For which site?
Q. For the -- the leachate.
A. Which --
Q. Well, I believe --
THE COURT REPORTER: Wait. You've got to wait. One at a time.
BY THE WITNESS:
A. For --
BY MR. RUSS:
Q. The leachate data has --
A. -- Waukegan?
Q. The --
A. -- which table?

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Q. The?

HEARING OFFICER HALLORAN: Come on, gentlemen, please. You have to help me and the court reporter. Speak one at a time.

MR. RUSS: I'm just trying to answer his question.

HEARING OFFICER HALLORAN: One at a time.

BY MR. RUSS:

Q. You -- you have one set of leachate data that you used for all the sites in Table 5-5; is that right?

A. Yes.

Q. And that's found in -- the data are found in Table 5-1 of your original report?

A. 5-1 is one set of data, I believe, and 5-2 is second set of data. I would have to look.

Q. And I'm -- I'm just reading off Table 5-5 where you said Table 5-1.

A. Okay. Yes.

Q. Okay. So in Table 5-1, what is the arsenic value for the leachate that you

used?

MS. NIJMAN: Do you have a page number?

MR. RUSS: The tables aren't -- I don't think the tables have page numbers. Oh, they do. I'm sorry. Table 5-1 is on Page -- well, it says Page 1 of 1 at the bottom. So I don't know how helpful that is.

THE WITNESS: There's no Bates number but it's Table 5-1 in my report.

BY MR. RUSS:

Q. How much arsenic is in the leachate?

A. There wasn't any site-related leachate.

Q. Now, you say there wasn't any, but what is the number that you show in Table 5-1?

A. Less than .006 milligrams per liter.

Q. I'm sorry. I'm asking about arsenic.

A. I -- I apologize. Arsenic is less than 0.050.

Q. Okay. So that's what you call non-detect, right?

A. Yes.

Q. And that might mean that there's no arsenic. It might also mean that there's 0.049 milligrams per liter of arsenic, right?

A. Yeah. The test is geared to run at or below the drinking water standard in Illinois. So if it's less than that number, it could be present, but you would never know.

Q. Right. It could be present at up to 49 micrograms per liter?

A. You'd never know if it was, like, one or zero.

Q. Right. But is that true to say that it could be as high as 49 micrograms per liter?

A. Yes, it could be.

Q. Can you tell me what concentrations were observed in groundwater in 2014?

To look at -- to do this, I think you're going to have to look at Exhibit 268-P, which should be there in front of you.

At Waukegan, at MW-5, what are arsenic concentrations in that well in this period of time?

A. They are low right around .01 to

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.009, .0013 milligrams per liter.

Q. Okay. So is it safe to say that the groundwater had concentrations of arsenic between roughly two and ten micrograms per liter?

A. Micrograms per liter or milligrams per liter?

Q. Two and ten micrograms.

A. Yes, micrograms per liter.

Q. Thank you.

So the leachate had something less than 50 micrograms per liter, the groundwater had something between two and ten micrograms per liter, the leachate could have the same amount of arsenic as the groundwater; isn't that right?

A. The leachate from the test?

Q. Yes.

A. The leachate, as you indicated, could have a concentration of less than the -- than the -- what was detected, which again is a test from the leachate just to give us some kind of an idea what's there, right.

HEARING OFFICER HALLORAN: We're

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getting soft again, gentlemen. If you could, raise your voices. Thank you.

MR. RUSS: Sorry. Maybe I should stay standing.

BY MR. RUSS:

Q. So the leachate could have between two and ten micrograms or arsenic per liter?

A. It could have concentrates that are lower.

Q. Yes. And the leachate in the groundwater, using these tests and these data, could have the exact same concentration of arsenic; isn't that correct?

A. It's possible.

Q. Uh-huh. And that would be a match?

A. If they were present and we were confident that the leach data were accurate, yes.

Q. And you don't really know whether these data are a mismatch or not because of the relative difference in the detection limits, right?

A. Well, we are looking at this data to see if it matches.

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Q. Uh-huh.
A. And sometimes it will match and won't match and then we fall back to the analysis that it's not in the ash in accordance with the test procedure, which is at the groundwater protective standards or slightly less.
Q. So the question I'm asking is since the leachate in the groundwater could have the same concentration of arsenic given these numbers, you can't really say for sure it's that it's a mismatch; is that right?
A. Well, if you don't have the data, you can't say it is a match either.
Q. Right. You can't say that it's a match and you can't say that it's a mismatch. I would call it unknown; is that fair?
A. Okay.
Q. Yet you coded it as a mismatch, I believe and --
A. Yes, I understand that. And as mentioned, I think I'm confused. I have to go back and look at it.
Q. So is that potentially an error in

your table?

A. It's possible it's an error, yes. I have to look at it. I am confused.

Q. And to generalize, I'd like to consider a hypothetical situation. You have a sample of water with eight micrograms of arsenic per liter and you subject it to the leach test, you subject it to the groundwater test, same sample of water, that would be a match?

A. If you analyzed it and found the same constituents, you mean?

Q. If you took the -- yeah. If you took one sample of water that you knew had eight micrograms per liter of arsenic and subjected it to both tests, you would get the same result and you would find the match, theoretically, right?

A. I'm sorry. Are you saying take the same water and test it to -- I'm sorry. Please repeat it.

Q. Say you took a gallon of water --

A. Yes.

Q. -- with eight micrograms of arsenic

per liter, you took some of it and you tested it with a leach test that was used for Table 5-1 and you took some of it and you tested it with a groundwater test that was used by Midwest Generation in 2014, that should be a match with the same sample of water, right?

A. Well, the leach test adds the ash material to it and then shakes it. So if there's arsenic, you'd be adding to it. But there's absolutely no arsenic, then you would have a similar concentration.

Q. Okay. And the leach test would not be able to detect that amount of arsenic; is that right?

A. Not necessarily, but I would have to look at that detection levels that were run at the time.

Q. I think we just looked at the leach test in Table 5-1 and it looked like it was --

A. I think you said eight?

Q. I said eight micrograms.

A. Yes. Then it would be above what the -- it would be detected in the groundwater test and I would have to look --

Q. And not --

A. Because you're converting from milligrams to micrograms. It's slightly confusing.

Q. Okay. I'm sorry.

So let's just -- I'll stick with micrograms. So eight micrograms in the sample you're testing, with the leach test table, would you be able to detect that?

A. I would have to look at the detection limits.

Q. Yep. Sure. Go ahead and look. The leach test is in Table 5-1 of your report.

A. It's 50 micrograms -- net micrograms, which is greater than eight.

Q. So that leach test would not be able to detect the arsenic; is that right?

A. That's correct.

Q. The groundwater test would be able to detect the arsenic; is that correct?

A. Yes.

Q. So the exact same sample of water, you would end up coding that as a mismatch using your method; is that right?

A. Yes, and it wouldn't.

Q. Is that an error in your method?

MS. NIJMAN: Objection, same error. You are giving the impression that there was -- well, I'm speaking. Objection, misstates the testimony.

HEARING OFFICER HALLORAN: Well, overruled. He can answer if he is able.

BY THE WITNESS:

A. I said what I said. It may be.

BY MR. RUSS:

Q. Okay. To generalize beyond arsenic, this kind of -- this kind of phenomenon, when you detect a constituent in groundwater, but not a leach test, even if groundwater and the leachate has the same concentration, it's possible whatever the groundwater test is, it's more sensitive than the leach test; isn't that right?

A. That's -- yes, it could be.

Q. Do you know how many of the results in your Table 5-5 might be affected by that circumstance?

A. I would have to add them, but you

know that there would be quite a few.

Q. Okay. Thanks.

A. Presuming, in fact, I'm -- I'm a little confused. If it's correct, there would be errors in the table.

Q. Okay. Now, in your deposition, you said that boron is a good indicator of coal ash contamination; is that right?

A. In the deposition, I have probably said that it was, but it's one of many. And again, to be able to prove it's from an ash, you have to have more than one constituent to make that case.

HEARING OFFICER HALLORAN: Keep your voice up, please, Mr. Seymour. You are trailing off again at the end. Thank you.

BY MR. RUSS:

Q. And one of the reasons that boron, in particular, is a good indicator of coal ash, is -- that it's often found in areas contaminated by coal ash; is that right?

A. Studies show that it's in the leachate and it's found in the groundwater also in some sites.

Q. And another reason that boron is a good indicator is because it's mobile in the environment; is that right?

A. It moves with the water.

Q. Okay. Would you call it a conservative constituent in that way?

A. If you think it's -- conservative is a relative thing. I would say that if it's mobile, then it's there and with others that would support it. Then it would be -- it may be conservative.

Q. Okay. Are there any other indicators of coal ash with similar characteristics?

A. I know that sulfate is one. That is generally accepted. It's fairly mobile.

Q. Okay. So is it safe to say boron and sulfate are better coal ash indicators than other constituents of coal ash?

A. Not necessarily. Because again, it's all what you find. They may be there, but there may be other things also.

Q. Okay. I want to go back to the matching analysis. I'm sorry. My outline

is a little bit disjointed. These questions are going to sound similar, but it's a different set of tables and different issues so bear with me.

If you look at Table 5-4 of your supplemental report, in the Waukegan -- we'll stick with Waukegan to keep it simple, I want to talk about antimony.

Based on this table --

A. I'm sorry. Let me find Waukegan.

Q. Oh, sure. I'm sorry. It's the smallest of the four.

A. I found it.

Q. For purposes of this table, were you treating antimony as an indicator of coal ash leachate?

A. Yes.

Q. How much antimony was there in the leachate that EPRI tested? You might have to look at Table 5-2 of your original report.

A. Antimony?

Q. Yes.

A. For an ^^antonina, we found a range in EPRI the data --

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Q. Uh-huh.
A. -- of .2 to .6 micrograms per liter.
Q. Okay. So for shorthand, we can say less than one microgram?
A. Okay.
Q. Is that fair?
Not nothing, but less than one microgram?
A. Yes.
Q. Was the groundwater test used by Midwest Generation in 2014 sensitive enough to detect that amount of antimony?
A. I don't recall. I would have to look.
Q. You can look at 268-P. That should show you.
HEARING OFFICER HALLORAN: 268-P, as in Patrick?
MR. RUSS: P, as in Patrick.
BY THE WITNESS:
A. The results for antimony looks to be less than three micrograms per unit, I believe. I'd have to check the units. It's less than three micrograms per unit.

BY MR. RUSS:

Q. Okay. That's -- the detection limit was three?

A. Yes.

Q. So was that test sensitive enough to detect the concentrations you saw in every leachate?

A. That doesn't look to be.

Q. Okay. Now, Table 5-4 shows empty green cells for antimony across the board.

Does that mean no antimony was detected in Waukegan in 2014?

A. Well, we are looking at -- I apologize. It's hard to flip back and forth.

Q. No, I know. I'm sorry about that.

A. We are saying that there was no antimony detected at those levels and that it is an indicator in coal ash.

Q. Okay. So since it was reported to be less than three micrograms per liter, it's possible that it had one or two micrograms per liter; is that right?

A. But what you're doing is you're -- you're taking the -- again the leachate and comparing it to groundwater. The leachate test is to see if it's there, not at what connotation.

So if it's found in the leachate, it's -- it's there. Whatever concentration that the lab is using, if it's not there, it would be inconsistent if it's in the leachate and not in the ground?

Q. The concentration that you saw in the leachate, which was, I believe, between 0.2 and 0.6 micrograms per liter --

A. Yes.

Q. -- if that exact same concentration was in the groundwater, that should be a match according to your earlier definition of a match?

A. Well, it actually is. You can see the level and the EPRI data has a lower detection level.

Q. Right.

A. So it is finding a more conservative characterization of the data than what we've used in that it includes more things than what we've found. And so if you look at the groundwater data, the groundwater data is at a detection level that's different. But again, it's the standard detection level for the water in these wells.

Q. Right.

A. It's an accepted test by the state of Illinois.

Q. I understand.

The question I'm asking is it's possible that the groundwater had the same concentration of antimony as leachate; is that right?

A. It's irrelevant.

Q. I don't believe it --

A. It's only relevant that it's there in the leachate, not at what concentration.

Q. Could you answer the question, please?

A. Repeat the question.

Q. Is it possible that the groundwater had the same amount antimony as the leachate?

A. Again, it could be, but it's really irrelevant.

Q. Okay. If it did have the same concentration as the leachate, that should

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be a match, right?
A. If the -- say if the concentration and where.
Q. The groundwater in the leachate were the same?
A. Well, and the concentration in the groundwater is at a different detection.
Q. I'm not asking --
A. You have to --
Q. I'm simply asking if the two concentrations were the same, that should be a match, right?
A. If you found antimony in groundwater and you found antimony in leachate, it would be a match.
Q. I'm asking if the same concentration of antimony exists in both the leachate and the groundwater, that should be a match?
A. If they are above the detection limit and you detect them, that would be a match.
Q. The exact same concentration would be not a match only as a function of the defection limit, is that what you're saying?
A. No. I am a saying that if you find

it in the coal ash and you find it in the groundwater, that would be a match.

Q. I guess what I'm asking you is isn't it possible that you wouldn't find it in the groundwater because the groundwater test was not as sensitive a test as the leachate test?

MS. NIJMAN: I'm just going to object as to asked and answered.

HEARING OFFICER HALLORAN: I don't think so. Overruled.

BY THE WITNESS:

A. So the -- please, again. Repeat the question, Mr. Russ.

BY MR. RUSS:

Q. Let me go about this a different way. Let's do the same kind of scenario.

You have a gallon of water with antimony. It has 0.6 micrograms per liter. According to the EPRI leach test, you would detect it.

A. I would -- 0.6 micrograms per liter and in the leach test used by EPRI, I think, yes, the -- the level was less than one.

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Q. Yeah. It was a range of 0.2 to 0.6. You can check, but that's -- so at 0.6, you would find it in the leach test, right?
A. Yes.
Q. Would you find it in the groundwater test?
A. Six micrograms?
Q. 0.6.
A. The groundwater detection level is established at, I believe, we said...
Q. Three.
A. Three?
Q. Yes.
A. And so that -- but again, the groundwater detection level is a state method.
Q. I understand that.
A. And that you can't measure below that.
Q. I understand. I'm simply asking whether that groundwater test would defect that amount of antimony?
A. The groundwater test is at a higher detection level.
Q. Would it detect that amount of

antimony?
A. .6?
Q. Yes.
A. It would not.
Q. So if the exact same sample of water detected in the leachate, not in the groundwater, should be a match, your result -- your method counts it as a mismatch; is that right?
A. Well, again, I think you're missing what I'm trying to say as far as the groundwater test is as low as the state standard test. You won't know if it's there.
Q. That's right.
A. Okay.
Q. Thank you.
A. So you can see that -- you can find it in the lower detection level in the leachate tests. So if you feel comfortable -- more comfortable it's there, but in the state test, it's at a higher level. So yeah, again, it's at the level the state accepts. So you don't report or test it that low.
Q. So you don't know whether the antimony

level in the groundwater is the same as it is in the leachate, but it could be; is that right?

A. Overall, in a laboratory analysis, there's always something that could be there, but you will never know.

Q. Is it possible that the groundwater in the leachate has the same concentration of antimony?

A. It's possible.

Q. And it's, therefore, possible that they match?

A. If there -- again, I keep going back to as you know, this is an interesting discussion on detection levels. If it's above the state detection level, and it's -- and obviously we found it in the EPRI leachate, it would be a match.

Q. So I just want to make it clear for the record. What you're saying, I think, is that it could have the exact same concentration. Your approach would count that as mismatch and count it against the possibility of contamination; is that right?

A. Again, it's a theoretical argument

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because you won't know in the groundwater sample if it's there.

Q. Is it --

A. If it's -- if it is there and we could measure it, then it would be there and it would be a match, but again, you can't test it below the detection level.

Q. I'm simply asking if it's possible it could be a match.

MS. NIJMAN: Asked and answered now.

HEARING OFFICER HALLORAN: Yes. You know, I think Mr. Seymour has answered it or at least qualified his answer. So you can move on now.

BY MR. RUSS:

Q. Okay. So let me just ask a slightly different question now. Well, let me think about this for a second.

Let me ask it this way. The leachate has less than one microgram per liter of antimony, correct?

A. The leachate detection level, we're saying, for now is one.

Q. I don't --

A. It's less than that actually.

Q. The leachate has less that is one microgram per liter, right?

MR. HALLORAN: You have to keep your voice up, Mr. Russ.

MR. RUSS: Okay.

HEARING OFFICER HALLORAN: Thank you.

BY THE WITNESS:

A. Again, I think so. I would have to look.

BY MR. RUSS:

Q. Yes. And in order for that to be detected in the groundwater, it would have to be at least three times higher than the leachate sample; is that right?

A. Again, I'm -- it's -- it's -- the leachate is like a separate test in a way. It's -- so it's hard to equate. If you're talking about laboratory analysis, if it's three times less, it would have to be three times.

Say that again. It would have

to be three times less?

Q. The leachate has less than one microgram per liter of antimony. In order for the groundwater test to detect that amount of antimony -- I'm sorry -- in order for -- you'd have to have three times the amount of antimony you have in leachate for the groundwater test to defect it; is that right?

A. Correct, but you can't assume that the leachate test is the groundwater. It's not the same. It's again indicating that it's there or not.

Q. So the only --

A. You really can't -- I don't think, Mr. Russ, you can use that as a comparison.

Q. Why is that?

A. Well, you're saying that in the leachate, which is .2 or .6, you're saying .1 -- 1, and the groundwater is 3, so you -- if you're saying the an- -- the concentration of leachate in the lab sample would have to be three times larger to detect in groundwater, it's like making a non- -- it's a non-comparison to me.

Q. I'm sorry. I might have misspoken.

The groundwater would have to have three times more antimony than the leachate in order for it to be detected by the groundwater test; is that right?

A. The groundwater -- I'm very sorry. It's difficult to track.

The groundwater concentration would have to be three times larger than --

Q. Than what we saw in leachate for it to be detected by the groundwater test that Midwest Generation was using in 2014?

A. Again, I think they are independent. The leachate test is to see if it's there. It's to see if it's there. Once we say it's there, then the concentration is irrelevant in the laboratory leachate. It's just that it is there.

Q. I don't think you're answering the question.

A. Yeah. Maybe I'm not understanding. I'll try harder.

Q. The leachate concentration is less

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than one microgram per liter, correct?
A. Yes.
Q. The groundwater would have to have at least three times that before it was detected by the groundwater test that Midwest Generation was using in 2014 --
A. Yes.
Q. -- is that right?
A. Yes.
Q. Okay. Thank you.
For the groundwater to have three times more antimony than the leachate, given what we've seen earlier that there's some attenuation and it's unlikely to increase from the source to a downgradient receptor well, it's impossible for that leachate to ever be detected in a downgradient groundwater well using those tests; is that right?
MS. NIJMAN: Object to overbreadth and ever.
HEARING OFFICER HALLORAN: I'm sorry, Ms. Nijman?
MS. NIJMAN: Object to overbreadth and the word ever.

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HEARING OFFICER HALLORAN: Can you rephrase, please?

BY MR. RUSS:

Q. If a source of coal ash like the one you sampled or the one that was sampled for the purposes of Table 5-2 in your report has less than one microgram per liter of antimony, would a downgradient well ever have enough antimony to be detected by the groundwater test that Midwest Generation was using in 2014 from that source?

A. You know, it -- it boils down to fundamentals. Okay. I -- I think there's maybe a misunderstanding of the fundamentals detect -- how we used the data.

In my view, when we take the data from the groundwater, which state the method of detection level, right? It's low. It's less than the groundwater standard. I'm talking about the method of detection level in the laboratory. And even though the laboratory test that was used by the EPRI data to test the leachate, the detection levels aren't an important part.

It's just whether it is there. And so it doesn't matter from Point A to B in the groundwater. It's just whether or not it is present. It's not -- concentration is not the point. If you don't -- and if you have groundwater less than the EPRI -- less than the method test, you're not going to -- you shouldn't -- you shouldn't detect it anywhere else. I mean, you know, downgradient if, in fact, it increases downgradient, as we talked about theoretically.

Q. Thank you. And that's exactly what I was trying to elicit.

So you shouldn't see it at a concentration that's greater than it is in the leachate in a downgradient well?

A. Again, it has nothing to do with the concentration of leachate. If it migrates and it is diluted as it moves, then it would be less than the detection level that we use in groundwater. It's still higher than this theoretical concentration that you're talking about.

Q. So you wouldn't expect to see it in

a downgradient well and yet when you found it in leachate and not in a downgradient well, which is what you're saying you would expect, you counted that as a mismatch; is that right?

A. It doesn't matter upgradient or downgradient, if it's there, it's not the concentration if it's detected if the detection level is the same in both of these wells.

Q. But the detection level is not the same, I think you've testified to?

A. The concentration in the groundwater -- excuse me.

The detection levels in the groundwater, I thought, are the same in the laboratory. I mean, we looked at one in the lab, right? I believe it was one result -- one detection level we looked at for the groundwater.

Q. You can look at the summary tables for the groundwater data in that report and you will see that it's consistently reported at less than 0.003 milligrams per liter?

A. Just three, right, three micrograms.

Q. And you wouldn't detect the leachate

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with that groundwater test is what we've established.

A. But it -- you cannot equate what's in the leachate as being put in the groundwater. Okay? It's just what is detected in the leachate that's important, not the absolute concentration.

Q. So are you suggesting then that the groundwater might have much more of a constituent than the leachate?

MS. NIJMAN: Objection, mischaracterizes his testimony.

HEARING OFFICER HALLORAN: I'm sorry?

MS. NIJMAN: Objection, mischaracterizes his testimony.

HEARING OFFICER HALLORAN: He can answer if he is able.

BY THE WITNESS:

A. Whether -- if it -- if it's three times higher than what's -- what we detect in the lab, it's irrelevant. It's either detected in the groundwater at those detection levels or not. If it's less than that, it's considered as a non-detect. So even though it could be three times, it's irrelevant.

BY MR. RUSS:

Q. Okay. I'm going to move on for now.
This matching analysis in Tables 5-4 and 5-5, have you ever used this before.

A. I do groundwater comparisons that match before and it's a common tool and we use it in these comparisons at all my sites.

Q. Have you ever used this particular quantitative method?

A. Again, this is a method that looks at the numbers and accumulates a percentage and presents a percentage. I have not used that presentation before.

Q. Okay. Can you name anyone else who has done it this way before?

MS. NIJMAN: I'm sorry. Vague.

HEARING OFFICER HALLORAN: Can you rephrase, please?

MR. RUSS: Okay. Sure. Yeah.

BY MR. RUSS:

Q. Are you aware of anyone else using

this particular quantitative method before?

MS. NIJMAN: Vague.

HEARING OFFICER HALLORAN: He can answer if he is able.

BY THE WITNESS:

A. I mean, it implies a very broad understanding of what all the industry does. So I think it's a little bit -- I would answer no, but I think it's -- there's a lot of ideas out there and I don't know if I could know.

BY MR. RUSS:

Q. And are you aware of this particular quantitative method where you compare a source characteristic to groundwater data, calculate a percentage of matching that has ever been published in a journal or academic publication?

A. I don't know.

MS. NIJMAN: I'm going to object to the form of the question as mischaracterizing. He said a percentage only.

HEARING OFFICER HALLORAN: Okay. Mr. Russ?

MR. RUSS: I can reask the question.

BY MR. RUSS:

Q. Are you aware of anyone -- are you -- has this particular quantitative method ever been published in any journal or academic publication?

A. It's a similar question that you asked before, if I knew of anybody who had done it. There's lots of publications. I've not read all the publications. So I don't know if I -- even if I say I don't know, that doesn't mean it hasn't been used.

Q. Are you aware of any?

A. As I said, I don't know. But it's a little unfair because there's lots of journals and I've not read all the journals.

Q. I'm just asking if you're aware of any publications --

HEARING OFFICER HALLORAN: I think he said no.

MR. RUSS: I'll move on.

BY MR. RUSS:

Q. Okay. Let's talk about your temporal

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ATTACHMENT D

Excerpts of Exhibit 901, John Seymour Testimony/PowerPoint Presentation and Updates

Sierra Club Environmental, et al. v. Midwest Generation, LLC.

Defense Expert John Seymour

Monday, February 5, 2018

Comparison With Groundwater Conditions

- Conducted a comparison of the occurrence of groundwater constituents detected in 2014 [and updated to 2017] compared to sets of indicators of leachate from ash stored in ponds and from EPRI research.
- The profiles of the constituents in the groundwater do not match the profiles of leachate constituent indicators in the ponds at the plant sites.
- Groundwater impacts are not the result of ash stored in the ponds at sites

Joliet #29 – Updated Table 5-5

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (MWG site specific analyses)

		Constituents Detected During Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring (2)										
		Joliet No. 29 Generating Station										
Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Arsenic				x	x		x	x		x		x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	X
Cobalt					x					x		
Iron				x			x			x		
Manganese		x					x	x	x	x		
Mercury										x		
Nickel		x	x	x	x	x	x	x	x	x		x
Selenium		x		x		x	x					x
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		3	1	4	3	2	5	3	2	6	0	3
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (4)		50%	25%	57%	50%	40%	63%	50%	40%	67%	0%	50%

Joliet #29 – Updated Table 5-4

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (EPRI, 2006)

		Constituents Detected during Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring [2]										
		Joliet No. 29 Generating Station										
Constituent	Constituent is an Indicator of Leachate from Ash in Impoundments [1]	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11
Antimony	Yes (Table 5-2)											
Arsenic	Yes (Table 5-2)			x	x		x	x		x		x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	X	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	X	x
Cadmium	Yes (Table 5-2)											
Chromium	Yes (Table 5-2)											
Cobalt	Yes (Table 5-2)				x					x		
Copper	Yes (Table 5-2)											
Iron				x			x			x		
Lead	Yes (Table 5-2)											
Manganese	Yes (Table 5-2)	x					x	x	x	x		
Mercury	Yes (Table 5-2)									x		
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x		x
Selenium	Yes (Table 5-2)	x		x		x	x					x
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	X	x
Zinc	Yes (Table 5-2)											
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments [3]		9	11	10	9	10	9	9	10	8	12	9
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments [4]		56%	69%	63%	56%	63%	56%	56%	63%	50%	75%	56%

Powerton – Updated Table 5-5

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (MWG site specific analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments (1)	Constituents Detected during Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring (2)															
		Powerton Generating Station															
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Arsenic			x				x	x	x			x	x	x	x	x	
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium															x		
Cobalt								x			x	X			x		
Copper					x						x						
Iron							x	x	x		x	x	x	x	x	x	
Lead											x						
Manganese		x			x	x	x	x	x	x	x	x	x	x	x	x	x
Nickel						x		x	x		x	x	x		x	x	
Selenium				x	x					x	x			x	x	x	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (3)		1	1	1	3	2	3	5	4	2	7	5	4	4	8	5	1
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments (4)		25%	25%	25%	50%	40%	50%	63%	57%	40%	70%	63%	57%	57%	73%	63%	25%

Powerton – Updated Table 5-4

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash in Impoundments [1]	Constituents Detected During Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring [2] — Powerton Generating Station															
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16
Antimony	Yes (Table 5-2)																
Arsenic	Yes (Table 5-2)		x				x	x	x			x	x	x	x	x	
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)														x		
Chromium	Yes (Table 5-2)																
Cobalt	Yes (Table 5-2)							x			x	x			x		
Copper	Yes (Table 5-2)				x						x						
Iron							x	x	x		x	x	x	x	x	x	
Lead	Yes (Table 5-2)										x						
Manganese	Yes (Table 5-2)	x			x	x	x	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)																
Nickel	Yes (Table 5-2)					x		x	x		x	x	x		x	x	
Selenium	Yes (Table 5-2)			x	x					x	x			x	x	x	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)																
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments [3]		11	11	11	9	10	11	9	10	10	7	9	10	10	8	9	11
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments [4]		69%	69%	69%	56%	63%	69%	56%	63%	63%	44%	56%	63%	63%	50%	56%	69%

Waukegan – Updated Table 5-5

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (MWG site specific analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected During Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring [2]						
		Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-07
Arsenic		x	x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x
Copper								x
Iron					x	x	x	x
Lead								x
Manganese			x	x	x	x	x	x
Nickel						x		
Selenium		x	x	x	x	x	x	
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		2	3	3	4	5	4	5
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		40%	50%	50%	57%	63%	57%	63%

Waukegan – Updated Table 5-4

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (EPRI, 2006)

Constituent	Constituent is an Indicator of Leachate from Ash in Impoundments (1)	Constituents Detected during Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring (2) – Waukegan Generating Station						
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Antimony	Yes (Table 5-2)							
Arsenic	Yes (Table 5-2)	x	x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)							
Chromium	Yes (Table 5-2)							
Cobalt	Yes (Table 5-2)							
Copper	Yes (Table 5-2)							x
Iron					x	x	x	x
Lead	Yes (Table 5-2)							x
Manganese	Yes (Table 5-2)		x	x	x	x	x	x
Mercury	Yes (Table 5-2)							
Nickel	Yes (Table 5-2)					x		
Selenium	Yes (Table 5-2)	x	x	x	x	x	x	
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)							
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments (3)		10	9	9	10	9	10	9
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments (4)		63%	56%	56%	63%	56%	63%	56%

Will County – Updated Table 5-5

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (MWG site specific analyses)

Constituent	Constituent is an Indicator of Leachate from Ash Currently Stored in Impoundments [1]	Constituents Detected During Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring [2] — Will County Generating Station									
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Arsenic			x	x		x	x	x	x	x	x
Barium	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Cobalt				x	x				x		
Iron		x	x		x		x	x	x		x
Lead			x								
Manganese		x	x	x	x	x	x	x	x	x	x
Mercury		x			x						
Nickel		x	x	x	x	x	x	x	x	x	x
Selenium		x			x	x	x	x	x	x	x
Sulfate	Yes (Table 5-1)	x	x	x	x	x	x	x	x	x	x
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [3]		5	5	4	6	4	5	5	6	4	5
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash Currently Stored in Impoundments [4]		63%	63%	57%	67%	57%	63%	63%	67%	57%	63%

Will County – Updated Table 5-4

Quarterly Groundwater Monitoring (2016-Q3 to 2017-Q2) Compared to Indicators in Impoundments/ponds (EPRI, 2006)

		Constituents Detected During Most Recent Year (2016-Q3 to 2017-Q2) of Quarterly Groundwater Monitoring (2)									
		Will County Generating Station									
Constituent	Constituent is an Indicator of Leachate from Ash in Impoundments (1)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Antimony	Yes (Table 5-2)										
Arsenic	Yes (Table 5-2)		x	x		x	x	x	x	x	x
Barium	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Boron	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Cadmium	Yes (Table 5-2)										
Chromium	Yes (Table 5-2)										
Cobalt	Yes (Table 5-2)			x	x				x		
Copper	Yes (Table 5-2)										
Iron		x	x		x		x	x	x		x
Lead	Yes (Table 5-2)		x								
Manganese	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Mercury	Yes (Table 5-2)	x			x						
Nickel	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Selenium	Yes (Table 5-2)	x			x	x	x	x	x	x	x
Sulfate	Yes (Table 5-2)	x	x	x	x	x	x	x	x	x	x
Zinc	Yes (Table 5-2)										
Number of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments (3)		9	9	8	8	8	9	9	8	8	9
Percentage of Observed Constituents that are not Consistent with Indicators of Leachate from Ash in Impoundments (4)		56%	56%	50%	50%	50%	56%	56%	50%	50%	56%

ATTACHMENT E

Excerpts of Exhibit 268P, NRG Energy, Annual and Quarterly Groundwater Monitoring Results, Fourth Quarter 2014, Waukegan Generating Station, Ash Impoundments, Table 2 (Jan. 22, 2015)

NRG Energy
401 E. Greenwood Ave,
Waukegan, IL 60087

ANNUAL and QUARTERLY GROUNDWATER MONITORING REPORT WAUKEGAN GENERATING STATION

January 22, 2015

VIA FEDERAL EXPRESS

Ms. Andrea Rhodes
Illinois Environmental Protection Agency
Division of Public Water Supplies
MC#19
1021 North Grand Avenue East
Springfield, IL 62794-9276

Re: Annual and Quarterly Groundwater Monitoring Results – Fourth Quarter 2014
Waukegan Generating Station – Ash Impoundments
Compliance Commitment Agreement VN W-2012-00056; ID# 6281

Dear Ms. Rhodes:

The fourth quarterly groundwater sampling for 2014 has been completed for the ash pond monitoring wells located at the Midwest Generation, LLC (Midwest Generation) Waukegan Generating Station in accordance with the Compliance Commitment Agreement (CCA) with Illinois Environmental Protection Agency (IEPA) dated October 24, 2012. This quarterly monitoring report summarizes the results of the monitoring event and is also intended to serve as the Annual Report and includes historical data analysis/summaries.

Well Inspection and Sampling Procedures

The groundwater monitoring network around the ash ponds at this facility consists of seven wells (MW-01 through MW-07) as shown on Figure 1. As part of sampling procedures, the integrity of all monitoring wells was inspected and water levels were obtained using an electronic water level meter (see summary of water level discussion below). Wells MW-01 through MW-04 are completed as flush-mounts at ground surface. The concrete anchors, protector boxes and interior casings were in good condition. Wells MW-05 through MW-07 are completed with stick-up protector casings. The wells were found in good condition with locked protector casings and the concrete surface seals were intact. Well MW-05 has a slightly damaged hinge on the protective casing lid, but the hinge is still functional and the integrity of the protective casing is intact.

Groundwater samples at well locations MW-01 through MW-07 were collected using the low-flow sampling technique.

One duplicate sample (well MW-07) was collected for quality assurance purposes. In addition, a deionized water trip blank was placed with the sample bottle shipment by the laboratory and accompanied the groundwater sample bottles from and back to the laboratory. The groundwater monitoring samples and the duplicate sample were analyzed for the inorganic compounds listed in Illinois Administrative Code (IAC) 620.410(a), 620.410(d) and 620.410(e), excluding radium 226/228. The trip blank was analyzed for the volatile organic compounds (VOCs) listed in IAC 620.410(d).

Groundwater Flow Evaluation

Water level data from the most recent round of sampling along with historical water levels obtained from each well are summarized in Table 1. The water levels from the most recent sampling were used to generate a groundwater flow map which is provided on Figure 2. The water elevation data indicates a general southeasterly flow of groundwater. The flow conditions observed during this sampling are generally consistent with historical conditions reported for the site.

Relative to an annual evaluation of groundwater levels, a historical hydrograph is presented in Attachment 1. The hydrograph indicates that after a groundwater elevation low noted in 4th quarter 2012 sampling, groundwater levels at all wells have recovered approximately 2 feet overall and that water levels have stabilized. Highest water levels were associated with the spring sampling event (May 2014) and the lowest water levels were associated with the summer sampling event (August 2014) suggesting some seasonal variations on the order of 2 to 2.5 feet.

Summary of Analytical Data

A copy of the analytical data package is provided in Attachment 2. The field parameter and analytical data from the most recent sampling, along with the previous eight quarters of data, are summarized in Table 2. The duplicate sample was collected from well MW-07. The data are generally consistent with previous data generated for the site. Any exceptions are discussed in greater detail below. All wells for which the sampling data reports a value above one or more groundwater standards are located within the area of the approved Environmental Land Use Control (ELUC).

At this time a statistical evaluation of background water quality for comparing against downgradient wells has not been completed. Data from the initial anticipated background well installation (MW-05) indicated impacts that are not associated with the ash ponds at the site and therefore, IEPA does not recognize the water quality data from this well as representative of background. A new potential background monitoring well (MW-06) has been installed and is included within the quarterly sampling. An initial review of the MW-06 data suggests that this well location may provide a representative background water quality with which to perform a statistical evaluation, however there are some detections of boron above the Class I standard which may be originating from off-site. In general, a minimum of eight quarters of data are required to provide a meaningful statistical analysis of background water quality. The exact nature of the statistics that will be required by IEPA is still in the process of being finalized.

Relative to an annual evaluation of the water chemistry data, time versus concentration curves are provided in Attachment 3 for each parameter analyzed. The curves include the Class I drinking water standard for reference, where appropriate. The following noteworthy observations are made for 2014:

- Arsenic detections at well MW-01 are consistently higher than at the other well locations. The arsenic concentration at this well has been overall decreasing since the 2nd quarter 2011 sampling, however a spike in concentration is noted for the 4th quarter 2014. The nature of this spike will be evaluated as additional quarterly data is collected. Arsenic concentrations at the remaining wells have been overall stable.

- Boron concentrations at wells MW-05 and MW-07 are consistently higher than at the other locations. Well MW-05 is immediately upgradient of the ash ponds and MW-07 is slightly sidegradient and to the south. This suggests that the elevated boron concentrations at these locations are not associated with the subject ash ponds.

- Chloride concentration curves are overall stable with the exception of well MW-05 where some temporal scatter is apparent. In 2013, there was spike in chloride concentrations at this well location which have subsequently diminished to below the Class I groundwater standard in the 4th quarter 2013 sampling and throughout 2014.

- There was some variability in iron concentrations at wells MW-05 and MW-06 over 2014 with overall increasing trends at these locations. Both of these wells are upgradient of the ash ponds being monitored. Well MW-07 consistently shows dissolved iron concentrations higher than the remaining wells, however with an overall decreasing trend.

- Wells MW-05, MW-06 and MW-07 were the only wells with detections of dissolved manganese above the groundwater standard since the 3rd quarter 2011 sampling. Manganese concentrations at all other locations appear fairly stable and are generally below the comparison standard.

- Wells MW-05 and MW-07 are the only wells with historic detections of dissolved sulfate above the comparison groundwater standard. The remaining sulfate concentrations appear to be fairly stable over the last year.

- Wells MW-05 and MW-07 are the only wells with historic detections of Total Dissolved Solids (TDS) above the comparison groundwater standard. The concentrations at these wells and the remaining wells appear overall stable with the exception of a non-reproducible spike in TDS at well MW-05 in the 2nd quarter 2013.

- The 4th quarter sampling for vanadium at well MW-01 appears to show a spike in concentration that is not consistent with historical data. Subsequent quarterly sampling will determine the nature of this spike in concentration at this location.

As noted previously, all wells for which the sampling data reports a value above one or more applicable groundwater standards are located within the area of the approved ELUC.

If there are any questions, please contact either James DiCola of NRG Energy at 815-207-5968 or Richard Gnat of KPRG at 262-781-0475.

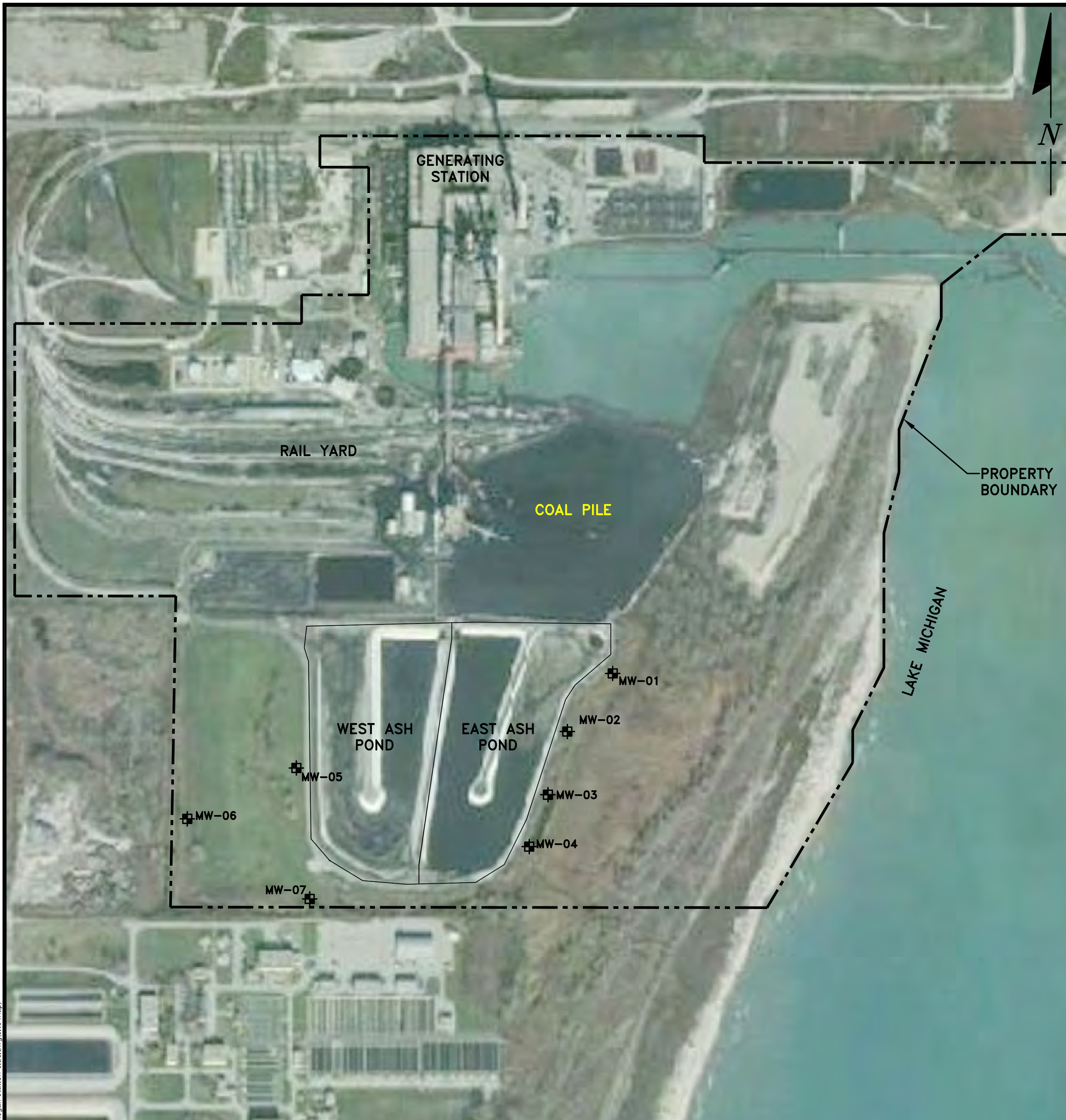
Sincerely,

Mark Nagel
Station Manager

Attachments

cc: William Buscher, IEPA
Fred Veenbaas, NRG Energy
James DiCola, NRG Energy
Elizabeth Quirk-Hendry, NRG Energy
Richard Gnat, KPRG and Associates, Inc.

FIGURES



NOTE:
BACKGROUND MAP RETRIEVED FROM MAPQUEST 2012

LOCATION:
SECTION 15, TOWNSHIP 45 N, RANGE 12 E

W:\c-p&p\projects\midwest generation\ash pond issues\eluc & gmz\waukegan station eluc.dwg(site map)

ENVIRONMENTAL CONSULTATION & REMEDIATION

KPRG

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414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

SITE MAP

WAUKEGAN STATION
WAUKEGAN, ILLINOIS

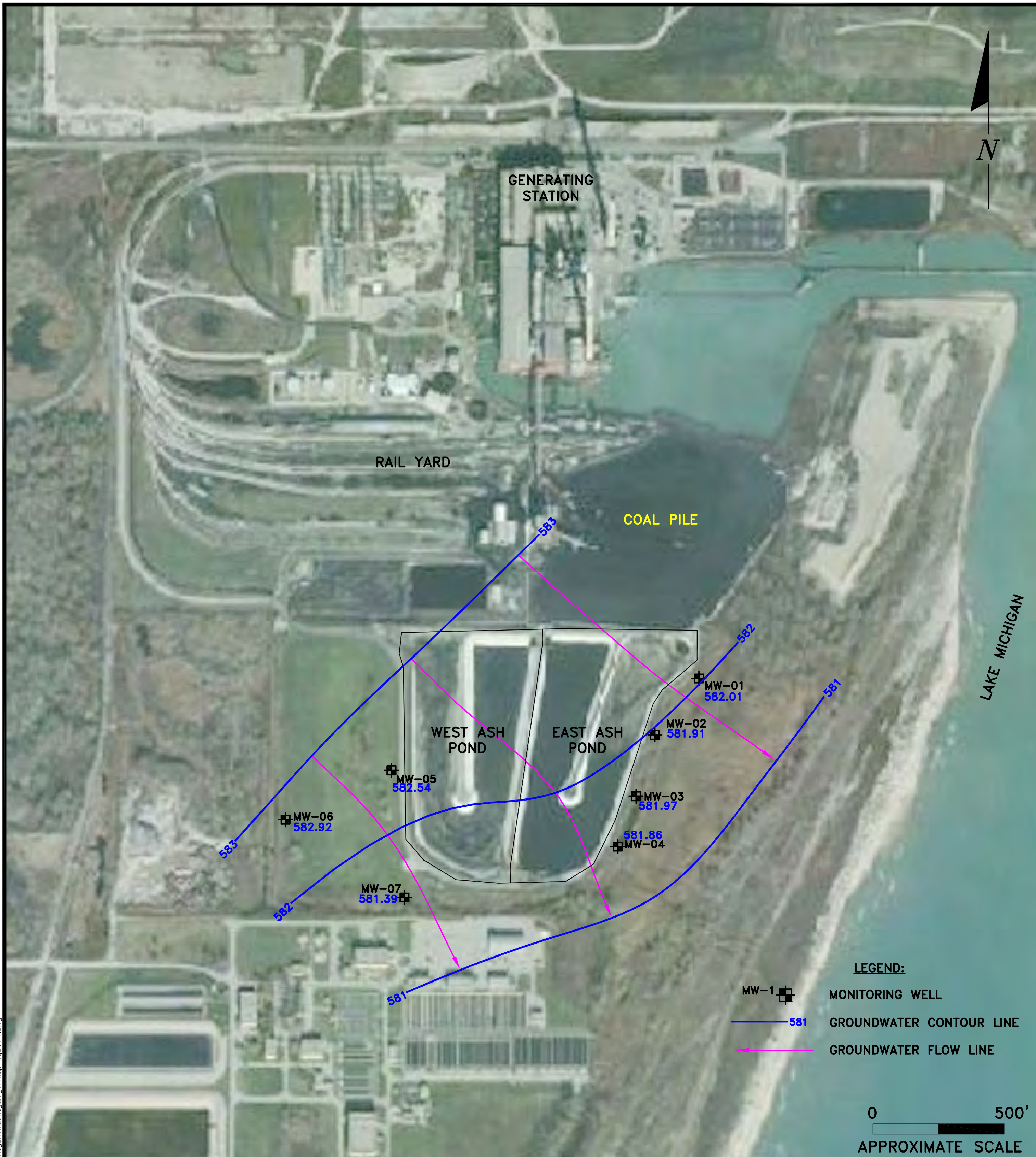
Scale: 1" = 500'

Date: January 23, 2015

MWG13-15_45333

KPRG Project No. 12313.2

FIGURE 1



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

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GROUNDWATER CONTOUR MAP 10/2014

WAUKEGAN STATION
WAUKEGAN, ILLINOIS

Scale: 1" = 500'	Date: January 23, 2015
KPRG Project No. 12313.2	FIGURE 2

MWG13-15_45334

TABLES

Table 1. Groundwater Elevations - Midwest Generation, LLC, Waukegan Station, Waukegan, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Ground Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Sampling Groundwater Elevation (ft above MSL)	Bottom of Well Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Sampling Depth to Groundwater (ft below TOC)	Depth to Bottom of Well (ft below TOC)
MW-01	6/13/2011	603.14	603.46	583.34	583.33	570.96	19.80	19.81	32.18
	9/13/2011	603.14	603.46	581.14	581.14	570.96	22.00	22.00	32.18
	12/6/2011	603.14	603.46	581.15	581.15	570.96	21.99	21.99	32.18
	3/14/2012	603.14	603.46	581.18	581.18	570.96	21.96	21.96	32.18
	6/18/2012	603.14	603.46	580.86	580.86	570.96	22.28	22.28	32.18
	9/28/2012	603.14	603.46	579.65	579.65	570.96	23.49	23.49	32.18
	12/19/2012	603.14	603.46	579.42	579.42	570.96	23.72	23.72	32.18
	3/7/2013	603.14	603.46	580.35	580.35	570.96	22.79	22.79	32.18
	6/6/2013	603.14	603.46	582.38	582.31	571.30	20.76	20.83	31.84
	7/25/2013	603.14	603.46	581.40	581.36	571.30	21.74	21.78	31.84
	11/4/2013	603.14	603.46	581.32	581.31	571.30	21.82	21.83	31.84
	3/10/2014	603.14	603.46	581.94	581.96	571.30	21.20	21.18	31.84
	5/16/2014	603.14	603.46	583.07	583.09	571.30	20.07	20.05	31.84
	8/21/2014	603.14	603.46	581.81	581.82	571.30	21.33	21.32	31.84
	11/6/2014	603.14	603.46	582.01	582.01	571.30	21.13	21.13	31.84
MW-02	6/13/2011	603.04	603.28	583.31	583.31	573.48	19.73	19.73	29.56
	9/13/2011	603.04	603.28	581.19	581.19	573.48	21.85	21.85	29.56
	12/6/2011	603.04	603.28	581.22	581.22	573.48	21.82	21.82	29.56
	3/14/2012	603.04	603.28	581.23	581.21	573.48	21.81	21.83	29.56
	6/18/2012	603.04	603.28	580.89	580.89	573.48	22.15	22.15	29.56
	9/28/2012	603.04	603.28	579.73	579.73	573.48	23.31	23.31	29.56
	12/19/2012	603.04	603.28	579.27	579.27	573.48	23.77	23.77	29.56
	3/7/2013	603.04	603.28	580.50	580.50	573.48	22.54	22.54	29.56
	6/6/2013	603.04	603.28	582.34	582.34	573.48	20.70	20.70	29.56
	7/25/2013	603.04	603.28	581.34	581.33	573.48	21.70	21.71	29.56
	11/4/2013	603.04	603.28	581.23	581.23	573.48	21.81	21.81	29.56
	3/10/2014	603.04	603.28	581.84	581.84	573.48	21.20	21.20	29.56
	5/15/2014	603.04	603.28	582.95	582.95	573.48	20.09	20.09	29.56
	8/21/2014	603.04	603.28	581.76	581.76	573.48	21.28	21.28	29.56
	11/6/2014	603.04	603.28	581.91	581.91	573.48	21.13	21.13	29.56
MW-03	6/13/2011	602.90	603.18	583.34	583.34	573.06	19.56	19.56	29.84
	9/13/2011	602.90	603.18	581.18	581.18	573.06	21.72	21.72	29.84
	12/6/2011	602.90	603.18	581.22	581.22	573.06	21.68	21.68	29.84
	3/14/2012	602.90	603.18	581.22	581.22	573.06	21.68	21.68	29.84
	6/18/2012	602.90	603.18	580.92	580.92	573.06	21.98	21.98	29.84
	9/28/2012	602.90	603.18	579.68	579.68	573.06	23.22	23.22	29.84
	12/19/2012	602.90	603.18	579.45	579.45	573.06	23.45	23.45	29.84
	3/7/2013	602.90	603.18	580.49	580.49	573.06	22.41	22.41	29.84
	6/6/2013	602.90	603.18	582.38	582.36	573.10	20.52	20.54	29.80
	7/25/2013	602.90	603.18	581.41	581.39	573.10	21.49	21.51	29.80
	11/4/2013	602.90	603.18	581.29	581.29	573.10	21.61	21.61	29.80
	3/10/2014	602.90	603.18	581.88	581.89	573.10	21.02	21.01	29.80
	5/16/2014	602.90	603.18	583.02	583.04	573.10	19.88	19.86	29.80
	8/21/2014	602.90	603.18	581.87	581.85	573.10	21.03	21.05	29.80
	11/6/2014	602.90	603.18	581.97	581.98	573.10	20.93	20.92	29.80
MW-04	6/13/2011	603.15	603.53	583.35	583.35	573.30	19.80	19.80	29.85
	9/13/2011	603.15	603.53	581.19	581.19	573.30	21.96	21.96	29.85
	12/6/2011	603.15	603.53	581.23	581.23	573.30	21.92	21.92	29.85
	3/14/2012	603.15	603.53	581.20	581.20	573.30	21.95	21.95	29.85
	6/18/2012	603.15	603.53	580.88	580.88	573.30	22.27	22.27	29.85
	9/28/2012	603.15	603.53	579.55	579.55	573.30	23.60	23.60	29.85
	12/19/2012	603.15	603.53	579.34	579.34	573.30	23.81	23.81	29.85
	3/7/2013	603.15	603.53	580.36	580.36	573.30	22.79	22.79	29.85
	6/6/2013	603.15	603.53	582.38	582.30	573.57	20.77	20.85	29.58
	7/25/2013	603.15	603.53	581.33	581.27	573.57	21.82	21.88	29.58
	11/4/2013	603.15	603.53	581.13	581.13	573.57	22.02	22.02	29.58
	3/11/2014	603.15	603.53	581.87	581.87	573.57	21.28	21.28	29.58
	5/16/2014	603.15	603.53	583.11	583.11	573.57	20.04	20.04	29.58
	8/21/2014	603.15	603.53	581.69	581.68	573.57	21.46	21.47	29.58
	11/6/2014	603.15	603.53	581.86	581.88	573.57	21.29	21.27	29.58
MW-05	6/13/2011	604.84	601.53	584.55	584.56	572.92	20.29	20.28	31.92
	9/13/2011	604.84	601.53	582.66	582.64	572.92	22.18	22.20	31.92
	12/6/2011	604.84	601.53	582.82	582.82	572.92	22.02	22.02	31.92
	3/14/2012	604.84	601.53	582.98	582.98	572.92	21.86	21.86	31.92
	6/18/2012	604.84	601.53	582.22	582.22	572.92	22.62	22.62	31.92
	9/28/2012	604.84	601.53	581.13	581.13	572.92	23.71	23.71	31.92
	12/19/2012	604.84	601.53	580.65	580.65	572.92	24.19	24.19	31.92
	3/7/2013	604.84	601.53	582.18	582.18	572.92	22.66	22.66	31.92
	6/6/2013	604.84	601.53	583.44	583.44	572.92	21.40	21.40	31.92
	7/25/2013	604.84	601.53	582.60	582.59	572.92	22.24	22.25	31.92
	11/5/2013	604.84	601.53	582.03	582.04	572.92	22.81	22.80	31.92
	3/11/2014	604.84	601.53	582.88	582.88	572.92	21.96	21.96	31.92
	5/16/2014	604.84	601.53	583.71	583.72	572.92	21.13	21.12	31.92
	8/21/2014	604.84	601.53	582.36	582.32	572.92	22.48	22.52	31.92
	11/5/2014	604.84	601.53	582.54	582.55	572.92	22.30	22.29	31.92

Table 1. Groundwater Elevations - Midwest Generation, LLC, Waukegan Station, Waukegan, IL

Well ID	Date	Top of Casing (TOC) Elevation (ft above MSL)	Ground Elevation (ft above MSL)	Groundwater Elevation (ft above MSL)	Sampling Groundwater Elevation (ft above MSL)	Bottom of Well Elevation (ft above MSL)	Depth to Groundwater (ft below TOC)	Sampling Depth to Groundwater (ft below TOC)	Depth to Bottom of Well (ft below TOC)
MW-06	12/19/2012	589.73	586.75	580.89	580.89	572.03	8.84	8.84	17.70
	3/7/2013	589.73	586.75	582.63	582.63	572.03	7.10	7.10	17.70
	6/6/2013	589.73	586.75	583.58	583.54	572.03	6.15	6.19	17.70
	7/25/2013	589.73	586.75	582.71	582.71	572.03	7.02	7.02	17.70
	11/5/2013	589.73	586.75	582.71	582.71	572.03	7.02	7.02	17.70
	3/10/2014	589.73	586.75	583.83	583.84	572.03	5.90	5.89	17.70
	5/15/2014	589.73	586.75	584.56	584.56	572.03	5.17	5.17	17.70
	8/21/2014	589.73	586.75	582.70	582.70	572.03	7.03	7.03	17.70
	11/5/2014	589.73	586.75	582.92	582.91	572.03	6.81	6.82	17.70
MW-07	12/19/2012	598.29	595.87	579.57	579.57	570.33	18.72	18.72	27.96
	3/7/2013	598.29	595.87	580.83	580.83	570.33	17.46	17.46	27.96
	6/6/2013	598.29	595.87	582.61	582.60	570.39	15.68	15.69	27.90
	7/25/2013	598.29	595.87	581.28	581.27	570.39	17.01	17.02	27.90
	11/4/2013	598.29	595.87	580.80	580.80	570.39	17.49	17.49	27.90
	3/10/2014	598.29	595.87	582.04	582.10	570.39	16.25	16.19	27.90
	5/15/2014	598.29	595.87	584.35	584.35	570.39	13.94	13.94	27.90
	8/21/2014	598.29	595.87	581.13	581.14	570.39	17.16	17.15	27.90
	11/5/2014	598.29	595.87	581.39	581.40	570.39	16.90	16.89	27.90

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-01	Date	12/19/2012		3/7/2013		6/7/2013		7/25/2013		11/4/2013		3/10/2014		5/16/2014		8/21/2014		11/6/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.091	0.0010	0.098	0.0010	0.036	0.0010	0.055	0.0010	0.046	0.0010	0.031	0.0010	0.036	0.0010	0.019	0.0010	0.21
Barium	2.0	0.0025	0.013	0.0025	0.033	0.0025	0.052	0.0025	0.040	0.0025	0.065	0.0025	0.031	0.0025	0.025	0.0025	0.032	0.0025	0.0094
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	1.9	0.50	2.2	0.50	2.2	0.50	2.3	0.25	3.1	0.25	1.9	0.050	2.0	0.25	2.0	0.50	2.2
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	48	2.0	45	2.0	34	2.0	42	2.0	28	2.0	33	2.0	31	10	79	2.0	70
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	0.0022	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0024
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	0.013	0.010	0.029	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.41 ^	0.10	0.50	0.10	0.41	0.10	0.45	0.10	0.28	0.10	0.27	0.10	0.46	0.10	0.76	0.10	0.56
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	ND	0.0025	0.0047	0.0025	0.011	0.0025	0.011	0.0025	0.021	0.0025	0.0073	0.0025	ND	0.0025	0.026	0.0025	0.0054
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	1.0	0.10	0.10	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.10	1.1	0.10	0.10	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	0.055	0.020	ND	0.020	0.058	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.024	0.020	0.078
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	10.47	NA	9.85	NA	8.37	NA	8.81	NA	8.42	NA	8.99	NA	8.88	NA	7.92	NA	10.54
Selenium	0.05	0.0025	ND	0.0025	0.056	0.0025	0.043	0.0025	0.031	0.0025	0.013	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.035
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	200	50	250	100	260	100	300	50	260	50	130	50	170	50	130	50	270
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	460	10	510	10	660	10	580	10	580	10	290	10	300	10	460	10	450
Vanadium	0.049	0.0050	0.026	0.0050	0.018	0.0050	0.056	0.0050	0.042	0.0050	0.0067	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.49
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	14.17	NA	12.8	NA	12.94	NA	14.93	NA	13.41	NA	13.79	NA	9.41	NA	16.04	NA	11.91
Conductivity	NA	NA	0.53	NA	0.60	NA	0.655	NA	0.65	NA	0.51	NA	0.41	NA	0.36	NA	0.638	NA	0.616
Dissolved Oxygen	NA	NA	0.45	NA	0.36	NA	0.39	NA	0.28	NA	0.55	NA	1.21	NA	1.46	NA	0.43	NA	1.75
ORP	NA	NA	-205	NA	-98.2	NA	-109.4	NA	-133.6	NA	-213.3	NA	-98.4	NA	42.7	NA	22.7	NA	-37.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

MWG13-15_45338

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-02	Date	12/19/2012		3/7/2013		6/7/2013		7/25/2013		11/4/2013		3/10/2014		5/15/2014		8/21/2014		11/6/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.0089	0.0010	0.012	0.0010	0.0090	0.0010	0.0087	0.0010	0.0091	0.0010	0.0085	0.0010	0.0062	0.0010	0.0081	0.0010	0.0095
Barium	2.0	0.0025	0.016	0.0025	0.020	0.0025	0.021	0.0025	0.026	0.0025	0.028	0.0025	0.046	0.0025	0.086	0.0025	0.029	0.0025	0.029
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	1.9	0.50	2.2	0.50	1.9	0.50	2.1	0.25	2.2	0.25	2.8	0.25	2.6	0.25	3.0	0.50	3.0
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	54	2.0	50	2.0	52	2.0	47	2.0	55	2.0	51	2.0	57	2.0	47	2.0	48
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	1.3 ^	0.10	1.2	0.10	1.3	0.10	0.93	0.10	0.60	0.10	0.60	0.10	0.70	0.10	0.76	0.10	0.61
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	0.16	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.023	0.0025	0.039	0.0025	0.051	0.0025	0.069	0.0025	0.034	0.0025	0.085	0.0025	0.16	0.0025	0.050	0.0025	0.041
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	7.94	NA	8.95	NA	7.63	NA	7.61	NA	7.97	NA	8.38	NA	7.65	NA	8.13	NA	8.61
Selenium	0.05	0.0025	ND	0.0025	0.0084	0.0025	ND	0.0025	0.015	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0060	0.0025	0.0045
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	210	50	230	50	220	50	260	100	290	50	370	100	280	50	210	50	350
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	500	10	520	10	550	10	530	10	770	10	670	10	710	10	550	10	510
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.00077
Temperature	NA	NA	13.01	NA	12.2	NA	12.99	NA	14.79	NA	13.16	NA	12.72	NA	11.00	NA	15.15	NA	11.87
Conductivity	NA	NA	0.54	NA	0.62	NA	0.55	NA	0.59	NA	0.62	NA	0.72	NA	0.79	NA	0.684	NA	0.647
Dissolved Oxygen	NA	NA	0.33	NA	0.18	NA	0.32	NA	0.42	NA	0.60	NA	0.81	NA	0.79	NA	0.32	NA	0.47
ORP	NA	NA	-43	NA	-66.4	NA	-124.3	NA	-90.4	NA	-129.8	NA	-121.9	NA	-18.2	NA	-58.2	NA	-145.3

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-03	Date	12/19/2012		3/7/2013		6/7/2013		7/25/2013		11/4/2013		3/10/2014		5/15/2014		8/21/2014		11/6/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.0031	0.0010	0.0018	0.0010	0.0014	0.0010	0.0025	0.0010	0.0050	0.0010	0.0013	0.0010	0.0020	0.0010	0.0041	0.0010	0.0029
Barium	2.0	0.0025	0.011	0.0025	0.015	0.0025	0.039	0.0025	0.017	0.0025	0.015	0.0025	0.012	0.0025	0.0061	0.0025	0.012	0.0025	0.013
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.050	1.9	0.50	2.0	0.50	2.5	0.50	1.8	0.25	1.9	0.25	1.1	0.050	1.2	0.25	2.3	0.50	2.3
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	49	2.0	45	2.0	39	2.0	43	2.0	25	2.0	37	2.0	37	10	89	2.0	64
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	1.1 ^	0.10	0.99	0.10	0.48	0.10	0.83	0.10	0.63	0.10	0.74	0.10	0.57	0.10	0.55	0.10	0.65
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	0.0015
Manganese	0.15	0.0025	0.0034	0.0025	0.015	0.0025	0.0062	0.0025	0.0031	0.0025	0.0082	0.0025	0.0069	0.0025	0.0028	0.0025	0.0083	0.0025	0.0035
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	13	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.50	13	0.10	ND	0.10	ND	0.10	0.11	0.10	0.15	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	0.072	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	8.22	NA	8.55	NA	7.13	NA	7.46	NA	7.26	NA	7.38	NA	8.47	NA	7.82	NA	6.95
Selenium	0.05	0.0025	ND	0.0025	0.011	0.0025	0.067	0.0025	0.0085	0.0025	0.0045	0.0025	0.0028	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	240	50	240	100	290	100	240	50	140	50	170	25	100	50	110	50	240
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	520	10	470	10	860	10	530	10	380	10	340	10	210	10	470	10	400
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	0.0055	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	13.02	NA	12.6	NA	12.87	NA	13.95	NA	15.35	NA	11.89	NA	8.47	NA	18.83	NA	13.28
Conductivity	NA	NA	0.55	NA	0.61	NA	0.86	NA	0.580	NA	0.40	NA	0.37	NA	0.27	NA	0.600	NA	0.513
Dissolved Oxygen	NA	NA	0.27	NA	0.4	NA	0.59	NA	0.31	NA	0.54	NA	0.78	NA	0.40	NA	1.05	NA	1.43
ORP	NA	NA	17	NA	40.8	NA	-84.1	NA	0.80	NA	-128.2	NA	-78.5	NA	90.5	NA	4.2	NA	13.2

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-04	Date	12/19/2012		3/7/2013		6/6/2013		7/25/2013		11/4/2013		3/11/2014		5/16/2014		8/21/2014		11/6/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND
Arsenic	0.010	0.0010	0.0080	0.0010	0.0081	0.0010	0.0032	0.0010	0.0044	0.0010	0.0055	0.0010	0.0062	0.0010	0.0061	0.0010	0.0064	0.0010	0.0080
Barium	2.0	0.0025	0.031	0.0025	0.031	0.0025	0.049	0.0025	0.049	0.0025	0.047	0.0025	0.071	0.0025	0.053	0.0025	0.029	0.0025	0.024
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.50	2.5	0.50	2.4	0.50	2.3	0.50	2.5	0.25	2.8	0.25	3.0	0.25	2.7	0.25	1.5	0.50	1.6
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	55	2.0	50	2.0	51	2.0	42	2.0	46	2.0	41	2.0	34	2.0	33	2.0	36
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.72 ^	0.10	0.73	0.10	0.67	0.10	0.60	0.10	0.48	0.10	0.28	0.10	0.27	0.10	0.26	0.10	0.23
Iron	5.0	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.031	0.0025	0.034	0.0025	0.016	0.0025	0.024	0.0025	0.036	0.0025	0.074	0.0025	0.052	0.0025	0.046	0.0025	0.035
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	0.31	0.10	ND	0.10	0.21	0.10	0.12	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	0.31	0.10	ND	0.10	0.21	0.10	0.12	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	8.41	NA	8.93	NA	7.25	NA	7.18	NA	7.35	NA	7.99	NA	7.76	NA	7.74	NA	7.53
Selenium	0.05	0.0025	ND	0.0025	0.0043	0.0025	0.028	0.0025	0.050	0.0025	0.011	0.0025	0.0034	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	220	50	230	50	260	100	300	50	270	100	360	50	140	25	130	50	200
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	510	10	460	10	660	10	610	10	630	10	680	10	470	10	370	10	280
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	13.11	NA	11.9	NA	12.91	NA	14.1	NA	13.17	NA	10.93	NA	10.27	NA	16.85	NA	10.41
Conductivity	NA	NA	0.57	NA	0.56	NA	0.666	NA	0.70	NA	0.59	NA	0.65	NA	0.59	NA	0.43	NA	0.374
Dissolved Oxygen	NA	NA	0.07	NA	0.14	NA	0.37	NA	0.35	NA	0.37	NA	1.28	NA	0.52	NA	0.43	NA	4.55
ORP	NA	NA	-151	NA	-54.3	NA	-55.9	NA	13.7	NA	-166.2	NA	-99.2	NA	13.8	NA	-48.2	NA	-56.8

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm[c]	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-05	Date	12/19/2012		3/7/2013		6/6/2013		7/25/2013		11/5/2013		3/11/2014		5/16/2014		8/21/2014		11/5/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.011	0.0010	0.012	0.0010	ND	0.0010	0.0013	0.0010	0.0086	0.0010	0.0097	0.0010	0.0090	0.0010	0.0019	0.0010	0.0097
Barium	2.0	0.0025	0.070	0.0025	0.060	0.0025	0.045	0.0025	0.037	0.0025	0.054	0.0025	0.051	0.0025	0.036	0.0025	0.031	0.0025	0.046
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	5.0	27	5.0	33	5.0	12	5.0	29	1.0	32	2.5	31	5.0	36	5.0	35	5.0	36
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	220	2.0	68	50	600	10	210	2.0	49	2.0	45	2.0	47	2.0	47	2.0	42
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.36 ^	0.10	0.36	0.10	0.21	0.10	0.32	0.10	0.32	0.10	0.29	0.10	0.31	0.10	0.31	0.10	0.29
Iron	5.0	0.10	3.9	0.10	4.0	0.10	0.41	0.10	1.1	0.10	4.6	0.10	5.5	0.10	5.5	0.10	4.0	0.10	8.6
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.48	0.0025	0.51	0.0025	0.17	0.0025	0.44	0.0025	0.54	0.0025	0.62	0.0025	0.49	0.0025	0.65	0.0025	0.62
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	0.0026	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0020
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.45	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.10	0.45	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	0.033	0.020	ND	0.020	ND	0.020	ND	0.020	0.047	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	7.36	NA	7.33	NA	6.61	NA	6.74	NA	7.20	NA	7.64	NA	7.07	NA	7.06	NA	7.30
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	0.0037	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	250	550	250	650	250	1200	250	890	250	870	250	640	100	630	130	640	200	840
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	1800	10	1600	17	3500	10	2000	10	1600	10	1400	10	1500	10	1600	10	1500
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	12.46	NA	12.5	NA	13.12	NA	15.7	NA	13.34	NA	10.19	NA	10.13	NA	19.08	NA	11.27
Conductivity	NA	NA	1.74	NA	1.48	NA	3.118	NA	2.18	NA	1.24	NA	0.86	NA	1.33	NA	1.509	NA	1.316
Dissolved Oxygen	NA	NA	0.10	NA	0.22	NA	0.63	NA	0.50	NA	0.47	NA	1.45	NA	0.59	NA	4.09	NA	1.61
ORP	NA	NA	-101	NA	-129.7	NA	18.4	NA	22.3	NA	-107.0	NA	-94.3	NA	-28.2	NA	-80	NA	-53

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-06	Date	12/19/2012		3/7/2013		6/6/2013		7/25/2013		11/5/2013		3/10/2014		5/15/2014		8/21/2014		11/5/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.0029	0.0010	0.0019	0.0010	0.0065	0.0010	0.0096	0.0010	0.0034	0.0010	0.0017	0.0010	0.0043	0.0010	0.0083	0.0010	0.0045
Barium	2.0	0.0025	0.11	0.0025	0.088	0.0025	0.077	0.0025	0.092	0.0025	0.13	0.0025	0.012	0.0025	0.061	0.0025	0.089	0.0025	0.10
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	0.25	1.1	0.50	2.8	0.50	6.7	2.5	4.3	0.25	2.4	0.25	2.0	0.25	2.2	0.25	2.9	0.50	3.7
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	10	110	2.0	61	2.0	48	2.0	69	10	85	2.0	8.0	10	84	10	98	10	97
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	0.0015	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	0.0025	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.43 ^	0.10	0.27	0.10	0.30	0.10	0.34	0.10	0.30	0.10	0.17	0.10	0.22	0.10	0.35	0.10	0.29
Iron	5.0	0.10	2.6	0.10	2.0	0.10	6.2	0.10	16	0.10	4.1	0.10	0.19	0.10	3.0	0.10	9.2	0.10	6.7
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.21	0.0025	0.36	0.0025	0.75	0.0025	0.72	0.0025	0.44	0.0025	0.0073	0.0025	0.17	0.0025	0.38	0.0025	0.44
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	0.0039	0.0020	0.0029	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	1.1	0.10	ND	0.10	ND	0.10	0.54	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.10	1.1	0.10	ND	0.10	ND	0.10	0.54	0.10	ND	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	7.52	NA	7.42	NA	6.83	NA	6.88	NA	7.24	NA	7.94	NA	7.18	NA	7.11	NA	7.33
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.014	0.0025	ND	0.0025	0.0033	0.0025	0.0034
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	50	160	100	380	100	390	100	360	100	350	25	93	50	170	50	120	50	240
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	940	10	1100	10	1100	10	1100	10	1200	10	190	10	870	10	950	10	890
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	0.0050	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	11.32	NA	7.1	NA	9.68	NA	12.92	NA	13.14	NA	5.14	NA	8.91	NA	17.83	NA	12.69
Conductivity	NA	NA	1.05	NA	1.01	NA	0.911	NA	1.18	NA	1.10	NA	0.21	NA	0.9	NA	1.179	NA	1.092
Dissolved Oxygen	NA	NA	0.07	NA	0.33	NA	0.40	NA	0.28	NA	0.22	NA	7.07	NA	0.51	NA	0.97	NA	1.37
ORP	NA	NA	-128	NA	-99.4	NA	-72.7	NA	-109.7	NA	-126.3	NA	-9.90	NA	-36.7	NA	-116.9	NA	-94.1

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts

Table 2. Groundwater Analytical Results - Midwest Generation LLC, Waukegan Station, Waukegan, IL

Sample: MW-07	Date	12/19/2012		3/7/2013		6/6/2013		7/25/2013		11/4/2013		3/10/2014		5/15/2014		8/21/2014		11/5/2014	
Parameter	Standards	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result	DL	Result
Antimony	0.006	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND	0.0030	ND ^
Arsenic	0.010	0.0010	0.0099	0.0010	0.012	0.0010	0.010	0.0010	0.011	0.0010	0.012	0.0010	0.0096	0.0010	0.0098	0.0010	0.011	0.0010	0.0095
Barium	2.0	0.0025	0.080	0.0025	0.082	0.0025	0.082	0.0025	0.083	0.0025	0.082	0.0025	0.073	0.0025	0.089	0.0025	0.072	0.0025	0.062
Beryllium	0.004	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Boron	2.0	5.0	43	5.0	49	5.0	42	5.0	44	1.0	45	2.5	39	5.0	27	5.0	40	5.0	41
Cadmium	0.005	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Chloride	200.0	2.0	60	2.0	54	2.0	44	2.0	33	2.0	53	2.0	34	2.0	35	2.0	36	2.0	48
Chromium	0.1	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Cobalt	1.0	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND	0.0010	ND
Copper	0.65	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Cyanide	0.2	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND	0.010	ND
Fluoride	4.0	0.10	0.48	0.10	0.50	0.10	0.46	0.10	0.46	0.10	0.44	0.10	0.39	0.10	0.30	0.10	0.47	0.10	0.45
Iron	5.0	0.10	12	0.10	12	0.10	13	0.10	13	0.10	13	0.10	11	0.10	12	0.10	11	0.10	9.4
Lead	0.0075	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Manganese	0.15	0.0025	0.46	0.0025	0.49	0.0025	0.48	0.0025	0.46	0.0025	0.46	0.0025	0.46	0.0025	0.60	0.0025	0.40	0.0025	0.34
Mercury	0.002	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND	0.00020	ND
Nickel	0.1	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Nitrogen/Nitrate	10.0	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND
Nitrogen/Nitrate, Nitrite	NA	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND	0.10	ND	0.10	0.11	0.10	ND	0.10	ND
Nitrogen/Nitrite	NA	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Perchlorate	0.0049	0.004	ND	0.004	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND	0.0040	ND
pH	6.5 - 9.0	NA	7.27	NA	8.24	NA	7.09	NA	7.10	NA	7.18	NA	7.67	NA	6.89	NA	7.25	NA	7.46
Selenium	0.05	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	0.0025	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Silver	0.05	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
Sulfate	400.0	250	630	250	710	250	650	250	860	250	770	250	540	100	330	130	690	200	880
Thallium	0.002	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND	0.0020	ND
Total Dissolved Solids	1,200	10	1800	10	1800	10	1800	10	1800	10	1800	10	1600	10	1300	10	1600	10	1500
Vanadium	0.049	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND	0.0050	ND
Zinc	5.0	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND	0.020	ND
Benzene	0.005	0.0005	ND	0.0005	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND	0.00050	ND
BETX	11.705	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND	0.0025	ND
Temperature	NA	NA	12.99	NA	1.5	NA	12.46	NA	13.99	NA	12.92	NA	12.33	NA	9.89	NA	18.25	NA	13.37
Conductivity	NA	NA	1.54	NA	1.17	NA	1.385	NA	1.52	NA	1.01	NA	0.98	NA	1.26	NA	1.607	NA	1.394
Dissolved Oxygen	NA	NA	0.05	NA	0.33	NA	0.80	NA	0.28	NA	0.54	NA	1.19	NA	0.62	NA	1.18	NA	2.35
ORP	NA	NA	-129	NA	-111.6	NA	-151.7	NA	-125.8	NA	-127.7	NA	-116.8	NA	-16.9	NA	-143.6	NA	-112.5

Notes: Standards obtained from IAC, Title 35, Chapter I, Part 620, Subpart D, Section 620.410 - Groundwater Quality Standards for Class I: Potable Resource Groundwater.
All values are in mg/L (ppm) unless otherwise noted.

DL - Detection limit
NA - Not Applicable
ND - Not Detected
NM - Not Measured

NR - Not Required
NS - Not Sampled
^ - Denotes instrument related QC exceeds the control limits

Temperature	°C	degrees Celcius
Conductivity	ms/cm^c	millisiemens/centimeters
Dissolved Oxygen	mg/L	milligrams/liter
Oxygen Reduction Potential (ORP)	mV	millivolts