ILLINOIS POLLUTION CONTROL BOARD
June 20, 2019

SIERRA CLUB, ENVIRONMENTAL LAW AND POLICY CENTER, PRAIRIE RIVERS NETWORK, and CITIZENS AGAINST RUINING THE ENVIRONMENT,	)	
Complainants,	)	
v.	)	PCB 13-15
	)	(Enforcement – Water, Land)
MIDWEST GENERATION, LLC,	)	
Respondent.	)	

GREG WANNIER OF SIERRA CLUB; FAITH BUGELAND LINDSAY DUBIN OF ENVIRONMENTAL LAW AND POLICY CENTER; ABEL RUSS AND SYLVIA LAM OF ENVIRONMENTAL INTEGRITY CENTER APPEARED ON BEHALF OF COMPLAINANTS;

JENNIFER T. NIJMAN AND KRISTEN GALE APPEARED ON BEHALF OF RESPONDENT.

INTERIM OPINION AND ORDER OF THE BOARD (by K. Papadimitriu)[1]:

On October 3, 2012, Sierra Club, Environmental Law and Policy Center, Prairie Rivers Network, and Citizens Against Ruining the Environment (collectively, Environmental Groups) filed a seven-count complaint against Midwest Generation, LLC (MWG). The complaint alleges groundwater contamination and open dumping in violation of the Environmental Protection Act (Act) and Board regulations. The Environmental Groups allege that MWG discarded contaminants into the environment through the coal ash disposal ponds and historical coal ash storage sites at MWG's four electric generation stations (EGUs or Stations) in Illinois: (1) the Joliet #29 Station, in Joliet, Will County (Joliet 29); (2) the Powerton Station, in Pekin, Tazewell County (Powerton); (3) the Will County Station, in Romeoville, Will County (Will County); and (4) the Waukegan Station, in Waukegan, Lake County (Waukegan).

After partially granting and partially denying MWG's motion to dismiss, the Board held 10 days of hearings. In today's order, the Board finds that the Environmental Groups met their burden in establishing that it is more probable than not that MWG violated the Act and Board regulations as alleged in the amended complaint. Specifically, the Board finds that MWG

[1] Daniel Pauley, who externed at Chicago Legal Clinic while a law student and prior to joining the Board as a staff attorney, took no part in the Board's drafting or deliberation of any order or issue in this matter.

violated Section 12(a) of the Act at all four Stations. 415 ILCS 5/12(a) (2016). The Board finds that MWG caused or allowed discharge of coal ash constituents into groundwater at all four Stations, thereby causing exceedances of the Board's Class I antimony (Joliet 29, Will County), arsenic (Powerton, Will County), boron (Powerton, Will County, and Waukegan), sulfate (Joliet 29, Powerton, Will County, and Waukegan) and TDS (Joliet 29, Powerton, Will County, and Waukegan) GQS during 2010-2017, violating Sections 620.115, 620.301(a), and 620.405 of the Board's regulations (35 Ill. Adm. Code 620.115, 620.301(a), 620.405). 415 ILCS 5/12(a) (2016).).

The Board also finds that MWG violated Section 12(a) of the Act at all four Stations by causing or allowing discharge of contaminants into groundwater causing water pollution. Specifically, the Board finds that MWG exceeded the statewide 90th percentile levels for sulfate and boron at all four Stations between 2010 and 2017. 415 ILCS 5/12(a)(2016). The Board, however, finds no violation of Section 12(a) of the Act at Joliet 29, Powerton, and Will County during the performance of corrective actions in October 2013 under the GMZs established at those three Stations.

The Board finds that MWG also violated Section 12(d) of the Act at Powerton Station by depositing coal ash cinders directly upon the land, thereby creating a water pollution hazard. 415 ILCS 5/12(d) (2016). The Board, however, finds that the Environmental Groups did not establish violations of Section 12(d) of the Act at Joliet 29, Will County, or Waukegan Stations.

Lastly, the Board finds that MWG violated Section 21(a) of the Act at all four Stations by allowing coal ash to consolidate in the fill areas around the ash ponds and in historical coal ash storage areas. The Board finds that MWG did not take measures to remove it or prevent its leaking of contaminants into the groundwaters.

The Board finds the record is insufficient to determine the appropriate relief in this proceeding. Therefore, the Board directs the hearing officer to hold additional hearings to determine the appropriate relief.

GUIDE TO THE BOARD'S OPINION

The Board first summarizes the procedural history of this case at page 4, before providing the relevant legal background including the standard of review and applicable law at page 10. The Board then summarizes the parties' positions starting at page 15. Next, the Board makes its factual findings, both regarding the general facts relating to all four MWG Stations (page 15) and separate facts specific to each of the Stations beginning on: page 22 for Joliet 29, page 35 for Powerton, page 51 for Will County, and page 63 for Waukegan. The Board then discusses and makes its legal findings regarding the alleged violations starting 77. After summarizing its conclusions at page 92, the Board issues its order page 92.

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I. PROCEDURAL HISTORY

i. Complaint

The Environmental Groups filed a seven-count complaint on October 3, 2012 (Comp.). The complaint alleges that MWG caused open dumping and water pollution, violating Sections 12(a), 12(d) and Section 21(a) of the Act (415 ILCS 5/12(a), 12(d), 21(a) (2016)), as well as Sections 620.115, 620.301(a), 620.405 of the Board's regulations (35 Ill. Adm. Code 620.115, 620.301(a), 620.405). Counts 1-3 also alleged violations of United States Environmental Protection Agency's regulations (40 C.F.R. §§ 257.1 and 257.3-4) implementing the federal Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §§ 6901 *et seq*.). The complaint alleges that through coal ash disposal ponds at its four stations, MWG has caused or contributed to contamination of groundwater, discarded contaminants into the environment and caused water pollution and exceedances of Illinois' Class I and II Groundwater Quality Standards (GQS). The Environmental Groups ask that the Board order MWG to cease and desist from the violations, modify its coal ash disposal practices, and remediate contaminated groundwater. The complaint also calls for civil penalties on MWG.

ii. Motion to Dismiss

On November 5, 2012, MWG filed a motion to dismiss the complaint (Mot. Dis.). In the motion, MWG argues that the complaint is duplicative and frivolous because, among other things, in 2012, MWG entered into compliance commitment agreements (CCAs) with the Illinois Environmental Protection Agency (IEPA or Agency) regarding the ash ponds at each of the four Stations. Mot. Dis. at 5. MWG contended that because there is no disagreement with IEPA, the complaint fails to meet requirements of Section 31(d) of the Act (415 ILCS 5/32(d) (2016)). *Id*. MWG also moved to strike parts of counts 1-3 alleging violations of federal regulations.

iii. Stay of the Proceedings

On December 28, 2012, the Environmental Groups and MWG separately notified the Board that, due to the December 17, 2012 filing of a bankruptcy petition, this enforcement proceeding was automatically stayed under Section 362(a) of the Bankruptcy Code (11 U.S.C. § 362(a)). On February 7, 2013, the Board issued an order that acknowledged the automatic stay and granted the Environmental Groups' motion for extension of time to reply to MWG's dismissal motion. Sierra Club, PCB 13-15, slip op. at 1, 4 (Feb. 7, 2013). The Board directed parties to notify the Board within 30 days of the stay's expiration. *Id*. at 4. On May 22, 2013, the Environmental Groups filed a notice stating that on April 22, 2013, the Bankruptcy Court partially lifted the automatic stay solely to permit the Board to rule on MWG's motion to dismiss.

On October 3, 2013, the Board partially denied and partially granted MWG's motion to dismiss. Specifically, the Board partially granted the motion by striking those portions of counts 1-3 alleging violations of federal regulations. Sierra Club, PCB 13-15, slip op. at 23-25 (Oct. 3, 2013). In partially denying the motion to dismiss, the Board found that the existence of CCAs does not render the complaint frivolous or duplicative. *Id*. at 18-23, 27 (Oct. 3, 2013). The Board stated that it "never treated as an additional requirement for citizen's suits the existence of

a disagreement between the Agency and the person complained against" and that "the existence of a CCA does not preclude the filing by the People or any citizen of an enforcement action." *Id*. at 18. The Board also noted that "because a CCA resolves and is an inextricable part of a non-adjudicatory process, it is not akin to a settlement agreement in an actual enforcement proceeding." *Id*. at 22. The Board also refused to dismiss the open dumping counts as insufficiently pled. The Board rejected MWG's arguments that ash ponds cannot be open dumps because they are properly "permitted and regulated as water pollution treatment units" under MWG's NPDES permit. *Id*. at 8. The Board concluded that "Section 21(a) [of the Act] may apply to permitted or otherwise lawful facilities that improperly fail to contain waste." *Id*. at 25-27.

On January 10, 2014, the Environmental Groups filed a copy of the Bankruptcy Court's order of December 11, 2013, lifting the automatic stay as to this enforcement proceeding but prohibiting enforcement of any monetary penalty award. On January 23, 2014, the Board accepted the complaint for hearing, finding the complaint, as modified by the order striking parts of counts 1-3, neither duplicative nor frivolous. Sierra Club, PCB 13-15, slip op. at 3 (Jan. 23, 2014).

On February 19, 2014, MWG filed a motion to stay the enforcement proceeding for at least one year. MWG argued that a stay was necessary to: (1) avoid potential conflicts from the coal ash rulemaking initiated by USEPA as well as the IEPA's proposed coal ash rules; (2) allow the pending acquisition of MWG by NRG Energy, Inc. to proceed; and (3) allow continued groundwater monitoring to assess the effect of MWG's actions taken under the CCAs. MWG further asserted that no ongoing environmental harm is occurring, and a stay would not prejudice the Environmental Groups. The Environmental Groups opposed the motion. On April 17, 2014, the Board denied the stay.

On May 5, 2014, MWG filed its answer and defenses to the complaint. On May 27, 2014, the Environmental Groups filed a reply to MWG's defenses.

iv. Amended Complaint

On December 15, 2014, the Environmental Groups moved to amend the complaint, attaching a first amended complaint. The Environmental Groups stated that, during discovery, they "have become aware of additional coal ash storage, disposal, and/or fill areas at each site that may be contributing to the coal ash-related contamination alleged in the Complaint." Sierra Club, PCB 13-15, slip op. at 5 (Feb. 19, 2017). After the Environmental Groups withdrew that motion, they filed another motion to amend, and a second amended complaint on January 30, 2015. On February 19, 2015, the Board granted the Environmental Groups' motion to file the second amended complaint. *Id.* at 6. For brevity, today's order refers to the second amended complaint, as the "amended complaint" (Am. Comp.). On April 20, 2015, MWG filed its answer and defenses to the second amended complaint (MWG 2nd Ans. Def.).

v. Summary Judgment

On June 1, 2016, the Environmental Groups filed a motion for partial summary judgment regarding coal ash areas outside of the ash ponds, referred to as "Historic Ash Areas." Sierra Club, PCB 13-15, slip op. at 4 (Jan. 19, 2017). MWG responded on July 19, 2016. The Board

denied the motion on January 19, 2017. At that time, the Board found genuine issues of material facts precluding summary judgment: whether the evidence confirms the presence of coal ash in the historic ash areas; whether coal ash constituents are present at all four Stations; and whether historic ash areas are the source of contamination. The Board added that weighing competing evidence to resolve a dispute over material facts was appropriate not at summary judgment but after hearing. Sierra Club, PCB 13-15, slip op. at 5 (Jan. 19, 2017).

vi. Hearings and Testimony

The Board held two sets of hearings before Board Hearing Officer Bradley Halloran, the first from October 23 through October 27, 2017 (10/23/17 Tr. - 10/27/17 Tr.), and the second from January 29 through February 2, 2018 (1/30/18 Tr. - 2/2/18 Tr.). Hearing Officer Halloran listed all hearing exhibits admitted into evidence in his April 25, 2018 order.[2]

The Environmental Groups presented a July 2015 expert report of James R. Kunkel, Ph.D., P.E. (EG Exhs. 401, 407, 408), who testified at the hearings. Dr. Kunkel is a licensed professional civil engineer (not in Illinois) and a retired registered professional hydrologist. *See* EG Exh. 400; 10/26/17 p.m. Tr. 24-144; 10/27/17 Tr. at 87 (Kunkel Test.). He holds a Ph.D. in Hydrology and Water Resources from the University of Arizona, an M.S. in Civil Engineering from the University of Connecticut, and a B.S.C.E in Civil Engineering from St. Martin's University. *Id*. Dr. Kunkel has about 40 years of relevant professional experience. *Id*.

MWG presented an expert report on the condition of the four Stations by John Seymour (MWG Exh. 903, 901), who testified at the hearings. *See e.g*. 2/1/18 Tr. at 213-214 (Seymour Test.); MWG Statement of Facts (SOF) at 1-2 ¶¶ 8-11. Mr. Seymour is a Senior Principal at Geosyntec Consultants and a geotechnical engineering and remediation practices specialist, with about 40 years of relevant experience. MWG Exh. 900. He holds an M.S. in Geotechnical Engineering from the University of Michigan and a B.S. in Civil Engineering from Michigan Technological University. *Id*.

The following expert witnesses also testified at the hearings:

- Maria Race, MWG's Director of Federal Environmental Programs, former manager of general environmental compliance for the Stations, and former Asset Manager. 10/23/17 Tr. at 29-211; 10/24/17 Tr. at 8-32 (Race Test.); SOF at ¶ 2.
- Mark Kelly, MWG's Chemical Specialist at the Powerton Station since 1992, responsible for water related matters. 1/31/18 Tr. at 67-68 (Kelly Test.); SOF at ¶ 6.
- Richard Gnat, Principal at MWG's consultant KPRG & Associates (KPRG), which performed relevant projects at the four Stations. 10/25/17 Tr. at 39-234; 10/26/17 a.m. Tr. at 5-84; 10/26/17 p.m. Tr. at 4-22; 2/1/18 Tr. at 82-83 (Gnat Test.); SOF at ¶ 5.
- Christopher Lux, MWG's Engineering Manager at the Waukegan Station, who has worked at the Station since 1992, before MWG began operating the Station in 1999. 10/24/17 Tr. 33-172 (Lux Test.); SOF at ¶ 3.

[2] All admitted hearing exhibits are available in the Board's website (pcb.illinois.gov) in the sub-docket "PCB 2013-015Exh".

- Rebecca Maddox, former MWG Environmental Specialist at the Will County Station between 2008 and April 2015. 10/24/17 Tr. 173-315; 10/25/17 Tr. at 10-38 (Maddox Test.); SOF at ¶ 4.
- Fredrick Veenbaas, MWG's Senior Compliance Specialist at the Waukegan Station since 2012; he had been the Chemistry Systems Specialist at the Will County Station since 1999. 1/31/18 Tr. at 221-222 (Veenbaas Test.); SOF at ¶ 7.

vii. Evidentiary Appeals

After the first set of hearings, the Environmental Groups and MWG objected to certain hearing officer's evidentiary rulings. On January 25, 2018, the Board granted the parties' respective motions for interlocutory appeal and affirmed the hearing officer's rulings to exclude Environmental Groups' Exhibit 37 from the evidence and to admit the Environmental Groups' Exhibits 5.5, 6, 7, 16, 204G–209G, 210H–215H, 222J–228J, and 236L–241L. In the same order, the Board reversed the hearing officer's ruling to admit the Environmental Groups' Exhibit 261 and excluded it from the record. *See* Sierra Club, PCB 13-15, slip op. at 5 (Jan. 25, 2018).

The parties also appealed certain hearing officer's evidentiary rulings made during the second set of hearings. On April 26, 2018, the Board affirmed the hearing officer's rulings to admit MWG's Exhibit 649 and to exclude MWG's Exhibit 662. *See* Sierra Club, PCB 13-15, slip op. at 2-4 (Apr. 26, 2018).

During the hearings, the hearing officer allowed 1998 Phase I and Phase II Environmental Site Assessment reports, prepared by ENSR for the previous owner of the Stations, into evidence over MWG's objections. At the same time, the hearing officer limited the use of the exhibits to the questions asked of, and the responses elicited from, the witness. 10/23/17 Tr. at 126-127; Hearing Officer Order, PCB 13-15 (Jan. 11, 2018); EG Exhs. 17D (1998 Phase II report for the Powerton Station), 18D (Phase II Will County), 19D (Phase II Waukegan) 20D (Phase II Joliet 29), 21 (Phase I Joliet 29), and 38 (Phase I Waukegan); MWG Exhs. 632 (Phase I Powerton), and 652 (Phase I Will County).

On February 26, 2018, the Environmental Groups filed a motion, amended on March 21, 2018, asking the Board to strike parts of the expert report and related testimony and demonstrative exhibit of Mr. Seymour, MWG's expert. On March 20, 2018, MWG filed a motion for sanctions, arguing that the Environmental Groups' motion to strike was untimely and their appeal of a hearing officer ruling was meritless. On May 10, 2018, the Board denied both motions. The Board found the evidence presented by Mr. Seymour to be reliable, given his professional qualifications. The Board also found that MWG had not demonstrated any unreasonable failure by the Environmental Groups to comply with a Board procedural rule or a hearing officer order. On October 2, 2017, the parties filed joint stipulations of facts (Joint Stip.).

viii. Post-Hearing Briefs

On July 20, 2018, the Environmental Groups and MWG filed their respective post-hearing briefs (EG Br. and MWG Br.). On August 30, 2018, the parties filed their respective response briefs (Env. Gr. Rep. Br. and MWG Rep. Br.). MWG' post hearing brief includes, as

an Appendix A, MWG's "Statement of Facts" (SOF), setting forth what MWG believes are the facts established at hearing.

ix. Table of Abbreviations Used in this Opinion

"Act"	Illinois Environmental Protection Act
"Agency"	Illinois Environmental Protection Agency
"Am. Comp."	The Environmental Groups' second amended complaint, filed with the January 30, 2015 motion for leave to reply
"ASTM"	ASTM International
"CCAs"	2012 compliance commitment agreements between MWG and IEPA for each of the four Stations
"CCB"	"Coal combustion by-product" as defined in the Act (415 ILCS 5/3.135 (2016))
"CCR Rules"	USEPA's Coal Combustion Residual Rule at 40 C.F.R. Part 257 Subpart D
"C.F.R."	Code of Federal Regulations
"Proposed CCR regulations"	IEPA's rulemaking proposal in Coal Combustion Waste (CCW) Ash Ponds and Surface Impoundments at Power Generating Facilities: Proposed New 35 Ill. Adm. Code 841, R14-10
"EG. Br."	The Environmental Groups' initial post-hearing brief
"EG. Rep. Br."	The Environmental Groups' post-hearing response brief
"ELUC"	Environmental Land Use Control
"Exh."	Hearing Exhibit; due to a large variety and inconsistency of page numbering though the documents in the record, page numbers of the exhibits refer to the consecutive page number as displayed in electronic document opened in PDF; page numbers starting with "#" refer to the document bates numbers, if available.
"GMZ"	Groundwater Management Zone
"GQS"	Groundwater Quality Standards
'IDOT"	Illinois Department of Transportation
"IEPA"	Illinois Environmental Protection Agency

"Joint Stip."	The parties' October 2, 2017 Joint Agreed Stipulations
"MWG Br."	MWG's initial post-hearing brief
"MWG Rep. Br."	MWG's post-hearing response brief
"NLET"	Neutral Leaching Extraction Test
"SOF"	MWG's "Statement of Facts" attached as Appendix A to MWG's initial post-hearing brief
"Tr."	Transcript
"VN"	Violation Notice
USEPA	United States Environmental Protection Agency

II. LEGAL FRAMEWORK

1. Standard of Review

In an enforcement proceeding before the Board, the complainant must prove by a preponderance of evidence that the respondent violated the Act, Board rules, or permits. People v. Packaging Personified, Inc., PCB 04-16, slip op. at 11 (Sept. 8, 2011); People v. General Waste Services, Inc., PCB 07-45, slip. op. at 12 (Apr. 7, 2011); Nelson v. Kane County Forest Preserve, PCB 94-244, slip op. at 5 (July 18, 1996); Lefton Iron & Metal Company, Inc. v. City of East St. Louis, PCB 89-53 slip op. at 3 (Apr. 12, 1990); Industrial Salvage Inc. v. County of Marion, PCB 83-173 slip op. at 3-4, (Aug. 2, 1984) *citing* Arlington v. Water E. Heller International Corp., 30 Ill. App. 3d 631, 640, 333 N.E.2d 50, 58 (1st Dist. 1975). A proposition is proved by a preponderance of evidence when it is more probably true than not. Nelson v. Kane County Forest Preserve, PCB 94-244, slip op. at 5 (July 18, 1996); Village of South Elgin v. Waste Management of Illinois, PCB 03-106, slip op. at 2 (Feb. 20, 2003); Industrial Salvage at 4, 59, 233, 236, *citing* Estate of Ragen, 79 Ill. App. 3d 8, 13, 198 N.E.2d 198, 203 (1st Dist. 1979). Once the complainant presents sufficient evidence to make a *prima facie* case, the burden of going forward shifts to the respondent to disprove the propositions. People v. Packaging Personified, Inc., PCB 04-16, slip op. at 11 (Sept. 8, 2011).

2. Applicable Law

In this case, the Environmental Groups allege violations of Sections 12(a). 12(d), and 21(a) of the Act (415 ILCS 5/12(a), (d), 21(a) (2016)). To establish these violations, the Board and the courts set specific elements that the Environmental Groups must prove. Below are the legal standards at issue in this proceeding.

A. Water pollution

Sections 12(a) and (d) of the Act state no person shall:

> (a) Cause or threaten or allow the discharge of any contaminants into the environment in any State so as to cause or tend to cause *water pollution* in Illinois, either alone or in combination with matter from other sources, or so as to *violate regulations or standards* adopted by the Pollution Control Board under this Act.
>
> * * *
>
> (d) Deposit any contaminants upon the land in such place and manner so as to create a *water pollution* hazard. 415 ILCS 5/12(a), (d) (2016) (emphasis added).

"**Contaminant**" is defined as "any solid, liquid, or gaseous matter, any odor, or any form of energy, from whatever source." 415 ILCS 5/3.165 (2016); 35 Ill. Adm. Code 620.110. "**Waters**" are defined as "all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon this State." 415 ILCS 5/3.550 (2016). "**Water pollution**" is defined as:

> such alteration of the physical, thermal, chemical, biological or radioactive properties of any *waters* of the State, or such discharge of any contaminant into any waters of the State, as will or is likely to create a *nuisance* or render such waters *harmful* or *detrimental* or *injurious* to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate uses, or to livestock, wild animals, birds, fish, or other aquatic life. 415 ILCS 5/3.545 (2016) (emphasis added).

To find a violation of Section 12(a) of the Act, the Board must find that a contaminant was discharged, or threatened to be discharged that is likely to render waters harmful, detrimental, or injurious to public health. People v. CSX, PCB 7-16, slip op at 16 (July 12, 2007). A violation of the Board's GQS constitutes violation of Section 12(a) of the Act. International Union, at all v. Caterpillar, PCB 94-420 slip op. at 33-34 (Aug. 1, 1996).

To establish a violation of Section 12(d), evidence must demonstrate that contaminants deposited upon land are in "particular quantity and concentration . . . likely to create a nuisance or to render the waters harmful, detrimental, or injurious." Jerry Russell Bliss, Inc. v. IEPA., 138 Ill. App. 3d 699, 704 (5th Dist. 1985).

To find a violation of Section 12(d) of the Act (415 ILCS 5/12(d) (2016)), the Board must find that a contaminant is placed on land in such a place and manner as to create a water pollution hazard. CSX, PCB 7-16, slip op. at 17. If a site's hydrology and geology would allow migration of the contaminants left in the soil to groundwater, a violation of Section 12(d) is found. *Id*.

Section 620.115 of the Board's rules (35 Ill. Adm. Code 620.115) states:

> No person shall cause, threaten or allow a violation of the Act, the [Illinois Groundwater Protection Act] or regulations adopted by the Board thereunder, including but not limited to this Part. 35 Ill. Adm. Code 620.115.

Section 620.301(a) of the Board's rules (35 Ill. Adm. Code 620.301(a)) states:

a) No person shall cause, threaten or allow the release of any contaminant to a resource groundwater such that:

1) Treatment or additional treatment is necessary to continue an existing use or to assure a potential use of such groundwater; or

2) An existing or potential use of such groundwater is precluded. 35 Ill. Adm. Code 620.301(a).

Section 620.405 of the Board's rules (35 Ill. Adm. Code 620.405) states:

No person shall cause, threaten or allow the release of any contaminant to groundwater so as to cause a groundwater quality standard set forth in this Subpart to be exceeded. 35 Ill. Adm. Code 620.405.

The Act and Board rules define "**groundwater**" as "underground water which occurs within the saturated zone and geologic materials where the fluid pressure in the pore space is equal to or greater than atmospheric pressure." 415 ILCS 5/3.210; 35 Ill. Adm. Code 620.110. "**Resource groundwater"** is defined as "groundwater that is presently being, or in the future is capable of being, put to beneficial use by reason of being of suitable quality." 415 ILCS 5/3.430; 35 Ill. Adm. Code 620.110.

For the pollutants alleged in the complaints, Section 620.410 sets the following standards:

a) Inorganic Chemical Constituents
Except due to natural causes or as provided in Section 620.450, concentrations of the following chemical constituents must not be exceeded in Class I groundwater:

Constituent	Units	Standard
Antimony	mg/L	0.006
Arsenic*	mg/L	0.010
…		
Boron	mg/L	2.0
…		
Chloride	mg/L	200.0
…		
Iron	mg/L	5.0
Lead	mg/L	0.0075
Manganese	mg/L	0.15
Mercury	mg/L	0.002
…		
Nitrate as N	mg/L	10.0
…		
Selenium	mg/L	0.05
…		

Sulfate	mg/L	400.0
Thallium	mg/L	0.002
Total Dissolved Solids (TDS)	mg/L	1,200
…		

*Denotes a carcinogen. 35 Ill. Adm. Code 620.410(a).

Class I Potable Resource Groundwater include "[g]roundwater located 10 feet or more below the land surface" that meets requirements of Section 620.210. 35 Ill. Adm. Code 620.210. Class I Potable Resource Groundwater excludes groundwater specified in Sections 620.230 (Class III Special Resource Groundwater), Section 620.240 (Class IV Other Groundwater), or Section 620.250 (Groundwater Management Zone). *Id*.

Section 620.250(a) of the Board's rules specifies that:

> a) Within any class of groundwater, a groundwater management zone may be established as a three-dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site:
>
> 1) That is subject to a corrective action process approved by the Agency; or
>
> 2) For which the owner or operator undertakes an adequate corrective action in *a timely and appropriate manner* and provides a written confirmation to the Agency. Such confirmation must be provided in a form as prescribed by the Agency. 35 Ill. Adm. Code 620.250(a).

Section 620.250(b) states that a GMZ is established when conditions of subsection (a) are met and "for a period of time consistent with the action described in that subsection." 35 Ill. Adm. Code 620.250(b).

Section 620.250(c) further states:

> A groundwater management zone *expires* upon the Agency's receipt of appropriate documentation which confirms the completion of the action taken pursuant to subsection (a) and which confirms the attainment of applicable standards as set forth in Subpart D. The Agency shall review the on-going adequacy of controls and continued management at the site if concentrations of chemical constituents, as specified in Section 620.450(a)(4)(B), remain in groundwater at the site following completion of such action. The review must take place no less often than every 5 years and the results shall be presented to the Agency in a written report. 35 Ill. Adm. Code 620.250(c).

Section 620.450(a) establishes quality standards for groundwater within a GMZ. Section 620.450(a) states:

1) Any chemical constituent in groundwater within a groundwater management zone is subject to this Section.

2) Except as provided in subsections (a)(3) or (a)(4), the standards as specified in Sections 620.410, 620.420, 620.430, and 620.440 apply to any chemical constituent in groundwater within a groundwater management zone. 35 Ill. Adm. Code 620.450(a)(1)-(2).

Section 620.450(a)(3) and (4) further define standards that apply to groundwater in a GMZ before and after completion of the corrective action:

3) Prior to completion of a corrective action described in Section 620.250(a), the standards as specified in Sections 620.410, 620.420, 620.430, and 620.440 are not applicable to such released chemical constituent, provided that the initiated action proceeds in a timely and appropriate manner.

4) After completion of a corrective action as described in Section 620.250(a), the standard for such released chemical constituent is:

A) The standard as set forth in Section 620.410, 620.420, 620.430, or 620.440, if the concentration as determined by groundwater monitoring of such constituent is less than or equal to the standard for the appropriate class set forth in those Sections; or

B) The concentration as determined by groundwater monitoring, if such concentration exceeds the standard for the appropriate class set forth in Section 620.410, 620.420, 620.430, or 620.440 for such constituent, and:

i) To the extent practicable, the exceedance has been minimized and beneficial use, as appropriate for the class of groundwater, has been returned; and

ii) Any threat to public health or the environment has been minimized. 35 Ill. Adm. Code 620.450(a)(3)-(4).

Section 620.450(a)(5) specifies the actions the IEPA must take with respect to standards applicable under subsection (a)(4)(B):

> The Agency shall develop and maintain a listing of concentrations derived pursuant to subsection (a)(4)(B). This list shall be made available to the public and be updated periodically, but no less frequently than semi-annually. This listing shall be published in the Environmental Register. 35 Ill. Adm. Code 620.450(a)(5).

B. <u>Open dumping</u>

Section 21(a) of the Act states "no person shall: cause or allow the open dumping of any waste." 415 ILCS 5/21(a) (2016).

The Act defines "**open dumping**" as "the consolidation of refuse from one or more sources at a disposal site that does not fulfill the requirements of a sanitary landfill." 415 ILCS 5/3.305 (2016). "**Refuse"** is defined as "waste" (415 ILCS 5/3.385 (2016)) and "**waste**" is defined as:

> any garbage, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility or *other discarded material*, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations, and from community activities, *but does not include* solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows, or *coal combustion by-products as defined in Section 3.135*, or industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as now or hereafter amended, or source, special nuclear, or by-product materials as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 921) or any solid or dissolved material from any facility subject to the Federal Surface Mining Control and Reclamation Act of 1977 (P.L. 95-87) or the rules and regulations thereunder or any law or rule or regulation adopted by the State of Illinois pursuant thereto. 415 ILCS 5/3.535 (2016).

"**Coal combustion by-product**" (CCB) is defined as "coal combustion waste when used beneficially in any of the [ways listed in this section]." 415 ILCS 5/3.135 (2016). The Act also defines "**Coal combustion waste**" as "any fly ash, bottom ash, slag, or flue gas or fluid bed boiler desulfurization by-products generated as a result of the combustion of … coal, or … coal in combination with [other material]." 415 ILCS 5/3.140 (2016).

"**Disposal**" means "discharge, deposit, injection, dumping, spilling, leaking or placing of any waste or hazardous waste into or on any land or water or into any well so that such waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters." 415 ILCS 5/3.185 (2016).

"**Sanitary landfill**" means "a facility permitted by the Agency for the disposal of waste on land meeting the requirements of the Resource Conservation and Recovery Act, P.L. 94-580, and regulations thereunder, and without creating nuisances or hazards to public health or safety, by confining the refuse to the smallest practical volume and covering it with a layer of earth at the conclusion of each day's operation, or by such other methods and intervals as the Board may provide by regulation. 415 ILCS 5/3.445 (2016).

For a violation of Section 21(a), although knowledge is not an element of a violation, the Environmental Groups "must show that the alleged polluter has the capability of control over the pollution or that the alleged polluter was in control of the premises where the pollution occurred." Gonzalez v. Pollution Control Bd., 2011 IL App (1st) 093021, ¶ 33; People v. A.J. Davinroy Contractors, 249 Ill. App. 3d 788, 793, 618 N.E.2d 1282, 1286 (5th Dist. 1993). Property owners are responsible for the pollution on their land unless the facts establish that the

owners either "lacked the capability to control the source" or "had undertaken extensive precautions to prevent vandalism or other intervening causes." *Id*; Perkinson v. Pollution Control Bd., 187 Ill. App. 3d 689, 695, 543 N.E.2d 901, 904 (3rd Dist. 1989).

III. PARTIES' ALLEGATIONS

1. Environmental Groups' Allegations

The Environmental Groups allege that MWG violated Sections 12(a), 12(d), and 21(a) of the Act (415 ILCS 5/12(a), 12(d), 21(a) (2016)) and Sections 620.115, 620.301(a) and 620.405 of the Board's groundwater quality rules (35 Ill. Adm. Code 620.115, 620.301(a) and 620.405). Am. Comp. at 17, ¶ 51; EG Br. at 4. The Environmental Groups allege that MWG discharged contaminants into the environment "through coal ash disposal ponds, landfills, unconsolidated coal ash fills, and/or other coal ash and coal combustion waste repositories" at all four Stations. Am. Comp. at 17, ¶ 51.

The Environmental Groups allege that at "all MWG Plants coal ash can be found in onsite impoundments (or 'ash ponds') and in ash landfills and other coal ash fill areas outside of the ash ponds." EG Br. at 4. The Environmental Groups allege that MWG has owned and operated the Stations since 1999, has known about coal ash both in and outside ash ponds, and has not exercised adequate control to prevent groundwater contamination. *Id*.

Historical sites. The Environmental Groups allege that all four Stations include large onsite historical coal ash storage areas, or landfills. In support of this allegation, the Environmental Groups rely on the 1998 Phase I and Phase II reports and Dr. Kunkel's testimony and reports to establish historic locations at the four Stations. EG Br. at 26, 29, 31; EG Resp. Br. at 37; EG Exh. 20D at Fig. 2 (#23339); EG Exh. 21 at 12 (#25150); 10/26/17 p.m. Tr. at 34-36, 39, 83 (Kunkel Test.); 10/27/17 Tr. at 12, 25-26 (Kunkel Test.); 1/29/18 Tr. at 73 (Kunkel Test.); EG Exh. 401 at 2. The Environmental Groups assert that MWG employees and consultants were well aware of these areas. 10/25/17 Tr. at 81-82, 95 (Gnat Test.); 10/23/17 Tr. at 100, 103-104, 110-114, 121-122, 134-137, 226 (Race Test.); 1/29/18 Tr. at 183; 2/1/18 Tr. at 193-194; 2/2/18 Tr. at 142, 158-160, 172, 184, 192 (Seymour Test.), MWG Exh. 903 at 43.

The Environmental Groups also allege that contaminants are leaking from the berms of the ash ponds, and, that certain Stations were constructed in part with coal ash and contain ash as deep as 10-120 feet as evidenced by soil borings. EG Br. at 59 *citing* EG Exh. 14C at 19 (#7166-7174); EG Exh. 401 at 24-25, Tab. 7; 27/10/17 Tr. 24:9-26:3.

The Environmental Groups argue that historic ash caused some or all of the groundwater contamination. EG Br. at 33. They argue that MWG expert Mr. Seymour confirmed that MWG is aware of the coal-ash related constituents in the monitoring wells, noting in his testimony that "[i]t's a power plant and so there's ash-related constituents at the site. It's just that we haven't identified a specific source." 2/2/18 Tr. at 46, 158; EG Br. at 33-34. "The power plant is over 50 years old and there are many historic uses at the site that may have caused the impacts that we're seeing, and they have caused the impacts that we're seeing, and they may be related to coal ash from historic uses." *Id*. at 158-160; EG Br. at 34. The Environmental Groups also note that MWG's experts cannot rule out historic coal ash landfills as the cause of contamination

because MWG has not taken samples or borings from many of these sites, did not conduct leachate testing there, and did not monitor groundwater close to those areas. EG Br. at 34; 2/2/18 Tr. at 21, 160-165; 1/30/18 Tr. at 258-260; 10/23/17 Tr. at 77.

Coal Ash Constituents. The Environmental Groups maintain that many of the pollutants exceeding GQS are "constituents" of coal ash. Am. Comp. at 4, ¶ 11; EG Br. at 4. Boron and sulfate are primary indicators of potential coal ash. *Id*. These pollutants make groundwater unusable when "at the concentrations found in MWG's wells." Am. Comp. at 4. The Environmental Groups argue that concentrations of these pollutants present human health risk or endanger aquatic ecosystems. Am. Comp. at 4-8, ¶¶ 13-27. The Environmental Groups argue this poses a significant concern because contaminated groundwater is migrating into adjacent surface water bodies. *Id*.

Class I GQS Exceedances. The Environmental Groups assert that groundwater at the four Stations has exceeded Illinois Class I GQS for coal ash constituents since monitoring began in 2010:

1) 69 times at Joliet 29, including eight exceedances in 2016 and four exceedances in the first half of 2017 (EG Br. at 29);

2) 406 times at Powerton, including 81 exceedances in 2016 and 45 exceedances in the first half of 2017 (EG Br. at 39);

3) 443 times at Will County, including 70 exceedances in 2016 and 37 exceedances in the first half of 2017 (EG Br. at 63, App. A);

4) 396 times at Waukegan, including 87 exceedances in 2016 and 55 exceedances in the first half of 2017 (EG Br. at 52, App. A).

Background Exceedances. Additionally, the Environmental Groups contend that onsite concentrations of coal ash constituents are higher than IEPA's state wide background values (both statewide median[3] and 90th percentile) from the IEPA ambient monitoring network and are not naturally occurring. EG Br. at 29. The Environmental Groups' expert, Dr. Kunkel, explained that "there are specific Illinois ground-water quality data which are representative of background on a state-wide level for the three indicator pollutants." EG Exh. 401 at 8. Dr. Kunkel compared median concentrations of coal ash constituents in each well at Joliet 29, Will County, and Waukegan to the statewide background values developed by IEPA. Env. Br. at 21. At Powerton, Dr. Kunkel employed MW-16 as the background well. EG Exh. 401 at 8. The Environmental Groups rely on IEPA's Technical Support Document filed in R14-10 in 2013 to establish statewide median and upper-bound 90th percentile values for boron, sulfate, and other pollutants. EG Br. at 21; EG Exh. 405 at 5 (#19071).

[3] Median is determined by arranging all the data in the background dataset from highest value to lowest and taking the center value of that dataset. 2/1/18 Tr. at 103 (Gnat Test.); EG Exh. 405 at 5-9 (#19071-75). 90th percentile is a statistical representation of monitoring data expected by the Illinois EPA that indicates the level of confidence above which a value can be considered above background. If a number is above the 90th percentile level, then it can be said with 90 percent confidence that the value is above background. 2/2/18 TR. at 32-33 (Seymour Test.)

The Environmental Groups allege that, at Joliet 29, boron and sulfate concentrations exceed the median background values in all 11 monitoring wells, as well as upper-bound 90th percentile background value for boron in MW-11 and sulfate in MW-09. EG Br. at 30. At Powerton, the concentrations of boron and sulfate were exceeded in 15 downgradient wells (MW-1 through MW-15) and the upper-bound 90th percentile background values were exceeded for sulfate in nine wells (MW-4, 5, 8, 9, and 11 through 15) and boron in seven wells (MW-6, 8, and 11 through 15). EG Br. at 40-41. At Will County, boron concentrations exceed the upper-bound 90th percentile background values in all ten wells. *Id.* at 64. Although monitoring well MW-04 is the only well's whose sulfate concentration exceeded the upper-bound 90th percentile value, the sulfate concentrations in all ten wells are three to five times higher than the statewide median value. *Id.* At Waukegan, the boron and sulfate concentrations in most of the wells are higher than the statewide upper-bound 90th percentile background value and not naturally occurring. EG Br. at 53.

Dr. Kunkel noted that all four Stations' sites overlay sand and gravel or shallow bedrock aquifers that are the same aquifers from which the IEPA's background community water supply wells (CWS) are drawing water. EG Exh. 401 at 8. Dr. Kunkel further notes that the actual background median for sulfate at Powerton's background well (MW-16), which is completed in the sand and gravel aquifer, was within a few milligrams per liter of the median statewide sulfate value. Thus, Dr. Kunkel argued that the statewide median background values may be used to evaluate groundwater monitoring results even though the statewide CWS wells were not located in counties with MWG plants. 1/29/18 Tr. 83-84; EG Exh. 401 at 8.

The Environmental Groups note that MWG's expert concurred that, if the groundwater concentration is greater than the 90th percentile of the statewide background values, then the value is above the background value. EG Br. at 21 *citing* 2/2/18 Tr. at 32-33 (Seymour Test.).

GMZs and CCAs. The Environmental Groups also noted that although MWG established Groundwater Management Zones (GMZ) at the three Stations, groundwater monitoring recorded exceedances of GQS in violation of Sections 620.301(a) and 620.405, on many occasions before the GMZs were established. EG Br. at 5. No GMZ was established at the Waukegan Station. The Environments Groups also argued that MWG's four Compliance Commitment Agreements (CCAs) failed to address all possible sources of coal ash contamination because they did not address coal ash outside of the coal ash ponds. The CCAs also failed, according to the Environmental Groups, to provide for any controls to prevent contamination from any historic coal ash landfills or fill areas. EG Br. at 25-26.

2. MWG Response

MWG denied the Environmental Groups' allegations and believed that alleged exceedances are random, inconsistent, and do not show a connection to the ash ponds. MWG 2nd Ans. Def. at 23; MWG Br. at 4. MWG stated that all ash ponds are permitted under its NPDES permits as part of its wastewater treatment systems and are lined with HDPE liners. MWG 2nd Ans. Def. at 1-2; SOF ¶ 91.

Historical Sites. MWG asserted that any historical sites at the four Stations that may contain historical coal combustion debris were not created, filled, or used for storage or disposal

by MWG. MWG 2nd Ans. Def. at 22. MWG experts testified that the Phase II Reports were prepared for the previous owner of the Stations, before MWG began operating them. MWG Exh. 901 at 23 (Seymour); EG Exhs. 17D-20D; SOF at 12 ¶ 119; MWG Br. at 11. When MWG acquired the Stations, MWG assessed these historic areas and concluded, based on the Phase I and Phase II Reports, that no further remediation was necessary. MWG Resp. Br at 28; SOF ¶¶ 78-85, 121, 122, 162-165, 272, 368-370; 1/29/18 Tr. at 185, 205-207 (Race Test.). Neither USEPA nor IEPA asked MWG to investigate these areas. *Id*. MWG also noted that, between 2004 and 2015, MWG investigated and tested historic ash in fill materials at Joliet 29, Powerton, Will County, and Waukegan Stations to confirm that the historic ash met the Act's requirements for beneficial reuse. MWG Br. at 7. The results showed that the historic ash met the "CCB criteria and can be used for beneficial reuse" under 415 ILCS 5/3.135. *Id*. at 7-8.

Class I GQS Exceedances. MWG believed that no concentrations of constituents related to coal ash above the groundwater standards exist at the Joliet 29 or Powerton Stations. MWG Br. at 12. According to MWG, Seymour established that the groundwater conditions at the Stations do not pose a risk to public health or water receptors in the neighboring surface waters. MWG Br. at 29. Seymour concluded that ash ponds are not the source of the Part 620 standards exceedances. In fact, Seymour suggested that exceedances may be due to the historic contamination that remains at the site. 2/2/18 Tr. at 80.

MWG stated that, since sampling groundwater began in 2010, boron has been detected above the Class I GQS at Joliet 29 in one of the eleven wells in 2011 once and never since. MWG Br. at 9. Moreover, MWG maintained that groundwater monitoring around the known former ash area at Powerton shows no coal ash constituents above the Class I GQS. MWG Res Br. at 2. MWG's expert Seymour also stated that, based on the groundwater concentrations in the monitoring wells, no groundwater plume exists at any of the Stations, evidenced by a lack of spatial trend in the indicator constituents' concentrations in the direction of the groundwater flow. Accordingly, MWG contended that no evidence exists to indicate that the source area remaining at the site can be remediated. MWG Exh. 903 at 15, 18, 21, 23. MWG's expert, Seymour, however, admitted that key indicator constituents intermittently exceeded Class I groundwater standards. MWG Exh. 903 at 18. MWG's consultants performed Neutral Leaching Extraction Test (NLET) analyses of the bottom ash from ponds at Powerton (2007), Waukegan (2004) and Will County (2010). *Id.* at 41; MWG Exh. 901 at 8. According to Seymour, the results of the NLET analyses indicate whether the leachate in the ponds has the potential to cause groundwater impacts above the Class I groundwater standards. MWG Exh. 903 at 41. Based on the NLET results, he concluded that the leachate in ponds at all four stations does not have the potential to impact groundwater above the Class I standard. *Id*.

Mr. Seymour compared the groundwater monitoring results from 2014 with the results of the NLET analyses of the bottom ash leachate. He noted a low percentage of constituents in the monitoring wells that match leachate indicator constituents (including barium, boron, sulfate, TDS and several metals): 11-37% at Joliet 29; 5-37% at Powerton; 16-26% at Waukegan; and 21-37% at Will County. Exh. 903 at 42-43. Mr. Seymour claimed that low matching percentages show substantial and widespread mismatch between the characteristics of recent groundwater analyzed near the ash ponds and the characteristics of leachate from ash currently stored in the ash basins. *Id.* at 43. Thus, he contended that the likely sources of groundwater impacts are not the ash stored in the ash basins but, rather, historical uses of the sites and surrounding industrial sites . *Id*.

Background Exceedances. MWG also disagreed with the Environmental Groups use of statewide median background values. MWG's expert Mr. Seymour asserted that the background levels employed by the Environmental Groups are based upon monitoring data from community water supply wells that are not representative of site-specific groundwater quality. 2/2/18 Tr. at 31-32 (Seymour Test.). He maintained that it is inaccurate to consider statewide background as representative of background at the sites where upgradient monitoring data is available. Mr. Seymour maintained that background concentrations must be evaluated based upon site specific data from monitoring wells installed at upgradient site boundaries in locations without the presence of ash materials in fill. MWG Exh. 903 at 60.

Mr. Seymour also noted that the IEPA's proposed CCR regulations explain the procedure for establishing background on site specific basis. The IEPA's proposal in R14-10 specifies that the groundwater monitoring system must include wells to represent the quality of groundwater at the site not affected by activities and units (background) and sets forth requirements for establishing background. EG Exh. 405 at 25-28. Additionally, MWG's consultant, Gnat, explained why a direct comparison of the median values from a monitoring well with the statewide median value is inappropriate. He noted that a monitoring well median above the statewide median means the well median value is above the median of community water supply wells' background values and not above background itself because the statewide median has a range of median values. 2/1/18 Tr. at 105-106. Mr. Seymour agreed that the comparison, according to the IEPA, must be based upon a statistical evaluation that employs a 90 percent confidence level, (i.e. a value above the 90 percent confidence level is considered above background levels with 90 percent assurance). 2/2/18 Tr. at 32-33 (Seymour Test.).

GMZ, ELUC, and CCA Compliance. MWG argued that Illinois law does not establish strict liability for water pollution and "simply being an owner or operator of a facility is not enough to find liability in this case." MWG Br. at 4. MWG noted that it took extensive precautions, including extensive corrective actions required by the CCAs: relined ash ponds, established GMZs and ELUCs, and performed regular inspections and repairs to the ash ponds' lining. MWG Br. at 3, 4. MWG believed that the law "is clear that a party does not cause or allow contamination if it took extensive precautions, as MWG did." MWG Br. at 4. MWG established ELUCs under 35 Ill. Adm. Code 742.1010 at Powerton, Will County, and Waukegan. MWG Br. at 29; SOF 646. An ELUC "is another institutional control tool in which a designated parcel of land has certain use restrictions, such as not allowing the placement of any potable water wells within the area." MWG Br. at 29; SOF 647.

MWG, further, argued that, because it performed all measures required by the IEPA, even if the Board finds violations of the Act, "no penalty or other response is warranted, and no further proceedings are warranted." MWG Br. at 5. MWG maintained that the Board may not grant relief requested by the Environmental Groups to modify MWG coal ash disposal practices and to remediate contamination because it has no enforcement powers and cannot grant injunctive relief. MWG 2nd Ans. Def. at 23.

MWG also asserted the following affirmative defenses:

I. MWG did not violate Board's Class I GQS[4] standards and Sections 620.301(a) and 620.405 because the groundwater at the Stations is within the GMZ which, under Section 620.450(a)(3), is exempt from those standards; and

II. There is no nuisance, harm or injury to public health, safety or welfare at or around the Stations because of low level of constituents in the groundwater and absence of human and environmental receptors. MWG 2nd Ans. Def. at 24-26 ¶¶ 82-97; 2/1/18 Tr. at 107.

IV. FACTS

1. General Facts Applicable to all Stations

x. Coal Ash and Constituents

The parties agreed that coal combustion for electricity generation creates two types of coal ash - fly ash and bottom ash. Joint Stip. at 4; MWG Br. at 6; 10/26/18 Tr. p.m. at 31 (Kunkel Test.). While fly ash consists of lightweight particles that go up the stack, the bottom ash consists of heavy particles that fall to the bottom of the furnace. Bottom ash is mixed with water, then removed by transporting out of the plant through a pipe to the ash ponds or a settling basin. MWG Br. at 6; EG Br. at 18; 2/1/18 Tr. at 7 (Veenbaas Test.); 10/26/18 Tr. p.m. at 31 (Kunkel Test.); *see also* EG Exh. 43; 10/24/17 Tr. at 38. "Slag" is a form of bottom ash that is a bi-product of coal combustion. 10/23/17 Tr. at 128 (Race Test.); 10/24/17 Tr. at 38, 179 (Lux Test.). The terms "coal ash" and "slag" are used interchangeably in the record by the parties and experts to refer to bottom ash.

Constituents found in the bottom ash depend on the source of coal and the combustion process. 10/23/17 Tr. at 13. The parties agreed that all four MWG Stations burned the same coal in a similar manner, thus the resulting coal ash from each Station possessed similar constituents. Joint Stip. at 4; MWG Br. at 6; 10/27/18 Tr. at 177 (Kunkel Test., noting that he heard that "there may have been some Illinois coal mixed in with the coal from one of the plants"); 2/1/18 Tr. at 266 (Seymour Test.); MWG Exh. 903 at 41 (Seymour Test.).

The parties agreed that boron and sulfate are typical indicators of coal ash and are constituents typically found in bottom ash. Env. Gr. Br at 4, 17, 28 and MWG Br. at 6. Coal ash indicators may also include other contaminants recognized by the USEPA in 40 CFR 257, App. III, such as, calcium, chloride, fluoride, pH, and total dissolved solids (TDS). Env. Gr. Br at 17, 20 and MWG Br. at 6. Environmental Groups note that 40 CFR 257, Appendix IV, also lists antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, thallium, and radium.

The Environmental Group's expert Dr. Kunkel noted that coal ash leachate is characterized by one or more of the following constituents: boron, molybdenum, lithium, sulfate, bromide, potassium, sodium, fluoride, chloride, or calcium. EG Exh. 401 at 7. However, boron,

[4] MWG refers to 35 Ill. Adm. Code 620.410, 620.420, 620.430 and 620.440. *See* MWG 2nd Ans. Def. at 25 ¶ 86.

manganese, sulfate, and TDS were chosen as indicators of GW contamination from coal ash ponds. *Id*. Dr. Kunkel stated that it is highly unlikely that the combination of boron, sulfate, and manganese in concentrations above groundwater standards or background water quality concentrations beneath or down-gradient from ash ponds would be caused by any source other than coal ash. *Id.* MWG's expert concurred that indicator constituents for coal ash in MWG's ash ponds, at a minimum, include barium, boron, and sulfate; and may also include antimony, arsenic, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, and zinc. MWG Exh. 901 at 21-25.

xi. Hydrogeological Assessment and 2012 Violation Notices

In 2010 MWG agreed to the IEPA's request to perform hydrogeological assessments around the ash ponds at the four Stations, even though MWG believed it "was under no legal obligation to do so." EG Exh. 8B at 1; MWG Answer and Defenses 5/5/14 at 21; MWG Br. at 3; EG Exhs. 12C, 13C, 14C, and 15C.

Upon completion of the assessments, on June 11, 2012, the IEPA issued Violation Notices (VN) to MWG under Section 31(a)(1) of the Act (415 ILCS 5/31(a)(1) (2016)), alleging violation of groundwater quality standards at all four Stations. MWG 2nd Ans. Def. at 4, 22; Joint Stip. at 4. The VNs alleged violations of Section 12 of the Act (415 ILCS 5/12 (2016)) and Sections 620.115, 620.301, 620.401, 620.405 and 620.410 of the Board's regulations (35 Ill. Adm. Code 620.115, 620.301, 620.401, 620.405, 620.410). EG Exhs. 3A, 4A. VNs alleged that "operations at ash impoundments have resulted in violations of Groundwater Quality Standards" between 2010 - 2012. *Id*.

xii. CCAs for All Four Stations

On July 27, 2012, MWG responded to the IEPA by requesting a meeting to discuss the VNs and included a proposed Compliance Commitment Agreements (CCA) for each of the four Stations. EG Exhs. 8B and 9B. MWG did not admit to any alleged violations and disagreed with the VNs. MWG argued that the VNs provided no information as to why the IEPA concluded that the ash ponds caused alleged groundwater impacts. EG Exhs. 8B at 2 and 9B at 2. "[A]lleged violations in the VN are based solely on the results of the hydrologic assessment" which "do not show that the coal ash ponds at the [Stations] are impacting the groundwater and do not provide the necessary evidence to support the alleged violations." *Id*. On August 14, 2012, the IEPA met with MWG to discuss the VNs. MWG Exh. 622 at 1. In August and September 2012, the IEPA received MWG's supplemental response to the VNs at the four Stations; MWG's supplemental response proposed revised terms for four CCAs based upon the August 14th discussions. MWG Exhs. 626 at 3; 624 at 2; 625 at 1; 622 at 1; 623 at 1.

On October 24, 2012, MWG entered into separate CCAs with IEPA with respect to the four Stations. MWG 2nd Ans. Def. at 24. The CCAs stated that, "pursuant to [VNs] the Illinois IEPA contends that Respondent has violated" Section 12 of the Act (415 ILCS 5/12 (2016)) and Sections 620.115, 620.301, 620.401, 620.405, and 620.410 (35 Ill. Adm. Code 620.115, 620.301, 620.401, 620.405, 620.410). MWG Exhs. 626 at 2 ¶ 3; 636 at 2 ¶ 3; 656 at 2 ¶ 3; 647 at 2 ¶ 3.

xiii. Groundwater Monitoring

In 2010 MWG installed groundwater monitoring wells around the ash ponds at the four Stations. The wells were screened to ensure collection of representative groundwater samples from the uppermost aquifer. EG Exh. 12C at 4. Beginning in the fourth quarter of 2010, MWG undertook a quarterly sampling program. MWG Exh. 809. The groundwater samples were analyzed for 35 parameters. *Id*. These parameters included the indicator constituents associated with coal ash. MWG Br. at 6. The quarterly monitoring reports, included in the record, for all four Stations provide results from December 2010 through April 2017 for 35 parameters, including antimony, arsenic, boron, manganese, and other indicator constituents associated with coal ash. MWG Exh. 809-812; s*ee also* EG Br. at 17 and App. A; MWG Br. App. A/SOF ¶¶508, 509, 520-523, 526, 528.

2. Joliet 29

A. Uncontested Facts

xiv. The Station

MWG leases and operates Joliet 29 Electric Generating Station, located in Joliet, Will County (Joliet 29). Joint Stip. at 1; MWG 2nd Ans. Def. at 1; 1/29/18 Tr. at 178-179 (Race Test.). The Station is located in a primarily industrial area, bordered on the west by a former Caterpillar, Inc. manufacturing facility. 1/29/18 Tr. at 179 (Race Test.). The north side of Joliet 29 is bordered by Channahon Road (East James St), beyond which are Illinois and Michigan Canal Trail, industrial facilities, and neighborhoods of Rockdale. 1/29/18 Tr. at 179-180 (Race Test.). The east side is bordered by Brandon Road, and the south side is bordered by the Des Plaines River. 1/29/18 Tr. 179-180 (Race test); MWG Exh. 667 at 2; EG Exh. 20D at 28 (Fig.1); MWG Exh. 246M at 4 (Fig.1); SOF at 8 ¶ 68, 69, 73; 10/26/17 Tr. A.m. at 36-37 (Gnat Test.).

The Station has operated since the mid-1960s. EG Exh. 201 at 2-4 (#24265-24267); EG Exh. 242 at 7; MWG Exh. 663 at 1; MWG Exh. 901 at 14; 1/29/18 Tr. at 182 (Race Test.). MWG operated the Station as a coal-fired plant from 1999 until March 18, 2016, when it ceased burning coal. Joint Stip. at 1-2; SOF ¶ 67; 1/29/18 Tr. at 186 (Race Test.). On May 26, 2016, Joliet 29 began generating electricity with natural gas. Joint Stip. at 2; MWG Br. at 11; SOF at ¶ 67; 1/29/18 Tr. at 186 (Race Test.). Joliet 29 Station burned subbituminous coal from Wyoming's Power River Basin until it ceased burning coal for electricity generation. Joint Stip. at 4.

xv. Ash Ponds

Three active coal ash ponds exist at Joliet 29: Pond 1, 2, and 3, all constructed in 1978 with a poz-o-pac liner. Joint. Stip. at 1; MWG 2nd Ans. Def. at 1; SOF ¶ 86; MWG Exh. 901 at 16; MWG Exh. 667 at 4. All three ponds were relined with a 60 mil. high density polyethylene (HDPE) liner: Pond 1 in 2007, pond 2 in 2008, and pond 3 in 2013. Joint Stip. at 1. All three ash ponds are included in the MWG's NDPES Permit #IL0064254, issued September 30, 2014, (effective November 1, 2014,) as part of the wastewater treatment system. MWG Exh. 603 at 1, (Joliet 29 NPDES Permit); MWG 2nd Ans. Def. at 1-2; SOF ¶ 91.

At the time MWG began operating Joliet 29, and until 2016, the majority of the bottom ash was conveyed automatically by an enclosed pipe system across the Des Plaines River to a

permanent permitted landfill operated by Lincoln Stone Quarry. 1/29/18 Tr. at 192-194 (Race Test.). When the enclosed pipe system was not operating, on rare occasions bottom ash from Joliet 29 was pumped to either Ash Pond 1 or Ash Pond 2. *Id*. at 194.

Ash Ponds 1 and 2 were operated one at a time and were emptied in succession, every two to four years, with the removed ash taken to a permitted landfill. MWG Exh. 901 at 16 (Seymour test); MWG Exh. 903 at 15-16, 30; MWG Exh. 500 at 30-31; 1/29/18 Tr. at 194. Ponds 1 and 2 were dredged regularly, approximately every year or every other year. Joint Stip. at 1. The ponds' lining includes (described bottom up): 12" poz-o-pac on the bottom, a bottom geotextile cushion, the 60 mil HDPE liner, a top geotextile cushion, a sand cushion and a limestone warning layer. MWG Exh. 901 at 17. The ponds' bottom elevation is at 516 ft; the average groundwater elevation is at 505.5 – 506 feet (about 10 feet below the pond's bottom). *Id*. By October 12, 2015, MWG removed Pond 1 from service with all coal ash removed from it. Joint Stip. at 2; 1/29/18 Tr. at 198 (Race Test.). Ash pond 2 closed as well, and, at the time of the January 29 hearing, MWG was in the process of removing the remaining ash was in the process of being removed to the Lincoln Stone Quarry landfill, scheduled to complete in 2018. 1/29/18 Tr. at 198-199 (Race Test.).

Ash Pond 3 was used as a finishing pond and received only a *de minimis* amount of ash. Because no ash accumulated in the pond, Pond 3 never needed to be emptied between 1978, when it was placed into operation, and 2013, when it was emptied and relined. 1/29/18 Tr. at 188-191 (Race Test.); 1/30/18 Tr. at 39-40 (Race Test.). The pond's lining is the same as Ash Ponds 1 and 2 and includes (described bottom up): 12" poz-o-pac on the bottom, a bottom geotextile cushion, the 60 mil HDPE liner, a top geotextile cushion, a sand cushion and a limestone warning layer. MWG Exh. 901 at 18. The pond's bottom elevation is at 517.5 ft; the average groundwater elevation is at 505.5 feet (about 12.5 feet below the pond's bottom). *Id*. The effluent entering Ash Pond 3 from Ash Pond 2 was sampled in 2015 for total suspended solids. The samples showed only 20 mg/L of total suspended soils in the water, which means that "influent looked like a clear water." 1/29/18 Tr. at 190-191 (Race Test.); MWG Exh. 602 at 6 (bates #49747). MWG removed coal ash from Pond 3 for the first time in 2013 when it was relined. Joint Stip. at 2; EG Br at 29; 1/29/19 Tr. at 191-192 (Race Test.).

xvi. Joliet 29 Violation Notice

The, IEPA issued Violation Notice W-2012-00059for Joliet 29 Station (Joliet 29 VN) which alleged that "operations at ash impoundments have resulted in violations of Groundwater Quality Standards" during 2010 - 2012 at monitoring wells MW-2 through MW-11, including for Chloride (all monitoring wells), Antimony (MW-2), manganese (MW-4, 7, 9), and boron (MW-11). EG Exh. 3A at 3-6. MW-9 also included sulfate, iron, and TSD. *Id*. at 5-6.

xvii. Joliet 29 CCA

The Joliet 29 CCA (MWG Exh. 626) states that:

> Operations at ash impoundments have resulted in violations of the Groundwater Quality Standards at monitoring wells MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10 and MW-11. MWG Exh. 626 at 2 ¶ 3.

The Joliet 29 CCA notes that "respondent agrees to undertake the following actions, which the Illinois EPA has determined are necessary to attain compliance" with the Act and Board rules. MWG Exh. 626 at 3 ¶ 5. Subsections (a) through (h) of paragraph 5 list activities MWG must undertake, that include:

5(a)	prohibiting the use of ash ponds as permanent disposal sites, but only as treatment ponds to precipitate ash, and to continue periodic removal of ash;
5(b)	maintaining and operating ponds in a manner that protects integrity of their liners;
5(c)	conducting visual inspections of the ponds during ash removal to identify breach of liners integrity and to promptly inform IEPA and repair (implement corrective action plan approved by IEPA) if signs of breach are found;
5(d)	continuing quarterly monitoring of the 11 monitoring wells "for constituents in 35 Ill. Adm. Code 620.410(a)" and record and report elevations to IEPA;
5(e)	apply to IEPA for a construction permit to reline Ash Pond 3 with HDPE liner;
5(f), (g)	submitting an application to IEPA to establish and establish a GMZ under section 620.250 within one year from the date of CCA; and
5(h)	within one year of the date of CCA, and upon realigning Ash Pond 3 and establishing GMZ, submit a certification of compliance. MWG Exh. 626 at 3 ¶ 5.

On October 9, 2013, MWG filed a certification with the IEPA that all Joliet 29 CCA measures were completed. Joint Stip. at 4; MWG Exh. 630.

xviii. <u>Joliet 29 GMZ</u>

As required by the Section 5 of the Joliet 29 CCA, on January 18, 2013, MWG submitted an application to establish a GMZ (Joliet 29 GMZ Application, EG Exh. 242), that would include the area around the ash ponds. EG Exh. 242 at 1; MWG Exh. 901 at 23 (Seymour Pres.). The IEPA approved the application on August 8, 2013. Joint Stip. at 4; MWG Exh. 627; MWG 2nd Ans. Def. at 25. The application describes the GMZ borders:

> groundwater flow in the vicinity of the subject ash ponds is in southerly direction with discharge to the adjourning station water intake channel of the Des Plaines River. The southern (downgradient) extent of the proposed GMZ corresponds with this hydraulic boundary. The northern (upgradient) boundary is defined by the placement of the three upgradient monitoring wells (MW-8, MW-10 and MW-11). The east and west sides of the proposed GMZ are based on the flow system and location of the three ash ponds. EG Exh. 242 at 1.

The application noted that "Class I" is the groundwater classification "the facility will be subject to at the completion of the remediation." *Id*. Att. 2 Part I, ¶ 10. The GMZ application noted that:

> The agreed upon remedy is specified in Item 5(a) through (h) of the executed [CCA]… The remedy includes lining of Ash Pond 3 with HDPE. This [GMZ] application fulfills requirements set forth under Item 5(f) of the CCA. EG Exh. 242 Att. 2, Part III ¶ 1.

The application also noted that "[at] the completion of the corrective process, a final report is to be filed which includes the confirmation statement included in Part IV." *Id*. Att. 2 at 1, Note 1.

B. Contested Facts

i. ***Ash Ponds Dredging and Liner Ruptures***

The record shows that three ash ponds at Joliet 29 have been lined and regularly dredged as needed. The liners are prone to damage in certain conditions. MWG took actions to identify and repair any damages to the liners, or to avoid rapturing the liners while dredging the ponds.

The three ash ponds at Joliet 29 were all constructed in 1978 with a poz-o-pac liner before they were relined with the HDPE (high-density polyethylene) liner in 2007 - 2013 (Ash Pond 1 in 2007, Ash Pond 2 in 2008, and Ash Pond 3 in 2013). Joint. Stip. at 1; MWG 2nd Ans. Def. at 1; SOF ¶ 86; MWG Exh. 901 at 16; MWG Exh. 667 at 4.

Poz-o-pac is a material that can crack in certain weather conditions or leak. 2/2/18 Tr. at 148; *see also e.g*. EG Exh. 303, 286 at 2; 10/24/18 at 215; 10/26/17 p.m. Tr. at 34-35 (Kunkel Test.). MWG relined the ponds on the assumption that they were in a "poor" condition. EG Exh. 34 at (#23614); MWG Exh. 606 at (#23647); *see also* 10/23/17 Tr, at 16; 10/24/17 Tr. at 12-13. In 2005 and 2006 MWG consultant, NRT, investigated the liners at Joliet 29 ponds and rated the condition of all three ponds as "poor." EG Exh. 34 at (#23614); MWG Exh. 606 at #23644. The report also rated these ponds as "high" for "contamination potential." *Id*. The same report rated a poz-o-pac liner in the "Environmental Criteria" as "1" on the scale of 0-10, with "0" being no liner (worth more than asphalt in unknown condition, which has "2" rating). MWG Exh. 606 at (#23631); EG Exh. 34 at (#23608). It also noted that "Poz-O-Pac liner systems were constructed more than 25 years ago and are reportedly in poor condition." *Id*. Race testified, however, that when the ponds were relined, the original 1978 poz-o-pac liner was found to be in a "good condition." 10/24/17 Tr. at 12-14 (Race Test.); 1/29/18 Tr. at 236 (Race Test.). When relining ponds in 2007, NRT suggested leaving bottom ash between poz-o-pac and HDPE liner at Joliet 29, noting that "this will make an excellent bedding layer for the geomembrane". EG Exh. 22. Maria Race agreed to that, noting "[i]t is fine to leave the ash there—it is poz o pac and is stable enough-and I agree with your assessment of risk/benefits." *Id*.

An HDPE liner is designed to prevent releases to soil and groundwater and is "the least permeable type of liner, resistant to chemicals, and is the same liner used for hazardous waste landfills." 1/29/18 Tr. at 224-226 (Race Test.); 2/1/18 Tr. at 243, 256 (Seymour Test.); MWG 2nd Ans. Def. at 1-2; SOF ¶¶ 26, 91. An HDPE liner, however, can be damaged during the pond

dredging process by the heavy equipment. *See e.g.* EG Exh. 306, 307; 10/26/17 p.m. Tr. at 35 (Kunkel Test.). Ash Ponds 1 and 2 were dredged approximately every one to two years. Joint Stip. at 1. The record indicates that MWG consultants took actions to avoid, identify, and repair any damage to the liners during ash removal and during the relining process. MWG Exh. at 903 at 38-39 (Seymour Test.).

After a careful review of the facts, the Board finds that the Environmental Groups established that both poz-o-pac and HDPE liners at Joliet 29 can and do crack or become damaged on occasions. Based upon the preponderance of the evidence in the instant record, including the quarterly groundwater monitoring results, MWG practices in pond relining and dredging, the Board concludes that it is more likely than not that the ash ponds did leach contaminants into the groundwater.

ii. Historical Coal Ash Sites

Three historical unlined areas exist at Joliet 29 where coal ash was deposited before MWG began operating: 1) the Northeast Area; 2) the Southwest Area; and 3) Northwest Area. 1/30/18 Tr. at 259-264, 272-273 (Race Test.); 2/1/18 Tr. at 193-198 (Gnat Test.); EG Exh. 21 at 12 (#25150) (noting that "the site was used for coal ash disposal by Joliet #9 Station prior to the construction of Joliet #29 in 1964-65. Coal ash was primarily disposed in a landfill on the eastern portion of the site. A second abandoned ash disposal landfill lies on the southwest portion of the site between the coal pile and Caterpillar, Inc. site.").

Unlined areas that contain coal ash pose a risk of groundwater contamination due to the water moving through the coal ash, thereby increasing the risk of leaching and contamination. EG Br. at 19; 10/24/17 Tr. at 39 (Lux Test.); 10/26/17 Tr. p.m. at 34-35, 83-84 (Kunkel test); 1/29/18 Tr. at 208 (Race Test.); 1/30/18 at 29 (Race Test.); MWG Exh. 636 at 4 (#555) (sec. 5(m) of the Joliet 29 CCA, stating that MWG "shall not use any unlined areas for permanent or temporary ash storage or ash handling."). No monitoring wells are installed around any of these areas. 2/1/18 Tr. at 196-198 (Gnat Test.); MWG Exh. 901 at 19; MWG Exh. 667 at 3. MWG possesses only partial knowledge of the content of these areas or their potential to contaminate the groundwater.

The Northeast Area is part of the Station's NPDES stormwater permit. MWG Br. at 11; MWG Exh. 603 at 1, 9, and 15; 1/29/18 Tr. at 183 (Race Test.). MWG admits, and the record indicates, that this area contains historic coal ash. MWG Br. at 11; 2/2/18 Tr. at 323 (Seymour Test.); EG Exh. 248N at 1 (#19442); EG Exh. 20D at (#23342; 23357); EG Exh. 401 at 11. MWG's experts testified that, as required by the NPDES permit, MWG consistently inspected the area, the soils, and seeding grasses growing in the area, to make sure it is properly covered. 1/29/18 Tr. at 185 (Race Test); 1/30/18 Tr. at 258 (Race test); MWG Br. at 11; SOF at 12-13. MWG's consultants conduct annual visual walk-over inspections of the area to identify "erosional features" and repair any issues within a few weeks of each inspection. *Id*., SOF at 13 ¶ 127; EG Exhs. 248-251 (2009-2012 Joliet 29 Northeast Area Inspections); MWG Exh. 803-805 (2012 - 2014 Joliet 29 Northeast Area Repair Documentations); 2/1/18 Tr. at 115-123 (Gnat Test.). The record shows that, in 2009 - 2012 these inspections on various occasions identified erosional features that required repairs (e.g. five areas identified in 2009 "where either sheet wash erosion or rilling has exposed the underlying ash slag and may transport the material to the Des Plaines River" (10/25/17 Tr. at Tr. 116; EG Exh. 248N) and suggested repairs were

performed. No issues requiring repairs were identified and no repairs were performed in 2013 - 2016. *See e.g*. SOF at 13 ¶¶ 129-135; 2/1/18 Tr. at 115-124, 204-205; 10/25/17 Tr. at 116 (Gnat Test.); 10/26/17 A.m. Tr. at 31-32 (Gnat Test.); 1/30/18 Tr. at 259; MWG Exh. 800-805; EG Exh. 248N-251N. No monitoring wells exist in this area. 2/2/18 Tr. at 21 (Seymour test); 10/23/17 Tr. at 77; EG Br. at 37. The closest monitoring well is MW-1 or MW-08 but considering the groundwater flow and the distance to this historic area, MW-01 or 08 are unlikely to show conclusive results of any contaminants emanating from this historical area. MWG Exh. 901 at 19 and 23. Other than visual inspections, MWG did not investigate the area or the soil cover to determine if it was impermeable. Moreover, MWG did not cap it with an impermeable cap did not investigate if it had a liner, and did not install a liner. 1/30/18 Tr. at 259-260; 272-273 (Race Test.); 2/1/18 Tr. at 193-195 (Gnat Test.). MWG also never took samples from this area. 1/29/18 Tr. at 184 (Race Test.); 1/30/18 Tr. at 259-260 (Race Test.).

The Southwest Area is adjacent to the former "Caterpillar/Center Point" site and is covered by the ELUC established by the Caterpillar's property owners. SOF 136-140. MWG Exh. at 611. MWG Br. at 12. MWG admits, and the records indicates, that this area contains historic coal ash. MWG Br. at 11; 2/2/18 Tr. at 293:3-294:24, 323:12-20 (Seymour Test.); EG Exh 248N at 1 (#19442); EG Exh. 20D at (#23342; 23357); EG Exh. 401 at 11. Several investigations have indicated that soils at the former Caterpillar site are contaminated with various heavy metals, including barium, chromium, selenium, and thallium. Further modeling has shown the potential for metals contamination to leach into groundwater and migrate to Joliet Station. MWG Exh. 611 at 1. Center Point established the ELUC on August 5, 2010. The ELUC restricts MWG from using any soil and groundwater from the ELUC area. *Id*. at 2; 1/30/18 Tr. at 6-12 (Race Test.); MWG Exh. 612 at 1-2; MWG Exh. 667 at 6; MWG Exh. 901 at 23. No monitoring wells exist in this area. 2/2/18 Tr. at 21 (Seymour Test.); 10/23/17 Tr. at 77. The closest monitoring well is MW-7, but considering the groundwater flow and the distance to this historic area, it is unlikely that MW-07 can show conclusive results of any contaminants emanating from this historical area. MWG Exh. 901 at 19, 20. In 2005, as part of the geotechnical testing at the four Stations, KPRG took six soil borings at Joliet 29, one of which was from this historical area. EG Exh. 201 at 1, 27 (#24264, 90); 2/2/18 Tr. at 161: 11-14, 164:22-24 and 293:5, 294:17-24 (Seymour Test.). The soil borings indicated a layer of coal ash mixed with gravel at the level zero to one foot below surface (GT-6). EG Exh. 201 at 27, 34 (#24290, 97). MWG did not take leach tests, did not evaluate the volume of ash in this area, did not cap it, and did not install a liner. 1/30/18 Tr. at 260-261, 273-274 (Race Test.).[5] MWG has not fully evaluated the content of the area and its potential to contaminate the groundwater. 1/30/18 Tr. at 260-61; 273 (Race Test.); 2/1/18 Tr. at 196-198 (Gnat Test.). Although the ELUC includes measures aimed to protect against exposure to contaminated soil and groundwater at the former Caterpillar site, the ELUC does not include measures to prevent contamination and migration of coal ash constituents from MWG's property. MWG Exh. 611 at 4-5.

[5] In parts of his testimony during the hearings, Mr. Seymour stated that KPRG conducted tests at the north (2/2/18 Tr. at 163:7) or southwest (Id. at 293:3-9) areas. It appears from his own reports and presentations that he misspoke, or referred to geotechnical testing referred above, because he relies upon KPRG's 2005 report in all his conclusions EG Exh. 293. This indicates that the only CCB samples taken at Joliet 29 were from the Northwest area. *See* EG Exh. 293 #19585; MWG Exh. 901 at 23; EG Exh. 201.

The Northwest Area is another area at Joliet 29 that contains coal ash fill material, as admitted by MWG and supported by the record. MWG Br. at 11; 2/2/18 Tr. at 323 (Seymour Test.); EG Exh. 20D at (#23342; 23357); MWG Exh. at 401 at 11. In 2005, MWG had the fill material analyzed by its consultant to determine if it meets the requirements of CCB and could be used beneficially. EG Exh. 293 at 1 (#19576). The testing report indicates that the area is appropriately 13.2 acres in size and contains interlayered fly ash and bottom ash and slag from the bottom of the coal combustion process. The borings indicate a coal ash layer as deep as 17 feet below the surface, lowest layers of which indicated as "moist" on some borings. *Id*. at 1-2, 7, 16-34 (#19576-77, 582, 591-609). The report indicates, and MWG experts testified, that most of the evaluated samples showed that the materials met the Act's criteria for beneficial use, had levels of boron, manganese and barium below Class I GQS and leached less metals than allowed by the Act. 10/26/17 A.m. Tr. at 39-40 (Gnat Test.); 1/29/18 Tr. at 184-185, 210-213 (Race Test.); 2/1/18 Tr. at 275-276 (Seymour Test.); MWG Exh. 901 at 9 (Seymour Test.); MWG Exh. 293 at 7, 10 (#19582, 85). The report, however, also states that NLET metal data from certain sample locations (GP-14A) "displayed elevated levels of lead and coper at concentrations at least two times higher than the Class I groundwater standards. The ash from this portion of the site should not be considered for potential beneficial reuse." MWG Exh. 293 at 7 (#19582). The record does not include information as to whether MWG separated or removed this part of the material from the sampled area. No monitoring wells exist in this area. 2/2/18 Tr. at 21 (Seymour Test.); 10/23/17 Tr. at 77 (Race Test.). The closest monitoring well is MW-11 or 07 but, considering the groundwater flow and the distance to this historic area, it is unlikely that MW-011 or 07 can show conclusive results of any contaminants coming from this historical area. MWG Exh. 901 at 19, 20; MWG Exh. 667 at 3.

Coal Ash in Fill Areas Outside Ash Ponds. During the 2005 geotechnical testing, KPRG also took five soil borings around the coal ash ponds. EG Exh. 201 at 1, 27 (#24264, 90); 2/2/18 Tr. at 164:23 and 293:5, 294:17-24. The soil borings indicated a layer of coal ash mixed with gravel at the level zero to one foot below surface in the areas near MW-11 and between MW-09 and 10 (GT-1, GT-3). EG Exh. 201 at 27, 29, 31 (#24290, 92, 94).

The Board finds that the evidence establishes that it is more probable than not that these historical coal ash storage and fill areas are contributing to the groundwater contamination. It is also more likely than not, however, that the exceedances appearing in the monitoring wells are not representing contamination from the historic coal ash storage areas, but, do show contaminants leaking from historic fill areas outside of the ash ponds and historic storage areas.

iii. Monitoring Wells

MWG installed 11 groundwater monitoring wells around the three ash ponds at Joliet 29 (MW-1 through MW-11) in 2010 and monitored groundwater quality since the final quarter of 2010. Env. MWG 2nd Ans. Def. at 2. Gr. Br. at 16-17, 29; MWG Br. at 3; MWG Exh. 667 at 2; 2/1/18 Tr at 86-87, 110 (Gnat Test.); MWG Exh. 809. Quarterly monitoring reports for Joliet 29 monitoring wells MW-1 through MW-11 from December 2010 through April 2017 tested for 35 parameters, including antimony, arsenic, boron, manganese, and other indicator constituents associated with coal ash. These quarterly reports are in the record. MWG Exh. 809; s*ee also* EG Br. at 17; EG Br., Att. A at 76-116; SOF ¶¶ 508, 509, 520-523, 526, 528.

Monitoring wells MW-8, 10 and 11 are located upgradient (north) of the ash ponds with respect to direction of groundwater flow and, thusly, are considered "upgradient" or "background" wells. MWG Exh. 901 at 19; 2/1/18 Tr. at 19 (Gnat Test.). These wells indicate potential chemicals that might migrate with the groundwater from outside of MWG's property. *See e.g.* 1/29/18 Tr. at 30-31 (Kunkel Test.); 2/1/18 Tr. at 109 (Gnat Test.); 2/2/18 Tr. at 8 (Seymour Test.);EG Exh. 12C at 3 and MWG Exh. 667 at 3. The other wells – MW-02, 03, 04, 05, 06, 07 and 09 - are located downgradient of the ponds. These wells measure the impact of the ash ponds on the groundwater quality. *Id.*; 10/23/17 Tr. at 220. No potable water wells are downgradient of Joliet 29. 10/27/17 Tr. at 181 (Kunkel Test.).

The record indicates that groundwater in the area has a potential to reverse the direction of groundwater flow, which can alter the monitoring wells treated as upgradient. The record, however, does not support the argument that a groundwater flow directional reversal occurred during the time-frame at issue in this proceeding. MWG's hydrogeological assessment determined that the direction of flow of groundwater in the shallow aquifer at the Joliet #29 Station is in the southerly direction towards the Des Plaines River. MWG Exh. 621 at 4-5 (#296297) (2009 Hydrogeological Assessment of MWG Electric Generating Stations); 1/29/18 Tr. at 253 (Race Test.); EG Exh 12C at 2; 2/1/18 Tr. at 97-98, 109-110 (Gnat Test.) and 2/2/18 Tr. at 13 (Seymour Test.). Dr. Kunkel testified that groundwater at the Joliet #29 site is strongly influenced by changes in Des Plaines River surface water elevations as well as potentially leaking ash ponds. EG Exh. 401 at 12. He stated that the Des Plaines River water-surface elevations strongly influences the groundwater elevations and groundwater gradients at site, causing seasonal flow from the River into the unconsolidated materials beneath the ash ponds. *Id.* at 13; 1/29/18 at 30-31 (Kunkel Test.); Exh. 411.

MWG witness Mr. Gnat testified that although reversal of flow described by Dr. Kunkel is a well-known phenomenon, more than 27 quarterly rounds of groundwater measurements do not indicate a reversal of groundwater flow beneath the ash ponds at Joliet Station. He noted that the flow directions, from quarter to quarter, is consistent from the north to the south towards the Des Plaines River. 2/1/18 Tr. at 109-110, 124-127 (Gnat Test.). The groundwater monitoring results support his position. MWG Exh. 809. The Board finds, therefore, that the record does not support consideration of the upgradient monitoring wells as downgradient wells, and vise versa, when interpreting the groundwater monitoring results.

iv. Exceedances of Part 620 Standards

Groundwater monitoring results in the record indicate 69 exceedances of the Board's Part 620 GQS for coal ash constituents at Joliet 29. MWG Exh. 809. The 69 exceedances are based upon the monitoring results from December 6, 2010, to April 25, 2017. *Id*. The constituents above the Class I GQS are as follows with number of exceedances shown in parenthesis: sulfate (29), TDS (32), antimony (4), boron (2), lead (1) and cadmium (1). The monitoring results indicate that, during the seven-year period, 53 of the 69 exceedances (78%) occurred in MW-09, while the remaining 16 exceedances occurring in MW-2, 3, 4, 8 and 11.

Among the 16 exceedances in the wells other than MW-09, nine were in the upgradient (background) wells MW-08 and MW-11. These wells exceeded standards for boron, cadmium, lead, sulfate and TDS once or twice during the seven-year monitoring period. During the same period, the downgradient wells MW-02, 03, and 04 exceeded antimony 7 times and TDS once.

Thus, monitoring well MW-09 is the only downgradient well that shows levels of sulfate and TDS consistently above the groundwater standards during the seven years of monitoring data considered by the Environmental Groups. A summary of the groundwater monitoring data exceeding Part 620 GQS standards for Joliet 29 is presented below in Table 1. EG Br. App. A; MWG Exh. 809; MWG Exh 901 at 20.

Table 1. Joliet 29 Groundwater Monitoring Results Summary

Monitoring Wells	Closest Ash Pond (AP)	Location	Constituents	Number of Exceedances of Part 620 Standards	Year(s)
MW-02	AP 3	Downgradient	Antimony	1	2010
MW-03	AP 2	Downgradient	Antimony	3	2011-2012
			TDS	1	2013
MW-04	AP 2	Downgradient	Antimony	2	2013
MW-08	AP 3	Upgradient	Sulfate	2	2014, 2015
			TDS	2	2014, 2015
MW-09	Between AP 3 and 2	Downgradient	Sulfate	26	2010 - 2017
			TDS	27	2010 -2017
MW-11	AP 1	Upgradient	Boron	2	2011
			Cadmium	1	2015
			Lead	1	2015
			TDS	1	2015

Table 1.B: Joliet 29 Groundwater Monitoring Results Summary (by year)

Year	Monitoring Wells	MW-2	MW-3	MW-4	MW-8	MW-9	MW-11
	Constituent						
2010	Antimony	1					
	Sulfate					1	
	TDS					1	
2011	Antimony		2	1			
	Boron						2
	Sulfate					3	
	TDS					4	
2012	Antimony		1				
	Sulfate					4	
	TDS					4	
2013	Antimony			1			
	Sulfate					4	
	TDS		1			4	
	Sulfate				1	4	

2014	TDS				1	4	
2015	Cadmium						1
	Lead						1
	Sulfate				1	4	
	TDS				1	4	1
2016	Sulfate					4	
	TDS					4	
2017	Sulfate					2	
	TDS					2	
Total		1	4	2	4	53	5

Table 1.C: Joliet 29 Groundwater Monitoring Results Summary (by wells)

Chemical Constituent	Antimony	Boron	Cadmium	Lead	Sulfate	TDS	Total
Monitoring Wells	Number of Exceedances						
MW-2	1						1
MW-3	3					1	4
MW-4	2						2
MW-8					2	2	4
MW-9					26	27	53
MW-11		2	1	1		1	5
Total	6	2	1	1	28	31	69

Antimony. As noted above six exceedances of the antimony standard occurred in downgradient wells MW-02, 03, and 04, during the early monitoring period of 2010 - 13. MWG Exh. 809. Since 2013, no exceedance of the antimony standard has occurred in any of the downgradient wells. *Id*. Dr. Kunkel stated that antimony may be present in coal ash leachate. EG Exh. 401 at 7. Both the Environmental Groups and Mr. Seymour identified antimony as one of the indicators for leachate from MWG's ash ponds. MWG Exh. 903 at 42. Also, all three ash ponds were operational during the period of observed exceedances, i.e., 2010 - 2013. The long-term monitoring data, however, shows that, during the seven-year monitoring period, all three wells had no exceedances of other coal ash indicator constituents such as boron, sulfate, or manganese. Also, because no exceedances of antimony were recorded after 2013, relining Ash Pond 3 and other measures required by the CCA might have eliminated antimony contamination. However, the monitoring results show that antimony was not detected in the upgradient wells, which indicates that upgradient off-site sources did not contribute to the exceedances of the antimony standard. Accordingly, the Board finds that the Environmental Groups have not proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside of the ash ponds is causing or contributing to the exceedances of antimony standard in Joliet 29's downgradient wells MW-02, 03, and 04 during 2010 - 13.

Cadmium and Lead. The monitoring results indicate a single exceedance of cadmium and lead standards in the upgradient monitoring well MW-11 in 2015. These metals were not

detected in any of the other monitoring wells. MWG Exh. 809. Although Dr. Kunkel included these metals in his list of coal ash associated chemical constituents, Seymour includes both metals in his "maximum" criteria of the second tier list of coal ash leachate constituents. MWG Exh. 901 at 42. Accordingly, there is a likelihood that an exceedance of cadmium and lead may be associated with coal ash leachate. Given that a single exceedance of both metals occurred during the seven-year monitoring period and both occurred in one upgradient well, the Board finds that the Environmental Groups have not proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds caused or contributed to the exceedances of cadmium and lead standards in monitoring well MW-11 at Joliet 29.

Boron. Both the Environmental Groups and MWG agree that boron is an indicator of coal ash contamination. *Id;* MWG SOF 57. The monitoring results indicate two exceedances of the Part 620 boron standard during the seven-year monitoring period, both occurring in the upgradient well MW-11 in 2011. Since then, the monitoring results do not indicate any exceedance of boron standard in any of the monitoring wells. Although the Environmental Groups asserted that Joliet 29 exceeded the boron standard, their expert, Dr. Kunkel, admitted that it would be difficult to draw conclusions for the overall site based upon the results from one well. 1/29/18 Tr. at 65.

MWG asserted that boron is below Class I standards at all monitoring wells around the Joliet 29 ponds. MWG Rep Br. at 6. Further, MWG's expert Seymour stated, based upon the analytical results of bottom ash taken from the ash ponds, the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the GQS because the leachate levels were below such standard. MWG Exh. 903 at 41. Given that the seven-year monitoring results show only two exceedances of the boron standard in one upgradient monitoring well and no exceedances in any of the other wells, the Board finds that the Environmental Groups have not proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds caused or contributed to the exceedances of the boron standard in the upgradient well at Joliet 29.

Sulfate and TDS. As noted earlier, except for five exceedances in the upgradient wells MW-08 and 11 and one exceedance in MW-03 (in 2013), all exceedances of sulfate and TSD standards occurred in one downgradient well, MW-09 (2010-2017). MW-09 is located between Ash Pond 2 and Ash Pond 3 at the southwest edge of Ash Pond 3. Additionally, MW-09 exceeded sulfate and TDS standards every quarter of the seven-year groundwater monitoring period. Regarding the elevated levels of sulfate and TDS in monitoring well MW-09, the Environmental Groups' expert, Dr. Kunkel, stated that the groundwater elevation data from third quarter 2012 indicated that Ash Pond 3 must have been leaking because of groundwater mounding.[6] He noted that the ground-water elevation in MW-9 was higher (505.66 feet) than in MW-8 (505.22 feet) which is generally upgradient from MW-9. EG Exh. 401 at 12-13. He further asserted an alternative explanation that coal ash deposits outside of the ash pond may be affecting the groundwater. *Id.*

[6] "Ground-water mounding" is a phenomenon usually created by the recharge to groundwater from a manmade structure, such as a surface impoundment, into a permeable geologic material, resulting in outward and upward expansion of the free water table. EG Exh. 401 at 5.

MWG's expert Seymour argued that Dr. Kunkel's assertion regarding groundwater elevation is based on selection of the single highest water level in MW-09, even though years of data show the average level in MW-09 is lower than in MW-08. MWG Exh. 903 at 8. Seymour noted that the groundwater elevation in MW-08 was higher than MW-09 in the 11 of the 16 quarterly monitoring events. *Id.* at 59. Additionally, Seymour maintained that any groundwater mounding would be too subtle to detect because of the accuracy of the elevation readings combined with small differences and variations of groundwater elevations at the site. *Id.*; 2/2/18 Tr. at 12-13 (Seymour Test.).

The monitoring results continue to show exceedances of sulfate and TDS standards even after relining Ash Pond 3 in 2013, as well as after MWG removed Ash Pond 1 from operation in 2015. MWG experts testified that no ash was found in Ash Pond 3 when it was drained for relining in 2013 and that the poz-o-pac liner was intact. 1/30/18 Tr. at 39 (Race Test.). MWG experts admitted that they considered leaving coal ash between layers when relining some of the ponds at some of the Stations. *See e.g.* EG Exh. 32; 10/23/17 Tr. at 156:18-162:21 (Race Test.). The consistent exceedance of Class I GQS as it appears in the groundwater monitoring results for MW-9 suggest that some active source of contamination persists. This persistent source of contamination may be coal ash remaining in Ash Pond 3, between its layers, or coal ash deposited outside the ash ponds. The sulfate and TDS also exceeded Class I GQS in 2014 and 2015 in monitoring well MW-08, which, although generally upgradient, is located near the northern side of Ash Pond 3.

Sulfate and TDS are indicators of coal ash contamination in groundwater. The monitoring results show consistent exceedances of the GQS of both constituents during the seven-year monitoring period at MW-09. Also, the record does not indicate that contamination has been caused by an off-site source because upgradient monitoring wells show no exceedances of the groundwater standards. Therefore, the Board finds that it is more probable than not that the source of the exceedances of sulfate and TDS in well MW-09 at Joliet 29 is either coal ash stored in Ash Pond 3 or any coal ash deposited in fill areas outside of but close to that pond.

v. <u>Exceedance of Background Concentrations</u>

The Environmental Groups asserted that the median[7] concentrations of boron and sulfate in all eleven monitoring wells exceed the statewide median background values developed by the IEPA. EG Br. at 30-31. Additionally, the median concentration of sulfate in MW-09, and boron in MW-11 exceeded the upper-bound 90th percentile background values. *Id.* at 31.

Regarding the use of IEPA's statewide background, Dr. Kunkel noted that the Joliet 29 site overlays the sand and gravel/shallow bedrock aquifers, which are the same aquifers from which the IEPA's background community water supply wells are drawing water. EG Exh. 401 at 8. Moreover, he noted that the actual background median for sulfate from a background well at the Powerton Station was within a few milligrams per liter of the median statewide sulfate value. Thus, Dr. Kunkel argued that the statewide median background values may be used to evaluate groundwater monitoring results at Joliet 29 even though the statewide CWS wells were not located in counties with MWG plants. 1/29/18 Tr. at 83-84 (Kunkel Test.).

[7] Median is determined by arranging all the data in the background dataset from highest value to lowest and taking the center value of that dataset. 2/1/18 Tr. at 103.

Additionally, Dr. Kunkel asserted that statewide median background values can be utilized to assess the severity of groundwater contamination because there are no background wells at Joliet 29. EG Exh. 401 at 8-9. He explained the upgradient wells (MW-8, 10 and 11) at Joliet 29 are not "background" wells because not only are the wells too close to the ash ponds, but they are also completed in areas where screened interval showed ash from construction of the dikes. 1/29/18 Tr. at 82 (Kunkel Test.). He asserted that the close proximity of the wells to the ponds makes them vulnerable to impact from the ponds, especially if the gradient reverses due to rise in Des Plaines River. *Id.* Kunkel asserts that the wells in question "are not background, but during certain times, maybe the majority of the time, they are upgradient but they're clearly not background." *Id.* at 83.

MWG's consultant, Seymour, disagreed. He argued that the IEPA's statewide background values are based on monitoring data from CWS wells and, therefore, are not representative of the site-specific groundwater quality because few CWS are sited wells near the Joliet 29 site. 2/2/18 Tr. at 31-32 (Seymour Test.). He maintained that it is inaccurate to consider statewide background as representative of background values at the sites where upgradient monitoring data is available. Additionally, MWG's consultant, Gnat, explained why a direct comparison of the median values from a monitoring well with the statewide median value is inappropriate. He noted that a monitoring well median above the statewide median means that the well median value is above the median of CWS wells' background values and not above background itself because the statewide median has a range of median values. 2/1/18 Tr. at 105-106 (Gnat Test.). Seymour explained that the comparison, according to the IEPA, must be based upon statistical evaluation using a 90 percent confidence level, i.e. a value above the 90 percent confidence level, which is considered above background with 90 percent assurance. 2/2/18 Tr. at 32-33 (Seymour Test.).

Seymour stated, however, that at MWG sites, background concentrations must be evaluated based upon site-specific data from monitoring wells installed at upgradient site boundaries in locations without the presence of ash materials in fill. MWG Exh. 903 at 60. Here, Seymour noted that the IEPA's proposed CCR regulations explain the procedure for establishing background on site-specific basis. The IEPA proposal specifies that the groundwater monitoring system must include wells to represent the quality of groundwater at the site not impacted by activities and units (background) and sets forth requirements for establishing background. EG Exh. 405 at 25-28.

Seymour maintained that the procedure followed by MWG at Joliet 29 is consistent with the IEPA's proposal in R14-10. 2/2/18 Tr. at 34-35 (Seymour Test.). Hence, the background at the site is the concentration in the upgradient wells MW-8, 10, and 11. *Id.* at 35. He asserted that the background concentrations at Joliet reflect sources other than the ponds and historical ash fill affected groundwater because the monitoring wells near the upgradient site boundary exceed Class I groundwater standards prior to migrating below the ponds. MWG Exh. 903 at 61. Seymour also clarified that all three upgradient wells are not installed in ash fill, as noted by Dr. Kunkel. *Id.*; 2/2/18 Tr. at 36-37 (Seymour Test.).

Although Dr. Kunkel raised concerns regarding the validity of background values from the upgradient wells, as noted by Seymour, the long-term groundwater elevation measurements do not indicate a reversal of groundwater flow. MWG Exh. 903 at 101 (Table 4.1). Thus, given

the availability of site-specific upgradient groundwater monitoring data, the evaluation of any potential groundwater contamination at the site would have benefitted from the use of such data rather than statewide background levels, which may not represent the groundwater at the site. Here, the Board notes that neither the Environmental Groups nor MWG experts can establish background values on a site-specific basis by using the groundwater monitoring results from upgradient wells MW-8, 9, and 11.

Because the Environmental Groups claim exceedance of the statewide background, such exceedance must be evaluated by using appropriate statistical measure. MWG's consultants, Gnat and Seymour, stated that the comparison must be done using the upper bound 90th percentile background value. Because the parties agreed that the appropriate comparison for background values is the upper bound 90th percentile value, the Board limits the groundwater monitoring results comparison to the 90th percentile statewide values.

The Environmental Groups provided a comparison of the median values of boron and sulfate in the monitoring wells with the 90th percentile statewide values from the statewide database. This comparison indicated exceedances of 90th percentile statewide value of: boron in well MW-11; and sulfate in well MW-09. EG Br. at 31. All other wells have no exceedances of either boron or sulfate above the 90th percentile values.

The exceedances of the statewide background are consistent with the exceedances of groundwater standards of sulfate and boron in MW-09 and MW-11, respectively. As noted above, seven years of monitoring showed two exceedances of the boron standard in the upgradient well MW-11 in 2011 and none thereafter in any of the monitoring wells. The median value of boron of 1.20 mg/L is below the groundwater standard of 2.0 mg/L. The Board finds that, given that MW-11 is an upgradient well and no exceedances of 90th percentile statewide value for boron occurred in any other well, the coal ash stored in ash ponds or coal ash deposits outside of the ash ponds at the Joliet 29 site are not the likely sources causing boron exceedances in MW-11.

Regarding sulfate, as noted above, the monitoring results show consistent exceedances of the groundwater standard during the seven-year monitoring period in well MW-09. Although two sulfate exceedances occurred in the upgradient well MW-08 (one in 2014 and one in 2015), a comparison of the sulfate levels in MW-08 (460 -600 mg/L) to MW-09 (560-1900 mg/L) clearly shows that the contamination in MW-09 is not caused by an off-site source. Therefore, the Board finds it more probable than not that the exceedances in MW-09 at Joliet 29 of the 90th percentile Statewide value for sulfate is either coal ash stored in Ash Pond 3 or any coal ash deposited in fill areas outside the pond.

3. Powerton

A. Uncontested Facts

i. The Station

MWG leases and operates Powerton Electric Generating Station, located in Pekin, Tazewell County, Illinois since 1999. Joint Stip. at 2; MWG Answer and Defenses 5/5/14 at 2. The plant began operations in the 1920s with four coal-fired units, which were replaced in the

early 1970s by the currently operating Units 5 and 6. Joint Stip. No. 18, MWG Exh. 664 at 1, 1/30/18 Tr. at 51:21-52 (Race Test.); MWG Exh. 635 at 1 (#11305).

The plant is bordered on the north by the Illinois River. MWG Exh. 901 at 33. The Powerton Lake and Wild Life Area surround the Station on the west. *Id.* Industrial and residential areas border the Station on the east, and agricultural land borders the Station on the south. EG Exh. 13C at 1; MWG Exh. 901 at 27, 33; 1/31/18 Tr. at 68:5-8 (Kelly Test.); MWG Exh. 667 at 10.

The fly ash at the station is collected through a dry system by electrostatic precipitators and then collected at silos and hauled off-site to Buckheart Mines for mine reclamation. The fly ash is never directed to the ash ponds. 1 /31/18 Tr. at 69:18-70:7 (Kelly Test.). The bottom ash from the bottom of the boilers and slag tanks is quenched with water and sluiced out to dewatering bins. The bottom ash is then decanted and sent to the ash surge basin. *Id*. at 70:8-14. The water from the Ash Surge Basin is either recycled back to the cooling pond or is discharged into the Illinois River through the NPDES permitted outfalls. *Id*. at 70:18-71:2. The ash is collected in the basin and periodically removed to the mines for mines reclamation. *Id*. at 71:3-11. The ash sent to the mines is periodically sampled. *Id*. at 71:9-73; MWG Exh. 700 at (#10965). The February 27, 2007, samples from the Ash Surge Basin identified barium at 0.027. 1/31/18 Tr. at 73:21-74:11; MWG Exh. 700 at (#10951).

ii. Ash Ponds

Powerton Station has four ash ponds, all under the Station's NPDES permit (#IL0002232): 1) the Ash Surge Basin, 2) the Ash Bypass Basin; 3) the Secondary Ash Settling Basin and 3) the Metal Cleaning Basin. Joint Stip. at 2; MWG Answer and Defenses 5/5/14 at 2; MWG Exh. 901 at 27, and SOF 166. The Station also has a Limestone Runoff Basin. MWG Exh. 901 at 27.

All four ponds were constructed in 1978; the Surge Basin, Bypass Basin, and the Metal Cleaning Basin with a poz-o-pac liner on the bottom and a Hypalon liner on the sides: the Secondary Settling Basin only was lined with a Hypalon liner. Joint Stip. at 2; MWG Exh. 901 at 28. All ponds were relined with HDPE liners in 2010 - 2013: the Bypass Basin and Metal Cleansing Basin in 2010, and the other two ponds in 2013. Joint Stip. at 2; MWG Exh. 901 at 28.

The Ash ***Surge Basin's*** is a primary ash basin, used to collect and settle bottom ash and hold it until removal. 1/30/18 Tr. at 58. The pond's lining includes (described bottom up): 12" poz-o-pac on the bottom, a bottom geotextile cushion, a 60 mil HDPE liner, a top geotextile cushion, a sand cushion and a limestone warning layer. MWG Exh. 901 at 30. The pond's bottom elevation is at 452 ft; average groundwater elevation is at 447 feet (about 5 feet below the pond's bottom). *Id*.

The ***Bypass Basin*** receives ash when the Station empties the Surge Basin. Joint Stip. at 2. The pond's lining includes (described bottom up): 12" poz-o-pac on the bottom, a bottom geotextile cushion, a 60 mil HDPE liner, a top geotextile cushion, a sand cushion and a limestone warning layer. MWG Exh. 901 at 31. The pond's bottom elevation is at 459 ft; average groundwater elevation is at 450.5 feet (about 8.5 feet below the pond's bottom). *Id*. MWG

removes the ash in the Surge Basin and Bypass Basin when the basins are full, every 6 to 8 years. MWG Exh. 901 at 28; SOF 174, 179; Joint Stip. at 2; 1/30/18 Tr. at 58:22-59:6 (Race Test.).; 1/31/18 Tr. at 78:2-3 (Kelly Test.). MWG last removed coal ash from the Surge Basin in 2013 before relining. MWG Exh. 901 at 28.

The ***Secondary Settling Basin*** is used as a finishing pond and receives *de minimis* ash from the Surge Basin. 1/31/18 Tr. at 126-127; Joint Stip. at 2. The pond's lining includes (described bottom up): a geotextile separator fabric, gravel underdrain system 18-24" thick, another geotextile separator fabric, a sand cushion layer, a bottom geotextile cushion, and a 60 mil HDPE liner. The sides also have prepared subgrade rip-rap on the very bottom. MWG Exh. 901 at 32. The pond's bottom elevation is at 440 ft; average groundwater elevation is at 441.5 feet (about 1.5f t above the pond's bottom). *Id*. It was only emptied for relining; when emptied, MWG found "less than a foot of material and it really want ash." 1/31/18 Tr. at 127:17-128:2 (Kelly Test.). MWG Exh. 901 at 28; 1/31/18 Tr. at 127:17-128:2 (Kelly Test.); 1/30/18 Tr. at 60:15-19 (Race Test.). It has never been dredged because no dredging was needed. 1/31/18 Tr. at 128:8-15 (Kelly Test.).

The ***Metal Cleaning Basin*** is not a part of the ash sluice system and is used during temporary outages to temporarily laydown ash removed from boiler tubes. 1/31/18 Tr. at 115; MWG Exh. 901 at 28. The pond's lining includes (described bottom up): 12" poz-o-pac on the bottom, a bottom geotextile cushion, a 60 mil HDPE liner, a top geotextile cushion, and a sand cushion and limestone warning layer. MWG Exh. 901 at 29. The pond's bottom elevation is at 457.5 ft; average groundwater elevation is at 445 feet (about 12.5 feet below the pond's bottom). *Id*. Ash is removed from the Metal Cleaning Basin approximately annually. Joint Stip. at 2.

iii. Powerton VN

The IEPA issued Violation Notice #W-2012-00057 (Powerton VN) for the Powerton Station (EG Exh. 4A) that alleged that "operations at ash impoundments have resulted in violations of Groundwater Quality Standards" during 2010-2012 at monitoring wells MW-1 through MW-15, including for Chloride (MW-6, 8, 12, 14, 15), Antimony (MW-2), manganese (MW-4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15), boron (MW-1, 9, 11, 13), arsenic (MW-7), iron (MW-7, 11, 12), sulfate (MW-13, 14, 15), TDS (MW-7, 13, 14, 15), and selenium (MW-7, 9, 13, 14), as well as pH, mercury, thallium, and nitrate. EG Exh. 4A at 3-11.

iv. Powerton CCA

The Powerton CCA (MWG Exh. 636) states that:

> Operations at ash impoundments have resulted in violations of the Groundwater Quality Standards at monitoring wells MW-1, MW-2, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14 and MW-15. MWG Exh. 636 at 2 (#553) ¶ 3.

The CCA notes that "respondent agrees to undertake the following actions, which the Illinois EPA has determined are necessary to attain compliance" with the statute and Board rules. MWG Exh. 636 at 3 (#554) ¶ 5. Subsections (a) through (m) of paragraph 5 list activities MWG

must undertake, subsections (a) though (d) are identical to Joliet 29 CCA. The other subsections require:

5(e)	apply to IEPA for a construction permit to reline Ash Surge Basin and the Secondary Ash Settling Basin with HDPE liner;
5(f)	installing additional monitoring well south of MW-9 in a location approved by IEPA to better define upgradient groundwater quality;
5(g), (j)	submitting an application to IEPA to establish and establishing a GMZ under section 620.250 within one year from the date of CCA; and
5(h), (i)	entering into an Environmental Land Use Control (ELUC) to cover area underlying GMZ, submit proposed ELUC to IEPA and record ELUC upon its approval;
5(k)	submitting a certification of compliance upon completing CCA requirements within one year of the date of CCA;
5(l)	not allowing East Yard Run-off to be part of the ash sluicing flow system and submitting monitoring results, for constituents in sec. 620.410(a)-(d), from water contained in it close to the outfall monitoring point 003 within 60 days from the date of CCA and for at least four monitoring quarters;
5(m)	not using any unlined areas for permanent or temporary ash storage or ash handling. MWG Exh. 636 at 3-4 (#554-5) ¶ 5.

On October 17, 2013, MWG filed a certification with the IEPA that all CCA measure were completed. Joint Stip. at 4; MWG Exh. 637.

v. Powerton GMZ and ELUC

As required by the CCA, on January 18, 2013, MWG filed applications with the IEPA to establish a GMZ (MWG Exh. 254) and also an ELUC (MWG Exh. 253) at the Powerton Station. Joint Stip. at 4; MWG Answer and Defenses 5/5/14 at 23; MWG Exhs. 253 and 254. IEPA approved the ELUC on August 26, 2013 and the GMZ on October 3, 2013. MWG Exhs. 638 and 639.

Both the GMZ and the ELUC cover the same area that includes all of the ash ponds. EG Exh. 253 at 1, 12; EG Exh. 254 at 1; MWG Exh. 901 at 39-40; MWG Exhs. 638 and 639. The borders of the GMZ and the ELUC are defined as follows:

> the western (downgradient) extent corresponds with the hydraulic boundary formed by the intake channel. The northern extent corresponds with the hydraulic boundary formed by the Illinois River. The southern and eastern boundaries are defined by the property boundary. The vertical extent of the GMZ is defined by the top of the Carbondale Formation which is approximately 70 feet below ground surface. EG Exh. 254 at 1; MWG Exh. 639.

The GMZ is established under 35 Ill. Adm. Code 620.250(a). EG Exh. 254 Att. 2 at 1, Note 1. The application notes that "Class I" is the groundwater classification "the facility will be subject to at the completion of the remediation". EG Exh. 254, Att. 2 ,Part I ¶ 10. The GMZ application notes the following:

> The agreed upon remedy is specified in Item 5(a) through (m) of the executed [CCA]… The remedy includes lining of the Ash Surge Basin and Ash Settling Basin with HDPE. This [GMZ] application fulfills requirements set forth under Item 5(g) of the CCA. EG Exh. 254 Att 2, Part III ¶ 1.

The application also notes that "[at] the completion of the corrective process, a final report is to be filed which includes the confirmation statement included in Part IV." *Id*. Att. 2 at 1, Note 1.

B. Contested Facts

i. Ash Ponds Dredging, Liner Ruptures and Flooding

Both poz-o-pac and HDPE liners are prone to damage in certain conditions, i.e. severe weather or rupture by heavy equipment during dredging. In 2005 and 2006 MWG consultant investigated the liners at Powerton ponds and rated the condition of the Ash Surge and Metal Cleaning Basin as "poor", the Secondary Ash Settling Basin as "no liner" and Bypass Basin as "unknown." Comp Exh. 34 at #23615; MWG Exh. 606 at 23646. MWD took precautions to ensure that dredging the Ash Surge Basin, Bypass Basin or the Metal Cleaning Basin was performed by trained MWG personnel instructed on the liners' safety procedures. 1/31/18 Tr. at 99:23-100:2, 116:15-22 (Kelly Test.). However, there were occasional issues with the liners, or the liners weren't installed correctly. EG Exh. 109 at 1, 3 ("several areas if liner to the north of the weir wall pulled the backing strips away and the liner is loose."); EG Exh. 108 ("couple of issues have emerged while de-watering the Secondary Basin . . . the liner on the east wall of the basin may not have been constructed as designed or it may have been damaged in the past or altered…."); *see also* EG Exh. 107. MWG's witness, Mr. Kelly, Powerton's Chemical Specialist, testified that the tears in the pond liners did happen, although not very often. 1/31/18 Tr. 146:12-21 (Kelly Test.). He noted that they mostly happened at the very top of the basin and above the water line. *Id*. Station operators inspected ponds regularly and reported any issues to Mr. Kelly. Any issues with the liners were repaired within one to two weeks. 1/31/18 Tr. at 80:9-12, 80:22-81:1, 101:11-13, 146:4-145:5 (Kelly Test.). Some coal ash might have been left between the layers when relining the Former Ash Basin. EG Exh. 32; 10/23/17 Tr. at 156:18-162:21 (Race Test.).

In addition, MWG employees recalled ash ponds and historical ash storage flooded on several occasions, with water rising 30 feet above the bottom of the Secondary Ash Settling Basin, and the Illinois River flowing in and out of the Former Ash Basin. EG Exh. 33; 10/23/17 Tr. at 164:18-21; 1/31/18 Tr. at 211:10-21 (Race Test.); 1/31/18 Tr. at 211:10-21 (Kelly Test.); 10/24/18 Tr. at 95:24-96:3 (Lux Test.); EG Exh. 107 10/24/17 Tr. at 94:0-11, 93:7. MWG confirmed that the area of the Secondary Ash Basin has high groundwater levels. MWG Br. at 15; SOF 606-609. To address this issue, MWG installed an underdrain system around the Secondary Ash Basin, composed of stones, drain tiles and riprap on the sides, "to move any water that may seep near the pond, away from the pond liner." MWG Br. at 15; SOF 606-609. MWG also noted that since the relining of the Secondary Ash Basin "there have not been any issues related to the river water impacting or moving the liner." MWG Br. at 15; SOF 616-617.

After a careful review of the facts, the Board finds that the Environmental Groups established that both poz-o-pac and HDPE liners at Powerton can and do crack or experience damage on occasions. Based on preponderance of all the evidence in the record, including the groundwater monitoring results, MWG practices in ponds relining and dredging, and flooding at the area, the Board concludes that it is more likely than not that the ash ponds did leach contaminants into the groundwater.

ii. Historical Coal Ash Sites

The record indicates three historical coal ash storage areas at Powerton: 1) East Yard Run-off Basin; 2) Limestone Runoff Basin; and 3) Former Ash Basin. Only the Limestone Runoff Basin is lined, and had its content tested for CCB. The record, however, shows no evidence that material from the Limestone Runoff Basin that was successfully tested for CCB, was ever beneficially used in compliance with 415 ILCS 5/3.135.

East Yard Run-off Basin is located southwest of the Ash Surge Basin and west of the Ash Bypass Basin and is neither part of the ash sluicing flow system, nor used by MWG to store or receive ash. MWG Exh. 254 at 4; 1/31/18 Tr. at 138:5-22 (Kelly Test.); MWG Exh. 667 at 12. It is used for stormwater run-off from east half of the Station. 1/31/18 Tr. 138:12-14 (Kelly Test.). The closest monitoring wells are MW-12 and MW-13. The record does not provide information about the content or condition of this basin. However, the consistent exceedances of the Class I GQS for coal ash indicators in the wells MW-12 and MW-13 that are downgradient to this area indicate that this basin may contain coal ash that is leaking into groundwater.

Limestone Runoff Basin is located east of the Ash Surge Basin. MWG Exh. 901 at 27. It is lined with poz-o-pac on the bottom and Hypalon liner on the sides. Joint Stip. at 2. There is no evidence in the record showing the condition of this liner. The closest downgradient monitoring well is MW-18; MW-10 might act as an upgradient well for this basin. MWG Exh. 901 at 33, 38. The basin has been used historically to temporarily store fly ash during equipment changes at the station. 1/30/18 Tr. at 70:2-7 (Race Test.);1/31/18 Tr. at 144:2-6, 144:13-24, 183:13-24 (Kelly Test.). It has been used twice to temporarily store coal ash during equipment changes, last time in 2013. MWG Br. at 17; SOF 237-238. In 2004, there was coal ash in the basin from when equipment was taken off service. 1/30/18 Tr. at 70:2-71:4 (Race Test.);1/31/18 Tr. at 144:2-6, 144:13-24 (Kelly Test.); MWG Exh. 635. The basin was empty since 2013. 1/31/18 Tr. 144:7-145:1 (Kelly Test.). In 2004, Anders Engineering analyzed samples from the test pits in the nine locations in the basin using the NLET method to confirm that the historic ash met the criteria for beneficial reuse as CCB. MWG Br. at 7-8; MWG Exh. 901 at 9; MWG Exh. 635 at 1 (#11305); 1/30/18 Tr. at 74:7-76:14 (Race Test.). The report identified that the basin contains 8,250 cubic yards of material. MWG Exh. 635 at 8 (#11312). The report concluded that MWG should either remove the material to a landfill or enroll the Basin in the IEPA's Site Remediation Program. *Id*. at 8 (#11312). Tested samples indicated boron levels ranging from 0.1 to 1.5 mg/L. MWG Exh. 635 at App. B Table 1 (#11341). Barium and zinc were also detected in the samples; selenium and chromium were detected above Class I GQS in two of the test pits (TP-03 and TP-15). 1/30/18 Tr. at 74:11-19 (Race Test.); MWG Exh. 635 at 10 (#11314), App. B Table 2 (#11342). The report noted that "material in the grid sections containing test pits TP-03 and TP-15 would need to be disposed at a permitted landfill." MWG Exh. 635 at 10 (#11314). If MWG wanted to use material as CCB, it had to separate it from the

non-CCW material found in three pits (TP-16, 25 and 29)[8] and from the material found in two pits that did not meet Class I GQS (Tp-03 and 15). *Id*. The record does not provide evidence that MWG separated it. The record also does not provide evidence that MWG used material from this basin as CCB under 415 ILCS 5/3.135. It appears from the record that due to easily cracked poz-o-pac liner, material from this basin may be leaking contaminants into groundwater.

Former Ash Basin is located northeast of the ash ponds and is part of the Station's NPDES permit as emergency overflow for Ash Surge Basin. MWG Exh. 901 at 38. 1/30/18 Tr. at 142:14-18 (Race Test.). It was previously used as ash impoundment. 1/30/18 Tr. at 61:14-22 (Race Test.); 1/31/18 Tr. at 142:14-18 (Kelly Test.); EG Br. at 39. Ms. Race testified that on rare occasions water from Ash Surge Basin may flow to this former basin, which happened once in 2015 and at the end of 2017. 10/23/17 Tr. at 164:18-21; 1/31/18 Tr. at 158:23-160:3; see also 1/31/18 Tr. at 143:19-144:2 (Kelly Test.). MWG has not sent coal ash to this basin since taking over the Station in 1999. 1/31/18 Tr. 142:10-13 (Kelly Test.). The closest downgradient monitoring well is MW-2 through 5, and MW-1 is side-gradient to this basin. MW-18 is also located close to the east side of the basin. MWG Exh. 667 at 11; MWG Exh. 901 at 33, 38 (Seymour); 10/27/18 Tr. at 205:20-206:9 (Kunkel Test.). MWG Exh. 901 at 38. Groundwater samples taken downgradient of this basin showed no coal ash constituents. SOF 248-251; MWG Br. at 17; 10/27/17 Tr. at 206:12-210:22; 2/1/18 Tr. at 277:1-13; 2/2/18 Tr. at 70:17-71:22. Thus, the board find that the Environmental Groups did not prove that it is more likely than not that this basin is a source of contamination at the Station.

Coal Ash Fill through the site. Environmental Groups also allege that numerous soil borings taken at Powerton at different times show extensive presence of coal ash in fill at elevation that allows up to nine feet of buried ash to be saturated with groundwater. EG Br. at 44. The record supports this. EG Exh. 401 at 48-49 (Table 6). Powerton's Phase II Environmental Site Assessment show that nine borings taken in 1998 showed coal ash "in fill that extends from the surface to as deep as sixteen feet below surface." MWG Exh. 17D at 57-72 (#3309-3324). Another five borings taken in 2005 by KPRG during the geotechnical testing showed coal ash fill starting at around two feet below surface and going as deep as 14 feet, mainly in areas around Secondary Basin, Ash Surge Basin and Ash Bypass Basin. The deepest coal ash fill coming from the area between the Ash Surge Basin and Ash Bypass Basin. MWG Exh. 201 at 37, 41, 43-46 (#24300, #24304, 06-09, -24310) (*see* GT-7 (2-12 feet deep), GT-8 (2.5-12 feet deep), GT-9 (3-14 feet deep)). Soil borings from December 2010, when MWG installed monitoring wells, particularly borings for wells MW-9, 11 and 12, show cinders "in fill that extends from the surface to as much as 24.5 feet below the surface." EG Br. at 44; EG Exh. 13C at 22-41 (#7102-7121); EG Exh. 30.5E; EG Exh. 24E at 16-19 (#40059-40062); 10/23/17 Tr. at 77:20-86:1. Also, Environmental Groups argue that coal ash is buried as low as 443 feet above mean seas level (MSL), which allows it to be saturated with groundwater at times up to nine feet, based on groundwater elevation fluctuations at the site between 430 to 452 feet above MSL. EG Exh. 13C at 33 (#7113); MWG Exh. 903 at 17 (Table 403); EG Br. at 44. Thus, the Board finds that the Environmental Groups proved that it is more likely than not that the coal ash is spread out across the Stations in the fill and is contributing to the exceedances in the Stations' monitoring wells.

[8] The report finds that material in TP-16, 25 and 29 was not a coal combustion waste (CCW).

Ash Cinders Stored on Land. MWG's employee, Mr. Kelly, testified that coal ash cinders at some point were temporarily stored on the ground in an open area directly south of the Bypass Basin for two to three months during the winter before 2012, because a contractor, Reed Mineral, could not get them offsite. 1/31/18 Tr. 184:20-185:21 (Kelly Test.); MWG Exh. 667 at 12; EG Br. at 45. When the cinders were removed, they went to Reed Mineral to be used in shingles and as sandblasting material. *Id.* at 187:23-188:3 (Kelly Test.). The closest downgradient monitoring wells to the area identified by Kelly at that time frame are MW-13, 12 and 14. An intermediate or side gradient well is MW-9. MWG Exh. 903 at 33; MWG Exh. 667 at 11-12. The groundwater monitoring results for these wells show exceedances of arsenic, sulfate, boron, TDS in 2011 - 2012. MWG Exh. 810. The Board, thus finds, that temporary storage of the cinders contributed to contamination at the Station.

Weighing the facts presented, the Board finds that Environmental Groups have proven that it is more likely than not that the historic areas and fill containing coal ash are causing or contributing to GQS exceedances at the Station.

iii. Monitoring Wells

Powerton Station's groundwater monitoring system consists of 19 monitoring wells (MW-1 through 19). MWG Exh. 901 at 33. MWG installed initial 15 groundwater monitoring wells (MW-1 through MW-15) in 2010. MWG Answer and Defenses 5/5/14 at 2. MWG installed MW-16 in a location south of MW-9, to comply with section 5(f) of the Powerton CCA, which requires the well "in a location approved by IEPA to better define upgradient groundwater quality." MWG Exh. 636 at 3 ¶ 5(f). Additional wells, MW-17, 18 and 19, were installed later to comply with proposed CCR rules. 2/1/18 Tr. at 135:6-9.

The groundwater monitoring through the initial 15 monitoring wells (MW-1 though MW-15) was conducted from the last quarter of 2010 through second quarter of 2017. 2/1/18 Tr. at 85:24-86:14, 110:2-20; MWG Exh. 810. The monitoring in MW-16 began in last quarter of 2012. MWG Exh. 810 at 31. Monitoring at wells MW-17 and MW-18 started in November 2015, and at MW-19 in November 2016. *Id.*; 2/1/18 Tr. at 135.

While wells MW-6, 8, 12, 14 and 15 are screened in the shallow silt/clay unit, the other wells are screened in the deeper sand/gravel unit. EG Exh. 401 at 17, 2/1/18 Tr at 130. The monitoring wells MW-1 through MW-10 wells were also used to characterize the site hydrogeology. These wells were spaced approximately 400 feet apart around the perimeter of ash ponds and screened approximately 10 feet past the intersection of the groundwater table to ensure collection of representative groundwater samples. EG Exh. 13C at 3.

Monitoring well MW-16, which is located outside of the area of groundwater impact associated with ash handling activities, is identified as an "**upgradient well**" with respect to direction of groundwater flow, or a "background" well, showing potential impact from off-site sources. EG Exh. 255 at 2. EG Br. at 40, 1/30/18 Tr. at 83. Monitoring wells MW-1, MW-9 and M-10 that are located upgradient of specific ash basins but are considered "intermediate" or "side gradient" wells because they are within area of impacted groundwater from historical ash related activities. MWG Exh. 639 at 1 ("Illinois EPA does not agree that MW-1, MW-9 and MW-10 are readily up gradient of historical ash related activities that may impact groundwater quality proximate to these wells…would characterize [them] as side gradient or intermediate wells");

EG Br. at 40, EG Exh. 255 at 2. All other wells (MW-2 through MW-8, MW-11 though MW15, and MW-17 through MW-19) are considered "downgradient" wells, showing the impact of MWG's operations on the groundwater quality. EG Exh. 255 at 2. A potable water well survey indicates six wells within 2,500-foot radius of the ash pond, but none of the wells are located downgradient from the ash ponds. MWG Exh. 621 at 14.

Starting from December 2010, quarterly groundwater samples from monitoring wells MW-1 through MW-16 were analyzed for 35 parameters. MWG Exh. 810. Monitoring wells MW-17 through 19 were analyzed for 22 parameters, including coal ash indicator constituents. 2/1/18 Tr. at 33-35. The monitored parameters from all 19 wells included coal ash indicator constituents – boron, chloride, sulfate, and TDS. MWG Br. at 6.

The site hydrogeologic conditions at the Powerton station were determined by Patrick Engineering using the soil boring logs of ten groundwater monitoring wells installed around the perimeter of the ash pond. EG Exh. 13C at 3. The site is predominantly fine sand fill underlain by sand and gravel with a silt seam running through a portion of the site. *Id.* at 7. There are two groundwater flow units at the Powerton Station that are distinct and hydraulically connected. 2/1/18 Tr. at 129-130, MWG Exh. 901 at 34. The first is on a discontinuous silty-clay unit with groundwater flowing from east to west. *Id*. The second is a sandy gravel unit at depths ranging from 18 to 28 feet below surface, with groundwater flow north towards the Illinois River. *Id.*; 2/1/18 Tr. at 133. The Board finds that hydrogeologic investigation performed by MWG consultants adequately represents the groundwater flow conditions at the Powerton Station and support designation of the wells as upgradient and downgradient.

iv. Exceedances of Part 620 Standards

The groundwater monitoring results at Powerton indicate 403 exceedances of the Board's Part 620 groundwater quality standards for coal ash constituents between December 2010 and April 2017 in 14 of the 19 monitoring wells. MWG Exh. 810. These include wells MW-2, MW-6 through MW-15, and MW-17 through MW-19. The groundwater monitoring results show no comparative exceedances of the standards in the upgradient monitoring well MW-16, as well as MW-1 (intermediate well) or wells MW-3, MW-4 and MW-5 (that show whether contamination may be moving north of the Former Ash Basin). Further, the results indicate the number of exceedances ranging from:

a) 1 to 3 in wells MW-2, MW-10, MW-18 and MW-19; and
b) 12 to 101 in wells MW-6 through MW-9, MW-11 through MW-15, MW-17 and MW-18.

The constituents above the Class I standard are as follows with number of exceedances shown in parenthesis: antimony (1), arsenic (83), boron (64), lead (2), selenium (4), sulfate (104), thallium (26) and TDS (119). A summary of the exceedances is presented in Tables 2.A-2.C, below. MWG Exh. 810; MWG Exh. 901 at 33.

Table 2.A: Powerton Groundwater Monitoring Results Summary

Monitoring Wells	Closest Ash Pond, hist storage	Location	Constituents	Number of Exceedances of Part 620 Standards	Year(s)
MW-02	ASB, FAB	Downgradient	Antimony	1	2013
MW-06	SSB	Downgradient	Arsenic	1	2014
			TDS	7	2012-2016
			Sulfate	9	2012-2017
MW-07	SSB	Downgradient	Arsenic	26	2010-2017
			TDS	12	2011-2016
			Lead	1	2010
MW-08	ASB	Downgradient	Sulfate	3	2012-2015
			TDS	9	2013-2017
MW-09	ABB	Intermediate	Boron	21	2010-2017
MW-10	ASB, LRB	Intermediate	Boron	2	2014
			Lead	1	2013
MW-11	ASB, LRB	Downgradient	Arsenic	15	2012-2016
			Boron	2	2012
			Sulfate	1	2017
			TDS	1	2017
MW-12	ASB, ABB, EYRB	Downgradient	Arsenic	7	2011-2016
			Boron	1	2013
			Sulfate	14	2012-2017
			TDS	10	2014-2016
MW-13	ASB, MCB, EYRB	Downgradient	Arsenic	22	2010-2017
			Boron	26	2014-2017
			Sulfate	27	2010-2017
			TDS	26	2010-2017
MW-14	MCB	Downgradient	Arsenic	3	2010-2011
			Boron	7	2014-2017
			Selenium	2	2011-2013
			Sulfate	26	2010-2017
			Thallium	20	2011-2017
			TDS	27	2010-2017
MW-15	ASB, MCB	Downgradient	Arsenic	2	2011-2012
			Boron	1	2016
			Selenium	2	2015
			Sulfate	16	2011-2017

			TDS	18	2011-2017
MW-17	ASB, MCB	Downgradient	Arsenic	7	2016-2017
			Sulfate	8	2015-2017
			Thallium	6	2016-2017
			TDS	8	2015-2017
MW-18	ASB, FAB	Downgradient	TDS	1	2016
MW-19	ABB, EYRB	Downgradient	Boron	3	2017

Table 2.B: Powerton Groundwater Monitoring Results Summary (by year)

Year	**Monitoring Wells**	**MW-2**	**MW-6**	**MW-7**	**MW-8**	**MW-9**	**MW-10**	**MW-11**
	Constituent	**# of Exceedances Above Part 620 Class I Groundwater Standards**						
2010	Arsenic			1				
	Boron					1		
	Lead			1				
2011	Arsenic			4				
	Boron					2		
	TDS			3				
2012	Arsenic			4				1
	Boron					4		2
	Sulfate		2		1			
	TDS		1	3				
2013	Antimony	1						
	Arsenic			4				4
	Boron	1				3		
	Lead						1	
	Sulfate		2		1			
	TDS		1	1	3			
2014	Arsenic		1	3				4
	Boron					2	2	
	Sulfate		2					
	TDS		2	2	2			
2015	Arsenic			4				4
	Boron					4		
	Sulfate		1		1			
	TDS		2	1				
2016	Arsenic			4				2
	Boron					3		
	Sulfate		1					
	TDS		1	2	2			
2017	Arsenic			2				
	Boron					2		
	Sulfate		1					1
	TDS				2			1

Total	2	17	39	12	21	3	19

Table 2.B: S Powerton Groundwater Monitoring Results Summary (by year) (contd)

Year	Monitoring Wells	MW-12	MW-13	MW-14	MW-15	MW-17	MW-18	MW-19
	Constituent	# of Exceedances Above Part 620 Class I Groundwater Standards						
2010	Arsenic		1	1				
	Boron		1					
	Sulfate		1	1				
	TDS		1	1				
2011	Arsenic	1	1	2	1			
	Boron		6					
	Selenium			1				
	Sulfate		6	6	1			
	Thallium			3				
	TDS		5	6	1			
2012	Arsenic	3	2		1			
	Boron		2					
	Sulfate	1	2	2				
	Thallium			2				
	TDS		2	2				
2013	Arsenic	2	4					
	Boron	1	3					
	Selenium			1				
	Sulfate	2	4	3	3			
	Thallium			4				
	TDS		4	4	3			
2014	Arsenic		4					
	Boron		4	1				
	Sulfate	3	4	4	2			
	Thallium			3				
	TDS	2	4	4	4			
2015	Arsenic		4					
	Boron		4	2				
	Selenium				2			
	Sulfate	3	4	4	4	1		
	Thallium			3				
	TDS	4	4	4	4	1		
2016	Arsenic	1	4			4		
	Boron		4	2	1			
	Sulfate	3	4	4	4	4		
	Thallium			4		3		
	TDS	4	4	4	4	4	1	

2017	Arsenic		2			3		
	Boron		2	2				3
	Sulfate	2	2	2	2	3		
	Thallium			1		3		
	TDS		2	2	2	3		
Total Exceedances		32	101	85	39	29	1	3

Table 2.C: Powerton Groundwater Monitoring Results Summary (by wells)

Chemical Constituent	**Antimony**	**Arsenic**	**Boron**	**Lead**	**Selenium**	**Sulfate**	**Thallium**	**TDS**	**Total**
Class I GWQS (mg/L)	**0.006**	**0.01**	**2**	**0.0075**	**0.05**	**400**	**0.002**	**1200**	
Monitoring Well	**Number of Exceedances**								
MW-2	1		1						2
MW-6		1				9		7	17
MW-7		26		1				12	39
MW-8						3		9	12
MW-9			21						21
MW-10			2	1					3
MW-11		15	2			1		1	19
MW-12		7	1			14		10	32
MW-13		22	26			27		26	101
MW-14		3	7		2	26	20	27	85
MW-15		2	1		2	16		18	39
MW-17		7				8	6	8	29
MW-18								1	1
MW-19			3						3
Total exceedances	1	83	64	2	4	104	26	119	403

Antimony. Over the entire seven-year monitoring period, only one exceedance of antimony Class I GQS was registered in all monitoring wells: in MW-2, during the second quarter of 2013. MWG Exh 810. Except for this event, the antimony level in MW-2 was below detection level at all other sampling periods. MWG Exh 810. Environmental Groups' expert, Dr. Kunkel, states that antimony may be present in coal ash leachate. EG Exh. 401 at 7. Further, MWG's expert Seymour identifies antimony as one of the indicators for leachate from MWG's ash ponds. MWG Exh. 903 at 42. However, MWG's bottom ash NLET results indicate that the level of antimony in the ash leachate was below the Part 620 Class I standard of 0.006 mg/L. MWG 903 (Table 5-3). Other than the one exceedance in MW-2, there were none observed in any of the remaining 18 monitoring wells. Thus, the single exceedance maybe attributable to

sampling or analytical error rather than by coal ash storage or handling activities at the site. Also, given that MW-2 is located at the north/northeast edge of the northern most former ash basin and had only two exceedances of Part 620 standards (1 antimony and 1 boron) during the seven-year monitoring period, the well may not be in area of impacted groundwater. MWG Exh. 810; MWG Exh. 901 at 35. The Board finds that the Environmental Groups have not proven that it is more likely than not that this single exceedance is caused by MWG operations.

Arsenic. The monitoring results indicate 83 exceedances of the Part 620 Class I arsenic standard in 6 monitoring wells from 2010 through 2017. These wells include (the number of exceedances shown in parenthesis): MW- 6 (1), MW-7 (26), MW-11 (15), MW-12 (7), MW-13 (22), MW-14 (3), MW-15 (2), and MW-17 (7). These wells are all located downgradient of the ash basins. While some of the wells (MW-6, 12, 14, and 15) had intermittent exceedances of the arsenic standard over the seven-year monitoring period, the results for wells MW-7, MW-11 and MW-13 indicate exceedances over a period of four to six years.

Like antimony, arsenic is listed by both Dr. Kunkel and Mr. Seymour as a constituent that may be present in coal ash leachate. EG Exh 401 at 7; EG Exh. 903 at 42. In this regard, MWG's bottom ash Neutral Leaching Extraction Test (NLET) result of 0.05 mg/L or less for arsenic suggests the presence of arsenic in the ash leachate at levels higher than the Part 620 Class I standard of 0.01 mg/L. MWG 903 (Table 5-3). While there were 83 exceedances in the downgradient wells, arsenic was not detected in the upgradient well MW-16 during the seven-year period. This indicates that upgradient off-site sources did not contribute to the exceedances of the arsenic standard. Given these observations, the Board finds that the Environmental Groups have proven that it is more probable than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to exceedances of arsenic standard in wells MW-6, MW-7, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-17.

Boron. The groundwater monitoring results indicate 64 exceedances of the Part 620 boron standard during the seven-year monitoring period in nine monitoring wells. EG Br. at 77-110 (App A); MWG Exh 810, also see Table 2 above. Most of the exceedances (shown in parenthesis) were observed in three monitoring wells MW-9 (21), MW-13 (26), and MW-14 (7). The other six wells had one to three exceedances over the seven-year period. Also, the upgradient well MW-16 with boron levels ranging from 0.13 mg/L to 1.0 mg/L did not have any exceedances of the boron standard of 2.0 mg/L. However, the boron levels in monitoring wells MW- 9, 13 and 14 ranging between 1.5 mg/L to 4.3 mg/L were higher than the upgradient well. This indicates that onsite sources, rather than any offsite sources, are contributing to groundwater exceedances.

Both the Environmental Groups and MWG agree that boron is an indicator of coal ash contamination. EG Exh 401 at 7, Exh. 903 at 42. Further, Seymour's comparison of the monitoring results from 2014 with indicator constituents in leachate shows that boron is an indicator of leachate from Powerton ash ponds. MWG Exh 903 (Table 5-4). However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the GWQS because the leachate levels were below such standard. MWG Exh. 903 at 41. Here, MWG's bottom ash NLET results indicate that the level of boron ranged from less than 0.1 mg/L to 2.0 mg/L, which the Part 620 Class I standard. MWG 903, Table 5-3. Dr. Kunkel asserts that boron is present in concentrations above Class I standard in wells sampling lower sand and gravel unit (MW-2, 9, 10, 11, and 13), as well as the upper silt/clay unit (MW-12

and 14). EG Exh. 403 at 42. He maintains that exceedances remain even after relining four of the ash ponds in 2010 and 2013, suggesting contribution from a leak in the new liner or coal ash deposited historically outside the basins. *Id.*

As noted above, MW-9, MW-13, and MW-14 had boron exceedances over four or more years and accounted for 83% of the exceedances. While MW-9 is located upgradient of the ash ponds, it is not considered an "upgradient" well because it is within an area of impacted groundwater from historical ash related activities. EG Br. at 41; EG Exh. 255 at 2 (#11236). Other wells (e.g. MW-11, 12, 15, and 19) had few intermittent exceedances that correlated with exceedances of other constituents in other wells in the same area and time. With respect to boron, exceedances in other wells appear to be less representative. The MW-2 single exceedance in 2013, and two exceedances in MW-10 in 2014, appear to be more random and not correlating to any other comparative exceedances in the same time. Given that any offsite boron contribution was below the groundwater standards and significantly lower than the levels in the onsite wells, the Board finds that the Environmental Groups have proven that it is more probable than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to exceedances of boron standard in wells MW-9, MW-11, MW-12, MW-13, MW-14 and MW-19 at Powerton.

Lead. The monitoring results indicate two exceedances of the Part 620 lead standard during the seven-year monitoring period: first in 2010 in MW-7 located on the western edge of ash settling basin; and second in 2013 in MW-10 located east of ash surge basin. EG Br. App. A., MWG Exh 901 at 35. In all other monitoring wells lead was either below detection level or below the Part 620 standard. MWG Exh. 810. While lead is not included in Dr. Kunkel's list of coal ash constituents, Seymour includes it in his "maximum" or second tier list of coal ash leachate constituents. MWG Exh. 901 at 42. MWG's bottom ash NLET results indicate that the level of lead in the coal ash leachate was below the Part 620 Class I standard of 0.0075 mg/L. MWG 903 (Table 5-3). Thus, the Board finds that the Environmental Groups have not proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to the two exceedances of the lead standard at the Powerton Station.

Selenium. There were two exceedances of the Class I GQS selenium standard in MW-14 (in 2011 and 2013), and one in MW-15 (in 2015) during the seven-year monitoring period. Selenium levels were below the groundwater standard in all other monitoring wells. MWG's bottom ash NLET results indicate that the level of selenium was below the Part 620 Class I standard of 0.050 mg/L. MWG 903, Table 5-3. Also, selenium is not considered as a primary indicator of coal ash leachate. Therefore, the Board finds that the Environmental Groups have not proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to the few sporadic selenium exceedances at Powerton.

Thallium. The monitoring results show that there were 20 exceedances of the Class I thallium standard in MW-14 (2011 through 2017) and 6 in MW-17 (2016-17). Neither Environmental Groups' experts nor MWG's experts consider thallium as a coal ash leachate indicator. EG Exh. 401 at 7 and MWG Exh. 903 at 42. Further, MWG's bottom ash NLET results indicate that the level of thallium was below the Part 620 Class I standard of 0.0020 mg/L. MWG 903, Table 5-3. Thus, the Board finds that the Environmental Groups have not

proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to the thallium exceedances at Powerton.

Sulfate and TDS. There were 104 exceedances of sulfate standard and 119 exceedances of TDS standard during the seven-year monitoring period. MWG Exh. 810. All exceedances occurred in downgradient wells, with sulfate in nine wells (MW-6, 8, 11 through 15 and 17) and TDS in 10 wells (same as sulfate wells plus MW-7 and 18). While some wells had intermittent exceedances, wells MW-12, 13, 14, and 15 had sulfate and/or TDS exceedances over a period of four or more years. *Id.* There were no exceedance of sulfate or TDS in the upgradient monitoring well MW-16 during the seven-year monitoring period.

Both Environmental Groups and MWG list sulfate as an indicator constituent of coal ash, and Dr. Kunkel notes that higher concentration of sulfate may be accompanied by high concentrations of TDS. EG Exh. 401 at 7; MWG Exh. 903 at 40. Further, Seymour's comparison of the monitoring results from 2014 with indicator constituents in leachate shows that sulfate is an indicator of leachate from Powerton ash ponds. MWG Exh 903, Table 5-4. However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the sulfate and TDS standards because the leachate levels are below the standards. He relies on MWG's Will County Station bottom ash NLET results of sulfate at 49 mg/L and TDS at 200 mg/L. MWG Exh. 903 at 41 and MWG Exh. 901 at 8.

Sulfate and TDS are indicators of coal ash contamination in groundwater. Further, the monitoring results show consistent exceedance of the Class I standard for both constituents during the seven-year monitoring period at multiple downgradient monitoring wells. Also, there is no indication of contamination being caused by an off-site source since upgradient monitoring well show no exceedances of either sulfate and TDS groundwater standards. The Board, therefore, finds that the Environmental Groups have proven that it is more likely than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to the 104 sulfate (wells MW-6, 8, 11, 12, 13,14, 15 and 17) and 119 TDS (MW-6, 7, 8, 11, 12, 13, 14, 15, 17 and 18) exceedances at Powerton Station.

v. Background Concentrations Exceedance

Environmental Groups allege that at Powerton, the median concentrations of boron and sulfate in fifteen downgradient wells (MW-1 through MW-15) exceeded the median concentration of those constituents in the upgradient well (MW-16). EG Exh. 405 at 7. They also assert that the median concentration of sulfate in nine wells (MW-4, 5, 8, 9, 11, 12, 13, 14, and 15), and boron in seven wells (MW-6, 8, 11, 12, 13, 14, and 15) exceed the upper-bound 90th percentile background values from the IEPA's statewide background data. *Id.* at 40-41. Dr. Kunkel also notes that Powerton site overlays the sand and gravel/shallow bedrock aquifers, which are the same aquifers from which the IEPA's background community water supply wells are drawing water. EG Exh. 401 at 8. Further, he notes that the actual background median for sulfate from the background well (MW-16) at the Powerton Station was within a few milligrams of the median statewide sulfate value. Thus, Dr. Kunkel argues that the statewide median background values may be used to evaluate groundwater monitoring results even though the statewide community water supply wells were not located in counties with MWG plants. 1/29/18 Tr. 83-84.

Dr. Kunkel asserts that the groundwater monitoring data at Powerton allows the comparison of the downgradient well concentrations of indicator constituents, boron and sulfate, with both the statewide area background and site-specific background (MW-16). EG Exh. 405 at 7. While the median values of sulfate and boron in all fifteen downgradient wells are above the median values of those constituents in the upgradient well, neither the Environmental Groups' nor MWG's experts established the 90th percentile upper bound background value for well MW-16. The parties agree that the appropriate comparison for background values would the upper bound 90th percentile value. Thus, the Board limits the groundwater monitoring results comparison to the 90th percentile statewide values. The Board finds that, as asserted by the Environmental Groups, a comparison of the median values of boron and sulfate in the downgradient wells with the 90th percentile statewide values indicate exceedances in 10 wells: boron (MW-04, 05, 08, 09, 11, 12, 13,14 and 15) and sulfate (MW-06, 08, 11, 12, 13, 14, and 15). The Board finds that these exceedances of the statewide background and site-specific upgradient median appear to be consistent with the exceedances of groundwater standards of sulfate and boron in many of the downgradient wells.

Given that there is no indication of contamination being caused by an off-site source, the Board finds that the Environmental Groups have proven that it is more probable than not that the coal ash stored at the site in the ash ponds or outside the ash ponds is causing or contributing to the exceedances of the upper-bound 90th percentile background values of boron (in wells MW-4, 5, 8, 9, 11, 12, 13, 14 and 15) and sulfate (in wells MW-6, 8, 11, 12, 13, 14 and 15) at Powerton Station.

4. Will County

A. Uncontested Facts

i. The Station

The Will County Station began operations in 1955 with four coal-fired electric generating units, Units 1-3 were deactivated between 2010 and 2015. Only one active unit, Unit 4, constructed in 1963, operates now. Joint Stip. No. 40, MWG Exh. 666 at 1, 1/30/18 Tr. at 188:20-22, 189:19 (Race Test.); MWG Exh. 903 at 21. MWG has been operating the plant since 1999. Joint. Stip. No. 41.

The Station is located on a peninsula, between the Chicago Sanitary and Ship Canal (CSSC) on the east and the Des Plaines River on the west, with surface water on either side. 2/2/18 Tr. at 172:5-20; MWG Exhs. 901 59 and 903 at 21. The Station is bordered on the north by Romeo Road and on the south Hanson Materials (f/k/a Material Services Corp.). EG Exh. 15C , SOF 358. There is also ComEd switchyard further west across the Des Plaines River. MWG Exh. 903 at 21, 901 at 59; MWG Exh. 652 at 2-1 (#29509).

At Will County, fly ash is collected using electrostatic precipitators and transported off-site for beneficial use. 1/29/18 Tr. at 177-178; MWG Exh. 903 at 21 (Seymour citing Phase I Wil County Environmental Site Assessment report at #28 (#29516)). Bottom ash that falls to the bottom of the furnace is mixed with water to form a slurry and is pumped to Ash Ponds 2S and 3S for settling. MWG Exh. 903 at 21-22 (Seymour report, citing Phase I Will County Environmental Site Assessment report at #28 (#29516)); 1/29/18 Tr. at 192. Bottom ash is then

collected from the ponds and transported off-site for beneficial reuse. The slurry water is recycled back to the Station for treatment. MWG Exh. 903 at 22 (Seymour report).

ii. Ash Ponds

Will County has four ash ponds: 1N, 1S, 2S and 3S. All ponds were constructed in 1977 with 36" thick Poz-o-Pac liners. MWG Exh. 901 at 5; MWG Exh. 500 at #5-9; 1/30/18 Tr. at 191:9-19 (Race Test.). Ponds 2S and 3S also had bituminous seal coat. *Id*. The ponds are regulated under NPDES permit #IL0064254. MWG Exhs. 652; 653, 655; 1/30/18 Tr. at 202:3-20 (Race Test.).

Ponds 1N and 1S were removed from service in 2010. MWG Exh. 901 at 60; 903 at 22. These ponds are further discussed in the Contested Facts section below.

Ponds 2S and 3S remain in operation and have been relined, 2S in 2013 and 3S in 2009. MWG Exh. 901 at 60; MWG Exh. 510 (2S line replacement documentation). Seymour described the ponds lining as (described bottom up): 36+" poz-o-pac, a bottom geotextile cushion, a 60 mil HDPE liner, a top geotextile cushion, and a sand cushion and limestone warning layer on the bottom 2S also has geocell liner on the sides. MWG Exh. 901 at 61; MWG Exh. 903 at 34-35. The ponds' bottom elevation is at 582 ft; average groundwater elevation at 3S is at 581 (about 1.5 feet below the ponds' bottom) and at 2S at 282.5 feet (about the same level as the pond's bottom). *Id*. The two active ash ponds are used interchangeably, only on in service at a time, while the other is designated for cleaning. MWG Exh. 903 at 35. These ponds are dredged approximately on an annual basis. In 2010 MWG performed the ASTM D3987-85 analysis of bottom ash taken from Will County ash pond 3S, the results of which indicate presence of boron, sulfate and TDS. MWG Exh. 901 at 8.

iii. Will County VN

The IEPA issued Violation Notice #W-2012-00058 (Will County VN) for the Will County Station (EG Exh. 2A) alleging that "operations at ash impoundments have resulted in violations of Groundwater Quality Standards" during 2010-2012 at monitoring wells MW-1 through MW-10, including for chloride (MW-1, 2, 3, 6, 7, and 8), antimony (MW-1, 2), manganese (MW-1, 3, 4, 7, 8, and 10), boron (MW-2, 4, 5, 6, 7, 8, 9, and 10), arsenic (MW-7), sulfate (MW-1, 2, 4, 5, 6, 7, 8, 9, and 10), TDS (MW-4, 5, 7 and 8), as well as pH (MW-5, 6). EG Exh. 2A at 3-9.

iv. Will County CCA

The Will County CCA (MWG Exh. 656) states that:

> Operations at ash impoundments have resulted in violations of the Groundwater Quality Standards at monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, and MW-10. MWG Exh. 656 at 2 ¶ 3.

The CCA notes that "respondent agrees to undertake the following actions, which the Illinois EPA has determined are necessary to attain compliance" with the statute and Board rules. MWG Exh. 636 at 3 ¶ 5. Subsections (a) through (m) of paragraph 5 list activities MWG must

undertake, subsections (a) though (d) are identical as in the Joliet 29 and Powerton CCAs. The other subsections require:

5(e)	removing ponds 1 North (1N) and 1 South (1S) from service and diverting all water from these ponds to the existing ponds 2 South (2S) and 3 South (3S); and developing and implementing a dewatering system which will not allow water to exceed a depth of one foot above the bottom of ponds 1N and 1S;
5(f)	apply to IEPA for a construction permit to reline 2S with HDPE liner;
5(g), (i)	submitting application to IEPA to establish and establishing a GMZ under section 620.250 within one year from the date of CCA;
5(h), (i)	entering into ELUC to cover area underlying GMZ, except for ComEd owned area, submit proposed and final ELUC to IEPA; and
5(j)	submitting certification of compliance upon completing CCA requirements within one year of the date of CCA. MWG Exh. 656 at 3-4 ¶ 5.

On October 17, 2013, MWG filed a certification with the IEPA that all CCA measure were completed. Joint Stip. at 4; MWG Exh. 661.

v. Will County GMZ and ELUC

As required by Items 5(g), (h) and (i) of the Will County CCA,MWG on January 18, 2013, filed applications with the IEPA to establish a GMZ (MWG Exh. 276) and also a proposed an ELUC (MWG Exh. 659). Joint Stip. at 4; MWG Answer and Defenses 5/5/14 at 23; MWG Exhs. 276 and 659.

Both the GMZ and the ELUC cover the same area, including ash ponds and the eastern part of the site, with the following borders:

> Groundwater flow in the vicinity of the subject ash ponds is in a westerly direction with discharge to the adjoining Des Plaines River. The western (downgradient) extent of the proposed corresponds with this hydraulic boundary. The eastern boundary is defined by the Chicago Sanitary and Ship Canal (CSSC) which forms a hydraulic boundary on the east side of the facility. The north and south sides of the proposed ELUC are based on the flow system and location of the four ash ponds. The vertical extent of the ELUC would be the first underlying aquitard identified as the Maquoketa Shale, approximately 140 feet below ground surface. The ELUC would therefore vertically include the unconsolidated overburden and the Silurian dolomite, both of which are hydraulically connected and overlie the Maquoketa Shale. EG Exh. 276 at 1 and MWG Exh. 659 at 1-2.

On July 2, 2013, IEPA replied, approving GMZ with several modifications and requesting that MWG submit the revised ELUC. MWG Exh. 658 at 1. IEPA modifications required excluding of the non-community wells from the ELUC area and ensuring that any unused non-community wells are properly. *Id*.

On September 4, 2013 KPRG (Mr. Gnat) on behalf of MWG submitted requested modifications to the ELUC and GMZ boundary map and on September 26, 2013 IEPA approved the modification. MWG Exh. 660.

The GMZ is established under 35 Ill. Adm. Code 620.250(a). EG Exh. 276 Att. 2, at 1 Note 1. The application notes that "Class I" is the groundwater classification "the facility will be subject to at the completion of the remediation". EG Exh. 276, Att. 2, Part I ¶ 10 (#630). The GMZ application notes the following selected remedy:

> The agreed upon remedy is specified in Item 5(a) through (j) of the executed [CCA]… The remedy includes lining of the Ash Pond 2S with HDPE, removing Ash Ponds 1S and IN from service and installing a dewatering system within those ponds to keep liquid levels to within no more than one foot of the bottoms of those units. This [GMZ] application fulfills requirements set forth under Item 5(g) of the CCA. EG Exh. 276 Att. 2, Part III ¶ 1 (#637).

The application also notes that "[at] the completion of the corrective process, a final report is to be filed which includes the confirmation statement included in Part IV." *Id*. Att. 2, at 1 Note 1.

B. Contested Facts

i. Ash Ponds Dredging, Liner Ruptures and Flooding

Dr. Kunkel asserts that boron is present at Will County in concentrations above Class I standard because of past and current leaks in the liners of the four ash ponds and past and ongoing leachate from ash utilized for fill or construction materials outside of the ponds. EG Exh. 401 at 32. He also argues that "there has been ground-water table mounding beneath the ash ponds, as shown on ground-water table contour maps in the MWG quarterly monitoring reports, and all ground-water monitoring wells at the site should be considered down-gradient." *Id.* He maintains that exceedances remain even after relining the four ash ponds between 2010 and 2013, suggesting a leak in a new liner or contribution from coal ash deposited historically outside the basins. *Id*.

As noted with all other Stations, both poz-o-pac and HDPE liners are prone to damage in certain conditions, i.e. severe weather or rupture by heavy equipment during dredging. MWG relined the ponds at Will County on the assumption they were in a "poor" condition. MWG Exh. 607; EG Exh. 34 at 7 (#23614); MWG Exh. 606 at 18 (#23647); *see also* 10/23/17 Tr, at 16; 10/24/17 Tr. at 12-13. In 2005 and 2006 MWG consultant, NRT, investigated the liners at Will County ponds and rated condition of all four ponds as "poor." EG Exh. 34 at #23614; MWG Exh. 606 at 23647. The reports also rated these ponds as "high" for "contamination potential". *Id*. When the ponds were relined, however, the original poz-o-pac liners in 2S and 3S were found to be in a "good condition." 10/24/17 Tr. at 304:7-10 (Maddox Test.); SOF at ¶ 621. When relining the 2S pond, MWG employees discovered that "existing poz-o-pac floor is different than the sites drawing" and commissioned NRT to take borings. EG Exh. 300. Boring taken at 2S in 2013 during relining showed that the bottom poz-o-pac layer goes deeper than 36". MWG Exh. 510 at 4 (#34271); 1/30/18 Tr. at 200:2-201:1 (Race Test.). Further, the record also

suggests that some coal ash may have been left between the poz-o-pac and HDPE layers when relining the ponds, since that was a practice approved by MWG employees at that time. *See e.g.* EG Exhs. 22, 32; 10/23/17 Tr. at 156:18-162:21 (Race Test.).

MWG employees were also concerned that even after relining with HDPE, the liners will be easily damaged by equipment during dredging. Rebecca Maddox noted in 2008 to Christopher Lux that LaFarge employees have "serious apprehension about working on this liner" and that MWG employees had to "reiterate over and over to be careful." She further noted that "[n]o matter how much we would reiterate to them to be careful, the possibility of the liner being punctured is much greater now than w/ just a poz-o-pac type "liner." We really feel this liner, even w/ the cushion and warning layers, will not be able to withstand the constant heavy equipment traffic that will continue." EG Exh. 306 at 1. The record shows that the liner in at least one of the ponds had cracked. An inspection of 3S in October 2009 during the liner replacement indicated that the liner cracked, and the water was seeping in. EG Exh. 303 at 1; 10/24/17 Tr. at 214:5-215:12. In 2012 KPRG did permeability testing and found hairline cracks in the poz-o-pac liner of one of the ponds. EG Exh. 286 at 2 (#14745); 10/25/17 Tr. at 221:6-223:2. In July 2010, Maddox noted that repairs were needed on 2S weir because there were "numerous breaks within the weir that is compromising the effectiveness of it." EG Exh. at 311. In June 2012, Ms. Maddox found the south section of the HDPE liner in the 3S pond "extremely damaged," with the felt lining and the HDPE "completely torn up" and "buried under some of the ash for a bit." MWG Exh 307 at 1. She attributed the damage to the cleaning performed by LaFarge "many months ago". *Id*.

Will County also had at least one instance of ash sluice water getting out of the ponds and into the nearby waterbody. In 2008 MWG also notified IEPA and Illinois Emergency Management Agency that on November 3, 2008, water was "flowing over the concrete barrier of the Unit 1 & 2 ash pond and traveling into a ravine that leads to the Des Plaines River" on the northwest part of the property. EG Exh. 309.

The record also indicates dewatering coal ash in areas outside of the ponds. In July 2010, Pond 3S got very close to overflowing on the east side, with "water and material … running to the east." EG Exh. 311 at 2. The contractor suggested that MWG "take the material from Pond 2S and pile it on our property until it dewaters." *Id*. at 1. MWG's Rebecca Maddox instead suggested to put the material from Pond 2S "in the area south of the contractor parking lot," noting that "[w]e used that area last year to dewater the material from 3S." She further noted that the water from that runoff "should make its way eventually to the south area runoff," noting that the "material will be there for a while until it dewaters - like it was last year." *Id*.

After a careful review of the facts, the Board finds that the Environmental Groups established that both poz-o-pac and HDPE liners at Will County can and do crack or get damaged on occasions. Based on preponderance of all the evidence in the record, including the groundwater monitoring results, MWG practices in ponds relining and dredging, storing coal ash from the ponds outside of the ponds, the Board concludes that it is more likely than not that the ash ponds and the material from those ash ponds did leach contaminants into the groundwater.

ii. <u>Historical Coal Ash Sites</u>

The record shows that there are several areas that have been historically used to store coal ash: 1) ponds 1N and 1S; 2) fill areas outside of the ponds; and 3) alleged Slag and Bottom Ash Placement Area.

Ponds 1N and 1S still contain one inch of water. MWG Exh. 901 at 58. The water level in the ponds is not allowed to exceed one foot above the base. MWG Exh. 903 at 22. Mr. Seymour notes that no additional ash was deposited in these ponds since they were removed from operation in 2010. *Id*. They also still contain ash and are not capped. 10/23/17 Tr. at 169:18-21, 170:1-19; 10/24/17 Tr. at 14:2-15:19. The ponds have 36-inch-thick poz-o-pac liners with bituminous carrying coat. MWG Exh. 500 at 5, 7; 1/30/18 Tr. at 193:11-23 (Race Test.). MWG admitted that ponds liners are in poor condition being 40 year old poz-o-pac. EG Exh. 34 at (#23614); MWG Exh. 606 at (#23647); EG Exh. 15C at 22-27 (#7251-7256); 1/30/18 Tr. at 191:20-23; EG Exh. 201 at 19-24 (#24282-24287). In June and August of 2015 KPRG took 20 soil borings of "historical ash samples" at an area right outside the east side of 1N to test for compliance with CCB. EG Exh. 284 at 1; MWG Exh. 901 at 59; MWG Exh. 903 at 48. The report indicates that the ash deposits consist of bottom ash and slag from the coal combustion process. The study area was four by seven squares, with each square equaling 25 feet. EG Exh. 284 at 4 (#49568). The samples were analyzed using the NLET method (ASTM D3987-85) for metals. EG Exh. 284 at 1-2 (#49565-66). The test concluded that ash deposits consist of bottom ash or slag from coal combustion process and the 20 samples taken meet the criteria of Section 3.135 of the Act to be considered CCB for beneficial use and there were no outlier samples. *Id.*; EG Exh. 284 at 4 (#49568).

Ponds 1N and 1S are at least one foot below average groundwater elevations. 2/2/18 Tr. at 309:21-310:19, 143:5-148:4. Because the bottom of these ponds is sitting below the water table, the cracks in the poz-o-pac liners allow groundwater to seep into the ponds and for ash constituents to leak out into the groundwater. 2/2/18 Tr. at 149:15-18. Groundwater leaked through poz-o-pac at 1N and 1S ponds. EG Exh. 302; 10/24/17 Tr. at 211:18-213:20, 213:1-6 (contractors were requested to "cut holes in liner to pump out groundwater" and "then patch the holes").

Coal ash buried around the ash ponds. The coal ash has been buried here since at least 2005. EG Exh. 34 at 7 (#23614); MWG Exh. 606 at 18 (#23647); EG Exh. 15C at 22-27 (#7251-7256); 1/30/18 Tr. at 191:20-23; EG Exh. 201. In 2005, MWG consultant KPRG, took five soil borings around the ash ponds and the samples identified "slag/bottom ash/coal" in four of the borings, at depths ranging from zero to two feet through eight to nine and a half feet deep beneath the surface. EG Exh. 201 at 4, 29-24 (#24267, 24282-24287). In 2010 and 2011, when installing groundwater monitoring wells MW-01 through 10 around the ash ponds, Patrick Engineering took the borings for the wells, that also showed a thick layers of coal ash buried along the eastern edge of the four ponds to a depth of 12 feet. EG Exh. 15C at 5, 22-25, 27 (#7234, 7251-54, 7256). Layers of fill, going down to six to twelve feet, containing ash cinders were found in borings for MW-1, 2, 3, 4 and 6, all along the eastern edge of the ash ponds. EG Exh. 15C at 22-25, 2727 (#7251-54, 7256). Borings for MW-02 showed black coal cinders a depth of up to 12 feet as "wet." *Id*. at 27 (#7256).

Former Slag and Bottom Ash Placement Area is located on the southeast corner of the Station. MWG Exh. 901 at 59; 2/2/18 Tr. at 119:21-120:1 (Seymour Test.). This area was identified in the 1998 Phase II Environmental Site Assessment report as ash disposal area. EG

Exh. 18D at 6, Fig. 5 (#5708, 5742). Borings taken from this area in 1998 (B-1 through B-4) show coal ash mixed with gravel as deep as three feet below surface. EG Exh. 18D at 6, Fig. 5, App. A B-1- B-4 (#5708, 5747-50). Although, there was a monitoring well (MW-1) in this area in 1998, there are no current monitoring wells in this area. EG Exh. 18D at 6, Fig. 5 (#5708, 5742). is the area is not covered by ELUC or GMZ. *Id*. at 67 and 68.

Weighing the facts presented, the Board finds that Environmental Groups have proven that it is more likely than not that the historic areas and coal ash in the fill areas at the Station are causing or contributing to GQS exceedances at the Station.

iii. <u>Monitoring Wells</u>

The groundwater monitoring network at Will County consist of 12 monitoring wells. Ten monitoring wells (MW-01 through MW-10) were installed in 2010. They are located around the perimeter of the four ash ponds. EG Exh. 15C at 2, 19 (#7234, 7248). These wells were spaced approximately 150 – 300 feet apart and screened approximately 10 feet past the intersection of the groundwater table to ensure collection of representative groundwater samples. EG Exh. 15C at 3 (#7234). Two additional monitoring wells (MW-11 and 12), referred to as CCR wells, were installed in 2015 to address the new USEPA's Coal Combustion Residual (CCR) rule. 2/1/18 Tr. at 89:13-90:7, 165:17-166:4. Starting from December 2010, quarterly groundwater samples from monitoring wells MW-1 through MW-10 were analyzed for 35 constituents. MWG Exh. 812. The additional CCR wells, MW-11 and 12, were sampled quarterly from November 2015. *Id.* at 21-23. These samples were analyzed for 15 constituents, and did not include boron, sulfate and TDS. *Id.* at 21.

The site hydrogeologic conditions at the Will County station were determined in 2011 by Patrick Engineering using the soil boring logs of ten groundwater monitoring wells installed around the perimeter around all four the ash ponds. EG Exh. 15C at 3 (#7234). The site geology consists of approximately 1 to 5 feet of unconsolidated deposits or fill, underlain by Silurian Dolomite to approximately 140 feet below ground surface, underlain by the Maquoketa shale, which is generally considered to be an aquitard that separates the shallow groundwater in the unconsolidated units and the Silurian dolomite from the underlying aquifers. EG Exh. 15C at 2 (#7233). While the groundwater flow in the shallow aquifer is controlled by the Des Plaines River and the CSSC with groundwater likely flowing towards either of the rivers, the flow direction in the deep aquifer is towards the southeast. *Id.* However, the groundwater contour map prepared by KPRG in 2016 indicates flow towards the Des Plaines river. EG Br. App. F, MWG Exh. 901 at 63, 2/1/18 Tr. at 163:20-164:22. Seymour noted, "groundwater generally flows west to the Des Plaines River on the western portion of the site and is understood to flow east to the Chicago Sanitary and Ship Canal on the eastern portion of the site." MWG Exh. 903 at 23. Will County GMZ and ELUC also note that "[g]roundwater flow in the vicinity of the subject ash ponds is in a westerly direction with discharge to the adjoining Des Plaines River." MWG Exh. 659 at 1 (ELUC proposal); EG Exh. 276 at 1 (GMZ application).

While the Will County hydrogeologic report notes that the well locations were selected to represent both upgradient and downgradient with respect to direction of groundwater flow, the report does not identify specific wells as being up gradient or downgradient. EG Exh. 15C at (#7234). However, Mr. Gnat states that since the groundwater flow is to the west towards the Des Plaines River, the upgradient wells are MW-01 through MW-06. MWG Exh. 901 at 63,

2/1/18 Tr. at 164:18-22. The other six wells are considered downgradient wells (MW-07, 8, 9, 10, 11, and 12). 2/1/18 Tr. at 164:14-17. Seymour indicates that the highest groundwater elevation during each quarterly monitoring event varied between wells MW-01, 02, 03, 05 and 09; the lowest was in MW-10. MWG Exh. 903 at 23. Environmental Groups' expert Dr. Kunkel argues that "there has been ground-water table mounding beneath the ash ponds, as shown on ground-water table contour maps in the MWG quarterly monitoring reports, and all ground-water monitoring wells at the site should be considered down-gradient." EG Exh. 401 at 32.

Groundwater flow to the east on the eastern portion of the site towards CSSC, as well as the large number of exceedances of coal ash constituents (boron, sulfate and TDS) in the wells Mr. Gnat designates as upgradient (MW-1 through MW-6), indicate that these wells are in the area where groundwater is affected by either the ash ponds or historic ash disposal activities. *See. e.g.* EG Exh. 15C at 2, MWG Exh. 903 at 23. The Board, thus, finds that the Environmental Groups have proven that it is more likely than not that the wells MW-1 through MW-6 should not be treated as upgradient for the Station.

iv. <u>Exceedances of Part 620 Standards</u>

The groundwater monitoring results at Will County indicate 441 exceedances of the Board's Part 620 Class I GQS for coal ash constituents in all 10 initial monitoring wells (MW-1 through 10) installed in 2010. MWG Exh. 812. There were 281 exceedances in the wells (MW-1 through MW-6) and 159 exceedances in the down gradient wells (MW-7 through MW-10). No exceedances were observed in the two newly installed CCR wells (MW-11 and 12). *Id*. While MW-9 had the least number of exceedances (7), MW-4 had the most (81). The number of exceedances in the other 8 wells ranged from 15 to 66. *See* Tables 3.A. – 3.C below. The constituents above the Class I standards are: antimony (3 exceedances), arsenic (18), boron (207), selenium (1), sulfate (131), and TDS (80). As noted above, given the large number of exceedances of coal ash constituents (boron, sulfate and TDS) in the wells MW-1 through MW-6, the Board does not consider these wells as background wells.

Based on review of groundwater data, Seymour noted that historic use of property was causing the impacts. 2/2/18 Tr. at 122. The Board notes, however, that ash ponds may also be contributing to the impacts because the record indicates the groundwater flow in the shallow aquifer underlying the site is controlled by the Des Plaines River and the CSSC with groundwater flowing likely flowing towards the rivers. *See. e.g.* EG Exh. 15 C at 2 (#7233).

A summary of the groundwater monitoring data exceeding Part 620 standards for Will County is presented in Tables 3.A-3.C, below. EG Br. at 77-110 (App. A); MWG Exh. 812.

Table 3.A: Will County Groundwater Monitoring Results Summary

Monitoring Wells	Closest Ash Pond, historical storage	Location	Constituents	Number of Exceedances of Part 620 Standards	Year(s)
MW-01	AP1-N	Upgradient	Antimony	1	2011
			Boron	6	2012-2014
			Sulfate	5	2012-2013
			TDS	3	2013-2014
MW-02	AP1-N	Upgradient	Arsenic	5	2014-2016
			Antimony	2	2011
			Boron	19	2011-2017
			Sulfate	11	2010-2017
			TDS	7	2015-2017
MW-03	AP1-S	Upgradient	Boron	27	2010-2017
			Sulfate	12	2012-2017
			TDS	1	2012
MW-04	AP1-S	Upgradient	Boron	27	2010-2017
			Sulfate	27	2010-2017
			TDS	27	2010-2017
MW-05	AP2-S	Upgradient	Boron	27	2010-2017
			Selenium	1	2013
			Sulfate	23	2010-2017
			TDS	15	2013-2017
MW-6	AP3-S	Upgradient	Arsenic	1	2017
			Boron	27	2010-2017
			Sulfate	8	2010-2014
MW-7	AP1-N	Downgradient	Boron	27	2010-2017
			Sulfate	22	2010-2017
			TDS	14	2010-2017
MW-8	AP1-S	Downgradient	Arsenic	6	2011-2014
			Boron	17	2011-2017
			Sulfate	19	2010-2017
			TDS	13	2011-2017
MW-9	AP2-S	Downgradient	Boron	4	2010-2016
			Sulfate	3	2010-2014
MW-10	AP3-S	Downgradient	Arsenic	7	2013-2017
			Boron	26	2010-2017

			Sulfate	1	2011

Table 3.B: Will County Groundwater Monitoring Results Summary (by year)

Year	Monitoring Wells	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
	Constituent	# of Exceedances Above Part 620 Class I Groundwater Standards									
2010	Boron			1	1	1	1	1		1	1
	Sulfate	1	1		1	1	1	1	1	1	
	TDS				1			1			
2011	Antimony	1	2								
	Arsenic								2		
	Boron		2	4	4	4	4	4	1		3
	Sulfate				4	4	4	4	3	1	1
	TDS				4	3		4	1		
2012	Arsenic								2		
	Boron	1	1	4	4	4	4	4	2		4
	Sulfate	1		3	4	2	2	4	1		
	TDS			1	4			2			
2013	Arsenic								1		1
	Boron	3	2	4	4	4	4	4	2	1	4
	Selenium					1					
	Sulfate	3		3	4	3		2	2		
	TDS	2			4	2			1		
2014	Arsenic		1						1		
	Boron	2	4	4	4	4	4	4	3		4
	Sulfate		1	4	4	4	1	3	3	1	
	TDS	1			4	4		4	3		
2015	Arsenic		2								3
	Boron		4	4	4	4	4	4	4	1	4
	Sulfate		3	1	4	4		3	4		
	TDS		1		4	3			3		
2016	Arsenic		2								2
	Boron		4	4	4	4	4	4	4	1	4
	Sulfate		4		4	3		3	4		
	TDS		4		4	2		1	4		
2017	Arsenic						1				1
	Boron		2	2	2	2	2	2	1		2
	Sulfate		2	1	2	2		2	1		
	TDS		2		2	1		2	1		
Total		15	44	40	81	66	36	63	55	7	34

Table 3.C: Will County Groundwater Monitoring Results Summary (by wells)

Chemical	Antimony	Arsenic	Boron	Selenium	Sulfate	TDS	Total

Constituent							
Monitoring Well	Number of Exceedances						
MW-1	1		6		5	3	15
MW-2	2	5	19		11	7	44
MW-3			27		12	1	40
MW-4			27		27	27	81
MW-5			27	1	23	15	66
MW-6		1	27		8		36
MW-7			27		22	14	63
MW-8		6	17		19	13	55
MW-9			4		3		7
MW-10		7	26		1		34
Total	3	19	207	1	131	80	441

Antimony. The Board notes that here were three exceedances of the antimony standard over the entire seven-year monitoring period, one in MW-1 and two in MW-2. All three exceedances were observed in 2011. Both Environmental Groups' expert, Dr. Kunkel, and MWG's expert Seymour agree that antimony is one of the indicators for leachate from MWG's ash ponds. EG Exh. 401 at 7; MWG Exh. 903 at 42. However, MWG's bottom ash Neutral Leaching Extraction Test (NLET) results indicate that the level of antimony in the ash leachate was below the Part 620 Class I standard of 0.006 mg/L. MWG Exh. 903 at 117 (Table 5-3). The single exceedance in MW-1 at a level of 0.0063 mg/L when rounded is at the same level as the standard. Thus, the groundwater data indicates two exceedances in MW-2 over two consecutive quarters in 2011. Given that MW-2 had 42 exceedances of other coal ash indicator constituents, the antimony exceedance may be due to coal ash storage or handling activities at the site. The Board, thus, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to the three antimony exceedances in MW-2 at the Will County Station in 2011.

Arsenic. The monitoring results indicate 18 exceedances of the Part 620 Class I arsenic standard of 0.01 mg/L in three monitoring wells from 2011 through 2017: MW- 2 (5), MW-8 (6) and MW-10 (7). While the arsenic levels in the upgradient well MW-2 ranged from 0.013 to 0.018 mg/L, the levels in downgradient wells MW-8 and 10 ranged from 0.012 to 0.025 mg/L. MWG Exh. 812, *see* Tables 3.A-3.C above. Also, the results indicate the exceedances in the four wells were intermittent during a period of one to four years. Both Dr. Kunkel and Mr. Seymour list arsenic as a constituent that may be present in coal ash leachate. EG Exh 401 at 7; MWG Exh. 903 at 42. MWG's bottom ash NLET result of 0.05 mg/L or less for arsenic suggests the presence of arsenic in the ash leachate at levels higher than the Part 620 Class I standard of 0.01 mg/L. MWG 903 at 117 (Table 5-3). All three arsenic-impacted wells also had exceedances of other coal ash constituents, including boron, sulfate and TDS. The Board, thus, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to 18 arsenic exceedances in MW-02, 8 and 10 at Will County.

Boron. The monitoring results indicate 207 exceedances of the Part 620 Class I boron standard during the seven-year monitoring period in all ten initial monitoring wells: MW-1 (6),

MW- 2 (19), MW-3 (27), MW-4 (27), MW-5 (27), MW-6 (27), MW-7 (27), MW-8 (17), MW-9 (4) and MW-10 (26). EG Br. at 77-110 (App. A); MWG Exh. 812; *see* Tables 3.A-3.C above. Most of the wells had continuing exceedances over the seven-year monitoring period. Both parties agree that boron is an indicator of coal ash contamination. EG Exh. 401 at 7; MWG Exh. 903 at 42. Further, Seymour's comparison of the monitoring results from 2014 with indicator constituents in leachate shows that boron is an indicator of leachate from Will County ash ponds. MWG Exh. 903 at 118 (Table 5-4). However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the GQS because the leachate levels were below such standard. MWG Exh. 903 at 41. Here, MWG's bottom ash NLET results indicate that the level of boron ranged from less than 0.1 mg/L to 2.0 mg/L, which is at the same level as the Part 620 Class I standard. MWG Exh. 903 at 117, (Table 5-3). The Board finds that monitoring results indicate continuing exceedance of Class I boron standard in most of the wells. As noted above, the record indicates that groundwater flow at the site in both directions, toward the Des Plaines River and CSSC. This discounts the position that some of these wells are upgradient and show off-site impacts. Also, the peninsular location of the Will County Station suggests that contamination is not caused by an off-site source. Considering that boron is an indicator constituent of coal ash, the Board, thus, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to the 207 boron exceedances in all ten monitoring wells at Will County.

Selenium. There was one exceedance of the Class I selenium standard in well MW-5 (2013) during the seven-year monitoring period. MWG Exh. 812 at 9-10. Selenium levels were below the groundwater standard in all other monitoring wells. MWG's bottom ash NLET results indicate that the level of selenium was below the Part 620 Class I standard of 0.050 mg/L. MWG Exh. 903 at 117 (Table 5-3). Also, selenium is not considered as a primary indicator of coal ash leachate. Therefore, the Board finds that the Environmental Groups have not proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to the single selenium exceedance at Will County.

Sulfate and TDS. There were 131 exceedances of the Class I sulfate standard and 80 exceedances of the Class I TDS standard during the seven-year monitoring period. MWG Exh. 812. While sulfate exceedances occurred in all ten initial monitoring wells (MW-01 through 10), TDS exceedances were observed in seven (MW-01, 02, 03, 04, 05, 07, and 08). While some wells had intermittent exceedances, wells MW-02, 04, 05, 07 and 08 had sulfate or TDS exceedances over a period of five or more years. *Id.*

Both parties list sulfate as an indicator constituent of coal ash leachate. Dr. Kunkel notes that higher concentration of sulfate may also be accompanied by higher concentrations of TDS. EG Exh. 401 at 7 and MWG Exh. 903 at 40. Further, Seymour's comparison of the monitoring results from 2014 with indicator constituents in leachate shows that sulfate is an indicator of leachate from Will County ash ponds. MWG Exh. 903 (Table 5-4). However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the sulfate and TDS standards because the leachate levels are below the standards. He relies on MWG's Will County Station bottom ash NLET results showing sulfate at 49 mg/L and TDS at 200 mg/L. MWG Exh. 903 at 41; MWG Exh. 901 at 8. Dr. Kunkel argues that except at MW-4 and MW-5, the sulfate concentrations in the monitoring wells have remained steady but

higher than Class I, thus, indicating that the ash pond liners continue to leak, or coal ash deposits located outside the ash ponds are leaching. EG Exh. 401 at 34.

The Board finds that sulfate and TDS are indicators of coal ash contamination in groundwater. The monitoring results show consistent exceedance of the Class I standard of both constituents during the seven-year monitoring period at multiple wells and, given the peninsular location of the Will County Station, there is no indication of contamination being caused by an off-site source. Therefore, the Board, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to the 131 sulfate and 80 TDS exceedances in Will County monitoring wells (MW-6 through 8, 11 through 15, 17 and 18).

v. Background Concentrations Exceedance

The Environmental Groups assert that onsite groundwater concentrations of the coal ash indicators boron and sulfate are higher than background values developed by IEPA, and not naturally occurring. EG Br. at 64. The median concentrations of boron exceed the upper-bound 90th percentile background values all ten wells. *Id.* at 40. The Environmental Groups also note that while only monitoring well MW-04 median sulfate concentration exceeded the upper-bound 90th percentile value, the median concentrations of sulfate in all ten wells are three to five times more than the statewide median value. *Id.*

The Board finds that because upgradient wells at the Will County Station are in areas of impacted groundwater, the groundwater monitoring results of indicator constituents, boron and sulfate may be compared with the statewide area background. EG Exh. 405 at 7. Thus, the Board finds that a comparison of the median values of boron and sulfate in the down gradient wells with the 90th percentile statewide values indicate exceedances of boron above background in all 10 wells and sulfate in one well (MW-4). Further, the median values of sulfate and boron in all ten wells are above the statewide median values of those constituents in the upgradient well. MWG Exh. 812. These exceedances of the statewide background are consistent with the exceedances of Class I groundwater standards of sulfate and boron in most monitoring wells.

Given that there is no indication of contamination being caused by an off-site source, the Board finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to boron and sulfate statewide background exceedances at Will County.

5. Waukegan

A. Uncontested Facts

i. The Station

The Waukegan Station began operations in 1920s with five coal-fired electric generating units and later expanded to 8 generating units. MWG Exh. 901 at 44; 1/30/18 Tr. at 121:11-15 (Race Test.). However, at present the station has two active units which began operation in 1958

and 1962. MWG Exh. 665 at 1-2; 1/30/18 Tr. at 121:16-122:8. MWG has owned and operated the Station since 1999. Joint. Stip. No. 32, 33.

The area around the Station has been primarily industrial from 1930s. The Station uses salt on the roads in winter for safety. 1/31/18 Tr. at 240:16-241:12 (Veenbaas Test.). Mr. Veenbaas testified that this "is probably one of the highest density urban sites in the country right now." 1/31/18 Tr. at 223:20-21 (Veenbaas Test.). On the north, the Station is bordered by Johns Manville Company's property that is now a Superfund site, with cleanup operations ongoing but no industrial operations. 1/31/18 Tr. at 223:10-14 (Veenbaas Test.); 1/30/17 Tr. at 123:11-124:2 (Race Test.). To the south of the Station is the North Shore Sanitary District; further south is the Johnson Marine Plant, another active Superfund, and also liquified gas Superfund sites. 1/31/18 Tr. at 223:10-21 (Veenbaas Test.). On the east side of the Station is the Lake Michigan. MWG Exh. 667 at 25; 1/31/18 Tr. at 223:10-21 (Kelly Test.); 2/1/18 Tr. at 162:13-163:8 (Gnat Test.); MWG Exh. 667 at 27; MWG Exh. 807.

Fly ash at the Stations is collected using electrostatic precipitators and transported off-site for beneficial use. 1/31/18 Tr. at 224-225. The heavier bottom ash that falls to the bottom of the furnace is generally mixed with water and sluiced to the ash. *Id.* at 225. The results of the ASTM D3987-85 analysis of bottom ash taken from Waukegan ash pond 2010 indicate presence of barium and boron, however, samples were not analyzed for sulfate and TDS. MWG Exh. 901 at 8.

ii. Ash Ponds

Waukegan has two ash ponds: 1) East Pond and 2) West Pond. Both were constructed in 1977 with Hypalon liners. MWG Exh. 901 at 44. The ponds are in the southern portion of the site. EG Exh. 19D at 6, EG Br. (App. E). Both ponds were relined, the East Pond in 2003 and West Pond in 2004, with a 60 mil HDPE. MWG Exh. 901 at 46-47; 903 at 34. The East and West Ponds lining includes (described bottom up) a sand cushion and limestone warning layer on the bottom. MWG Exh. 901 at 47. The ponds'' bottom elevation is at 585 ft; average groundwater elevation is at 582-583 feet (about 2-3 feet below the ponds' bottom). *Id*. The ash ponds are regulated under an NPDES permit (#IL0002259). MWG Exh. 642. One pond is used at a time while the other is being dredged to remove the settled coal ash. 1/31/18 Tr. 230-231. Ash removal from the pond is scheduled every three to four years. *Id.*; MWG Exh. 901 at 46.

iii. Waukegan VN

The IEPA issued Violation Notice #W-2012-00056 (Waukegan VN) for the Waukegan Station (EG Exh. 1A) alleging that "operations at ash impoundments have resulted in violations of Groundwater Quality Standards" from 2010 to2012 at monitoring wells MW-1 through 5, including for chloride (MW-5), antimony (MW-1), manganese (MW-4 and 5), boron (MW-1 through 5), arsenic (MW-1), iron (MW-5), sulfate (MW-5), TDS (MW-5), as well as pH (MW-1, 2, and 3). EG Exh. 1A at 3-5.

iv. Waukegan CCA

The Waukegan CCA (MWG Exh. 647) states that:

> Operations at ash impoundments have resulted in violations of the Groundwater Quality Standards at monitoring wells MW-1, MW-2, MW-4, and MW-5. MWG Exh. 647 at 2 ¶ 3.

The CCA notes that "respondent agrees to undertake the following actions, which the Illinois EPA has determined are necessary to attain compliance" with the statute and Board rules. MWG Exh. 647 at 3 ¶5. Subsections (a) through (i) of paragraph 5 list activities MWG must undertake, subsections (a) though (c) are identical to all other CCAs. The other subsections require:

5(d)	installing two additional monitoring wells at locations approved by IEPA;
5(e)	continuing quarterly monitoring of the existing five and the newly installed additional two monitoring wells "for constituents in 35 Ill. Adm. Code 620.410(a)" and record and report elevations to IEPA;
5(f), (g)	entering into an Environmental Land Use Control (ELUC) to cover remaining area at the Station to the east not covered by existing ComEd Former Tannery Site ELUC, submit proposed ELUC to IEPA and record ELUC upon its approval;
5(i)	submitting a certification of compliance upon completing CCA requirements within one year of the date of CCA. MWG Exh. 647 at 3-4 ¶ 5.

On October 22, 2013, MWG filed a certification with the IEPA that all CCA measure were completed. Joint Stip. at 4; MWG Exh. 651.

v. Waukegan ELUC

On June 23, 2003, MWG recorded ELUC covering western part of the Waukegan Station, including the railway tracks north west of the ash ponds, "to protect against exposure to contaminated soil or groundwater, or both, that may be present on the property as a result of past industrial activities on adjacent property known as the Griess-Pfleger Tannery site." MWG Exh. 646 at 1, 7 and 9. On January 18, 2013, MWG submitted to IEPA proposed extension of ELUC to cover eastern part of the Station including the ash ponds, as required by Item 5(f) of the CCA. MWG Exh. 263. On August 26, 2013, IEPA approved MWG's request for ELUC extension, directly adjacent to the 2003 Griess-Pfleger Tannery ELUC. MWG Exh. 650; MWG Exh. 901 at 52; EG Exh. 263 at 8-12. The ELUC extension borders are:

> The western boundary of the ELUC extension abuts the boundary of the existing ELUC. The south boundary is defined by the existing property line. The east boundary is Lake Michigan and the north boundary is defined by the northern extent of the ash pond system. The proposed vertical extent of the ELUC is the unconsolidated overburden deposits overlying the Silurian dolomite bedrock beneath the site. The estimated vertical thickness of the unconsolidated deposits is 100 feet below ground surface based on information provided in the Hydrogeologic Assessment Report dated February 2011 that was submitted to the EPA. MWG Exh. 263 at 1.

The record indicates that MWG did not establish a GMZ at Waukegan. MWG Exh. 649.

B. Contested Facts

i. Ash Ponds Dredging, Liner Ruptures and Migrating Contaminants

As with all other Stations, the liners at Waukegan are prone to damage in certain conditions, particularly by the heavy equipment during dredging. In 2005 and 2006 MWG consultant, NRT, investigated the liners at Waukegan ponds and rated condition of West and East Ponds as "excellent" and the "Coal Pit Runoff Basin" as "unknown" with "high" for "contamination potential." EG Exh. 34 at 9 (#23616); MWG Exh. 606 at (#23645). MWG experts and employees testified that each pond was historically dredged approximately every other year; but only every 3-4 years lately, because less bottom ash has been generated recently. MWG Exh. 901 at 46; 10/24/17 Tr. at 162:10-163:4 (Lux Test.); 1/30/18 Tr. at 118:19-24 (Race Test.); 1/31/18 Tr. at 230:15-231:4 (Veenbaas Test.). Waukegan ponds are inspected at least once per day as part of operator's rounds, with any damage reported to supervisors and promptly repaired. 10/24/17 Tr. at 126:20-128:21, 143:11-144:1 (Lux Test.); 1/31/18 Tr. at 228:23-239:8 (Veenbaas Test.). MWG employees also testified to a system in place during the ponds dredging to ensure that heavy equipment operators do not damages the liners. The ponds have 20-foot tall warning posts at the edge of the bottom of the ponds to identify the bottom of the slope for the equipment operators. 10/24/17 Tr. at 131:23-132:11 (Lux Test.); 1/31/18 Tr. at 236:11-15 (Veenbaas Test.). Upon completion of dredging, Waukegan manager walks though the pond to ensure that contractors did not damage the liners or protective layers. Ponds are released for operations upon confirmation that the liners are intact. 10/24/17 Tr. at 131:17-132:11, 167:3-14 (Lux Test.); 1/31/18 Tr. at 235:20-237:11-17 (Veenbaas Test.).

The record, however, shows that liners in Waukegan ponds did have tears occasionally. About five to six tears were found since 2003, all above the water line in the ponds. All of the tears were typically repaired within one to two weeks. 10/24/17 Tr. at 144:2-145:17 (Lux Test.); 1/31/18 Tr. at 239:9-11 (Veenbaas Test.). In 2005, KPRG performed inspection of the liners in both ponds and found one tear on the south side of the East Ash Pond, which was shortly repaired. 10/25/18 Tr. at 193:10-15 (Gnat Test.); 10/26/18 A.m. Tr. at 52:9-53:24 (Gnat Test.); EG Exh. 274 at 6 (#12832).

After a careful review of the facts, the Board finds that the Environmental Groups established that the liners at Waukegan can and do crack or get damaged on occasions. Based on the preponderance of the evidence in the record, including the groundwater monitoring results, MWG practices in ponds relining and dredging, the Board concludes that it is more likely than not that the ash ponds did leach contaminants into the groundwater.

ii. Historical Coal Ash Sites

The record indicates at least one area where coal ash has been historically stored at the Waukegan station. The record also indicates the presence of coal ash in the fill areas outside of ash ponds and historic area.

Former Slag/Fly Ash Storage (or FSFS). The area immediately west of the West Pond is an unlined area that may contain historic slag, slag and fly ash. EG Exh. 19D at 36 (#45814); 10/23/17 Tr. 99:14-100:17; EG Exh. 38 at 15, 10 (#12017, 12012); 10/23/17 Tr. at 137:1-138:1.

The historic coal ash was placed in this area before 1998. 2/2/18 Tr. at 323:12-20 (Seymour Test.); EG Exh. 19D at 6, Fig. 2 and 5 (#45788, 45813, 45817). Borings from this area from the 1998 Phase II Environmental Site Assessment report shows a coal ash layer of up to a depth of one foot below the surface (B-22). EG Exh. 19D at 6, Fig. 5, App. A B-22 (#45788, 45817, 45841). The Environmental Groups claim this area to be the primary onsite source of groundwater contamination at the Stations. EG Br. at 54. Part of this area is covered by the 2003 Griess-Pfleger Tannery ELUC. MWG Exh. 646 at 1, 7, and 9. The other part is covered by the 2013 ELUC extension. MWG Exh. 263 at 8-12. The former Tannery owner semiannually samples groundwater in wells installed within the Tannery ELUC area on both the tannery site and Waukegan Station site. 1/30/18 Tr. at 146:9-23 (Race Test.); EG Exh. 39F, 40F, 42F, 42.5F. MWG concluded from the ELUC groundwater monitoring results that arsenic, iron, manganese, and TDS concentrations in the ELUC wells on the Waukegan Station site were higher than the concentrations predicted in the modeling to establish the ELUC and that contamination is migrating from the Tannery site onto the Waukegan Station. EG Exh. 41F at 5-8 (#46117-46118); 1/30/18 Tr. at 148:13-149:23 (Race Test.); MWG Exh. 901 at 56-57; EG Exh. 42.5F.

Coal Ash in Fill Areas. The record also shows the presence of coal ash buried around the ponds going as deep as 22 feet below ground surface. In 2005, when MWG's consultant KPRG performed geotechnical testing, it took five soil borings, three of which were taken around the ash ponds (GT 3-5). EG Exh. 201 at 10-16 (#24273-79). The results show bottom ash in those borings at depths below the surface ranging from 1 to 19 feet in GT-4 (taken west of the West Pond), and 1 to 22 feet in GT-5 (taken south of the East Pond). EG Exh. 201 at 15-16 (#24267, 24278-24279). Further, the boring logs indicate the condition of the samples at depths of 10 to 20 feet as "wet" or "slightly moist". *Id*. When MW-5 was installed in 2011 on the east side of the FSFS, in a location close to the GT-5 boring taken in 2005, the MW-5 boring also identified 16 feet of "black coal cinders" mixed with other material. EG Br. at 54; EG Exh. 14C at 19, 28 (#7166, 7175). MWG employees testified that they knew this area as a former ash storage area. 2/1/18 Tr. at 9:3-10:18, 62:16-18, (Veenbaas Test.); 1/30/18 Tr. 162:4-16, 264:9-13 (Race Test.); EG Exh. 16 at 14167; 10/23/17 Tr. at 86:23-87:18. The 2014 drillings for installation of monitoring wells MW-8 and MW-9 also indicated that ash and slag were buried along the northern and western edges of the FSFS area. EG Exh. 203 at 1-2 (#45648-45649); 10/25/17 Tr. at 53:5-54:17. Environmental Groups argue that MWG has done nothing to investigate or remediate this storage area. MWG has taken no borings from the center to determine how much ash is located there, and has not tested leachate to determine whether the area is leaching contaminants. EG Br. at 56. MWG employees confirm that no liners were installed here and that they do not have information of any liners present here. 10/23/17 Tr. at 137:20-138:1; 2/1/18 Tr. at 11:3-5. They also confirmed that no borings or samples were taken. 2/2/18 Tr. at 192:20-193:14 (Seymour Test.). MWG employees also testified that they were not aware of an impermeable cap over this area. 1/30/18 Tr. at 264:14-265:24; 2/1/18 Tr. at 9:3-11:15. MWG employees testified that they were not aware of ash having been ever removed from this area. 2/1/198 Tr. at 10:16-18. Groundwater elevation at Waukegan fluctuates between 579 and 582 feet above mean sea level, groundwater monitoring from wells around FSFS indicate potential ash buried around 582 feet, leaving about 3 feet of overlap. MWG Exh. 903 at 106 (Table 4-5); EG Exh. 203 at 1-2 (#45648-45649).

Weighing the facts presented, the Board finds that Environmental Groups have proven that it is more likely than not that the historic areas and coal ash in the fill areas at the Station are causing or contributing to GQS exceedances at the Station.

iii. Monitoring Wells

The groundwater monitoring network at Waukegan consisted of 16 monitoring wells. MWG Exh. 901 at 48. Patrick Engineering installed five wells (MW-1 through MW-5) as a part of the hydrogeologic investigation, and wells MW- 6 and 7 were added as upgradient wells at the request of IEPA in 2010. Wells MW-8 and 9 were added in 2014. Five additional wells (MW-10, 11, 12, 14 and MW-15) located west of the ash ponds have been monitored since August 2014 to assess the groundwater impacted by the former Griess-Pfleger Tannery and General Boiler properties. EG Exh. 14C at 2, 19 (#7152-7153, 7166), EG Exh. 401 at 23-24, MWG Exh. 811. These wells are called ELUC wells as they were installed as part of the Tannery ELUC. 2/1/18 Tr. at 148-149. MWG's expert, Mr. Gnat, also mentioned the installation of a new well MW-16 as part of CCR rules. *Id.* at 148.

The Waukegan hydrogeologic report identified well MW-5 as upgradient and wells MW-1 through 4 as downgradient. EG Exh. 14C at 3 (#7152); MWG Exh. 901 at 49. However, Mr. Gnat clarified that wells MW- 6, 8, 9, 10, 11, 12, 14 and 15 are also upgradient of the ash ponds and MW-7 is slightly side-gradient. 2/1/18 Tr. at 154. Monitoring wells were sampled on a quarterly basis: MW-1 through 7 from October 2010; MW-8 and 9 from May 2014; MW-10 through 15 from August 2014; and MW-16 from November 2015. MWG Exh. 811. The groundwater samples from all monitoring wells, except MW-16, were analyzed for 35 constituents, including boron, sulfate and TDS. *Id.* The samples from MW-16 were analyzed for 15 constituents, mostly metals. *Id*.

The Environmental Groups argue that because the groundwater flows through the Former Slag and Fly Ash Storage site from west/northwest to east/southeast, the upgradient groundwater quality for the FSFS is found in MW-11 through MW-14 and MW-6. EG Br. at 55. The Environmental Groups contend that MW-8 and 9 should not be considered upgradient for this area because they are screened in the FSFS. *Id.* at 57. The Environmental Groups note that boron levels (1 - 4 mg/L) in upgradient wells (MW–6, 11 through 14) increase more than tenfold (30 - 40 mg/L) after crossing the slag/fly ash storage area in wells MW-5 and 7 and the sulfate levels also show a similar pattern. *Id.* at 57-58.

The site hydrogeologic conditions at the Waukegan Station were determined in 2011 by Patrick Engineering using the soil boring logs of five groundwater monitoring wells installed approximately 150 to 300 feet around the perimeter of the ash ponds. These wells were screened approximately 10 feet past the intersection of the groundwater table to ensure collection of representative groundwater samples. EG Exh. 14C at 3 (#7152). The well locations were chosen to represent upgradient and downgradient wells with respect to expected groundwater flow direction to the east towards the Lake Michigan. *Id.* at 2-3 (#7151-7152). The well borings were advanced to depths ranging from 30 to 32 feet below ground surface (bgs). Borings were terminated after the field geologist determined that the borings were installed approximately 10 feet past the first intersection of the groundwater table. *Id.* at 3 (#7152).

The site geology, based on regional geologic information, consists of 100 feet of sand deposits, underlain by Silurian Dolomite to approximately 360 feet below ground surface, underlain by the Maquoketa shale. EG Exh. 14C at 2 (#7151). The hydrogeologic site investigation indicated predominantly fine sand and silt underlain by sand and gravel. *Id.* at 7 (#7156). Further, the uppermost groundwater unit underlying the site is found at 22.4 to 23 feet bgs with groundwater flow to the east/southeast towards Lake Michigan. Mr. Gnat agreed that the groundwater flow in the ash pond area is to the east, southeast. 2/1/18 Tr. at 154-155. However, he also noted that a component of groundwater flow goes north, northwest towards Lake Michigan intake channel. *Id.* at 155; MWG Exh. 901 at 49.

The Board notes that, given that the groundwater flow direction at the Waukegan Station generally flows the west/northwest to the east/southeast, wells MW-10 through 14 are showing the upgradient groundwater quality for the Station. These wells are also upgradient of the Former Slag and Fly Ash Storage area, as well as the ash ponds. EG Br. at 21 (Ap. E); MWG Exh. 901 at 49; MWG Exh. 813. These wells also are located downgradient of the Tannery site, showing constituents that might be migrating to the Station from the Tannery site.

Also, there are eight potable/industrial use wells within 2,500-foot radius of the ash ponds, all to the north or west of the ponds.

iv. Exceedances of Part 620 Standards

The groundwater monitoring results at Waukegan indicate 394 exceedances of the Board's Part 620 Class I GQS in all 15 monitoring wells (MW-1 through 16) during 2010-2017. MWG Exh. 811. While 102 of these exceedances are in wells downgradient of the ash ponds, the remaining 292 are in wells that are upgradient or side-gradient of the ash ponds. The constituents above the Class I standard are: antimony (2 exceedances), arsenic (97), boron (169), cadmium (1), chromium (2), selenium (2), sulfate (57), and TDS (63). *Id*. A summary of the groundwater monitoring data exceeding Part 620 standards for Waukegan is presented in Tables 4.A-4.C, below. EG Br. at 77-110 (App. A); MWG Exh. 811.

The Board also finds that while there are many exceedances (e.g. arsenic, boron, sulfate and TDS) in the wells upgradient of the ash ponds, as noted by the Environmental Groups, the location of these upgradient wells shed light on the potential source of contamination at the Waukegan site. Starting with the monitoring wells near the western property boundary and moving east/southeast along the groundwater flow direction, the number of exceedances were: 59 in wells MW-10 through 14 downgradient of former tannery and boiler sites and upgradient of the Former Slag and Fly Ash Storage area; 66 in wells MW-6, 8 and 9 along the western border (immediately upgradient) of the Former Slag and Fly Ash Storage area; 163 in wells MW-5, 7 and 15 which are downgradient of the Former Slag and Fly Ash Storage area and upgradient or side-gradient of the ash ponds; and 102 in wells MW-1 through 4 downgradient of the ash ponds. Even though the 59 exceedances in wells MW-10 through 14 suggest that contamination may be coming in from the former tannery and boiler sites, the 163 exceedances downgradient of the Former Slag and Fly Ash Storage area, along with higher concentrations of indicator constituents, show that the Former Slag and Fly Ash Storage area is contributing to the exceedances in wells MW-1 through 7.

Table 4.A: Waukegan Groundwater Monitoring Results Summary

Monitoring Wells	Closest Ash Pond, historical storage	Location	Constituents	Number of Exceedances of Part 620 Standards	Year(s)
MW-01	EP	Downgradient	Arsenic	26	2010-2017
			Boron	14	2010-2017
			Selenium	1	2013
MW-02	EP	Downgradient	Antimony	1	2010
			Arsenic	11	2010-2017
			Boron	21	2010-2017
MW-03	EP	Downgradient	Arsenic	1	2017
			Boron	10	2011-2017
			Selenium	1	2013
MW-04	EP	Downgradient	Arsenic	1	2017
			Boron	15	2011-2017
MW-05	WP	Upgradient	Arsenic	6	2012-2017
			Boron	27	2010-2017
			Sulfate	27	2010-2017
			TDS	27	2010-2017
MW-06	FSFA	Upgradient	Boron	12	2013-2017
MW-07	WP	Side-gradient	Arsenic	7	2013-2015
			Boron	19	2012-2017
			Sulfate	18	2012-2017
			TDS	19	2012-2017
MW-08	FSFA	Upgradient	Boron	13	2014-2017
			Cadmium	1	2017
			Sulfate	7	2014-2017
			TDS	5	2015-2016
MW-09	WP, FSFA	Upgradient	Boron	13	2014-2017
			Sulfate	5	2014-2017
			TDS	10	2014-2016
MW-10	FSFA, WP	Upgradient	Arsenic	11	2014-2017
MW-11	FSFA, WP	Upgradient	Arsenic	12	2014-2017
			Boron	11	2014-2017
MW-12	FSFA, WP	Upgradient	Arsenic	4	2015-2017
			Boron	5	2015-2017
			TDS	1	2015

MW-14	FSFA	Upgradient	Antimony	1	2017
			Arsenic	11	2014-2017
			Chromium	2	2017
			TDS	1	2014
MW-15	FSFA	Upgradient	Arsenic	4	2014-2017
			Boron	9	2014-2017
MW-16	EP and WP	Upgradient	Arsenic	3	2016-2017
			Thallium	1	2017

Table 4.B: Waukegan Groundwater Monitoring Results Summary (by year)

Year	Monitoring Wells	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
	Constituent	# of Exceedances Above Part 620 Class I Groundwater Standards								
2010	Antimony		1							
	Arsenic	1	1							
	Boron	1	1			1				
	Sulfate					1				
	TDS					1				
2011	Antimony									
	Arsenic	4	2							
	Boron	3	1	2	2	4				
	Sulfate					4				
	TDS					4				
2012	Arsenic	4	2			2				
	Boron	1	2		4	4		1		
	Sulfate					4		1		
	TDS					4		1		
2013	Arsenic	3	1			1		3		
	Boron	4	3	1	4	4	4	4		
	Selenium	1		1						
	Sulfate					4		4		
	TDS					4		4		
2014	Arsenic	4						1		
	Boron	1	4	2	2	4	3	4	3	3
	Sulfate					4		3	1	1
	TDS					4		4		3
2015	Arsenic	4	2			1		3		
	Boron		4			4	1	4	4	4
	Sulfate					4		4	2	1
	TDS					4		4	1	4
2016	Arsenic	4	1			1				
	Boron	2	4	3	1	4	3	4	4	4
	Sulfate					4		4	3	2

	TDS					4		4	4	3
2017	Arsenic	2	2	1	1	1				
	Boron	2	2	2	2	2	1	2	2	2
	Cadmium								1	
	Sulfate					2		2	1	1
	TDS					2		2		
Total		41	33	12	16	87	12	63	26	28

Table 4.B: Waukegan Groundwater Monitoring Results Summary (by year) (cont)

Year	Monitoring Wells	MW-10	MW-11	MW-12	MW-14	MW-15	MW-16
	Constituent	# of Exceedances Above Part 620 Class I Groundwater Standards					
2014	Arsenic	2	2		2	1	
	Boron		2			2	
	Sulfate						
	TDS				1		
2015	Arsenic	3	4	2	3	1	
	Boron		4	1		1	
	Sulfate						
	TDS			1			
2016	Arsenic	4	4		4		1
	Boron		4	3		4	
	Sulfate						
	TDS						
2017	Antimony				1		
	Arsenic	2	2	2	2	2	2
	Boron		1	1		2	
	Chromium				2		
	Sulfate						
	Thallium						1
	TDS						
Total		11	23	10	15	13	4

4.C: Waukegan Groundwater Monitoring Results Summary (by wells)

Chemical Constituent	Antimony	Arsenic	Boron	Cadmium	Chromium	Selenium	Sulfate	Thallium	TDS	Total
Monitoring Well	Number of Exceedances									
MW-1		26	14			1				41
MW-2	1	11	21							33
MW-3		1	10			1				12
MW-4		1	15							16
MW-5		6	27				27		27	87
MW-6			12							12
MW-7		7	19				18		19	63
MW-8			13	1			7		5	26
MW-9			13				5		10	28
MW-10		11								11
MW-11		12	11							23
MW-12		4	5						1	10
MW-14	1	11			2				1	15
MW-15		4	9							13
MW-16[9]		3						1		4
Total	2	97	169	1	2	2	57	1	63	394

Antimony. There were only two exceedances of the antimony standard over the entire seven-year monitoring period, one in 2010 in MW-2 (downgradient of the ash ponds) and one in 2017 in MW-14 (upgradient near the western property line). Both parties agree that antimony is one of the indicators for leachate from MWG's ash ponds. EG Exh. 401 at 7; MWG Exh. 903 at 42. However, MWG's bottom ash Neutral Leaching Extraction Test (NLET) results indicate that the level of antimony in the ash leachate from Waukegan was below the Part 620 Class I standard of 0.006 mg/L. MWG Exh. 901 at 8; MWG Exh 903 at117 (Table 5-3). Because the antimony concentration in the bottom ash was below the Class I standard and there were only two exceedances over the seven-year monitoring period, the Board finds that the Environmental Groups have not proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to these exceedances.

Arsenic. The monitoring results indicate 97 exceedances of the Part 620 Class I arsenic standard in 12 of the 15 monitoring wells, upgradient and downgradient of both Former Slag and Fly Ash Storage site and ash ponds from 2010 through 2017. EG Br. at 77-110 (App. A); MWG Exh. 811, *also see* Table 4.A-4.C above. The number of exceedances include: MW-1 (26 exceedances), MW- 2 (11), MW-3 (1), MW-4 (1) MW-5 (6), MW-7 (7), MW-10 (11), MW-11 (12) MW-12 (4), MW- 14 (11), MW-15 (4), and MW-16 (3). Both parties list arsenic as a constituent present in coal ash leachate. EG Exh. 401 at 7; Exh. 903 at 42. MWG's bottom ash NLET result of 0.05 mg/L or less for arsenic suggests the presence of arsenic in the ash leachate

[9] While groundwater monitoring results for MW-16 for 2016-17 are included in MWG Exh. 811, the location of the monitoring well is not shown on any of the Waukegan maps.

at levels higher than the Part 620 Class I standard of 0.01 mg/L. MWG Exh. 903 at 117 (Table 5-3).

Seymour also notes that analytical results of the groundwater from the former Tannery site indicate that certain inorganic constituents, including arsenic, have migrated onto the Waukegan property. MWG Exh. 903 at 19. MWG asserts that the groundwater contamination at Waukegan site, particularly arsenic, is migrating from two industrial properties on the west of the Station, the former Griess-Pfleger Tannery and the former General Boiler. MWG Br. at 18. MWG notes that the General Boiler property contained arsenic above remediation benchmarks and the property included a fly ash fill area. *Id.* Both sites appear to be now closed and part of IEPA's Site Remediation Programs. *Id*. at 124:16-125:3 (Race Test.); MWG Exh. 667, at 25; MWG Exh. 901 at 56-57. Investigation at the General Boiler site in 1998-1999 also found arsenic concentrations above Class I GQS in a fly ash fill area. MWG Exh. 623 at 472. Soil boring at the Tannery found coal and angular slag. MWG Exh. 643 at 105-08 (#47180-4718); 1/30/18 Tr. at 131:6-134:2 (Race Test.). Groundwater investigation at the Tannery also found arsenic, chromium, cadmium, mercury, lead, manganese, iron and total dissolved solids contamination. MWG Exh. 644 at 31, 33-34 (#46627, 46629-46630); 1/30/18 Tr. at 135:23-139:3 (Race Test.). The former Tannery owner removed impacted soil and in 2003 established ELUC on the west side of Waukegan Station to prevent any use of the groundwater. Joint Stip. No.38, 39; MWG Exh. 645 at 55-56 (#46255-46256); 1/30/18 Tr. at 141:23-144:4 (Race Test.); MWG Exhs. 646; 667 at 22.

The Board notes that wells MW-10 through 14 are downgradient of the former Tannery site and upgradient of the Station, including the Former Slag and Fly Ash Storage area and the ash ponds. EG Br.at 120 (App. E); MWG Exh. 901 at 48-49; MWG Exh. 813. The Board, thus, finds that the exceedances in the wells MW-10 through 14 support Seymour's assertion that contamination is moving into the Waukegan site from the former Tannery site. The arsenic levels in the upgradient wells MW-10 through 14 were consistently higher, in the range of 0.06 to 1.3 mg/L, compared to the levels ranging from 0.013 to 0.21 in the wells downgradient of the Former Sag and Fly Ash Storage site, as well as the ash ponds. Thus, the Board finds that the it is more likely than not that the arsenic levels in groundwater at the Waukegan site are impacted by upgradient offsite contamination coming to the Tannery site. The Board, thus, finds that the Environmental Groups have not proven that it is more likely than not that coal ash stored on-site, either in the ash ponds or outside of the ponds, is causing or contributing to these exceedances.

Boron. The monitoring results indicate 169 exceedances of the Part 620 Class I boron standard in 12 of the 15 monitoring wells upgradient and downgradient of both Former Slag and Fly Ash Storage site and ash ponds from 2010 through 2017. EG Br. App. A; MWG Exh 810; *see also* Table 4.A-4.C above. These wells show the following exceedances: MW-1 (14), MW-2 (21), MW-3 (10), MW-4 (15) MW-5 (27), MW-6 (12), MW-7 (19), MW-8 (13), MW-9 (13), MW-11 (11) MW-12 (5), and MW-15 (9). Most of the wells had continuing exceedances over the four to seven-year monitoring period.

Both parties agree that boron is an indicator of coal ash contamination. EG Exh. 401 at 7; Exh. 903 at 42. Further, Seymour's comparison of the monitoring results from 2014 with indicator constituents in leachate shows that boron is an indicator of leachate from Waukegan Station ash ponds. MWG Exh. 903 at 118, 122 (Table 5-4). However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above

the Class I standard because the leachate levels were below such standard. MWG Exh. 903 at 41. Here, MWG's bottom ash NLET results indicate that the level of boron ranged from less than 0.1 mg/L to 2.0 mg/L, which is the same as the Part 620 Class I standard. MWG Exh. 903 at 117 (Table 5-3). Seymour maintains that analytical results of the groundwater from the tannery site indicate that certain inorganic constituents, including boron have migrated onto the Waukegan site. MWG Exh. 903 at 19. Environmental Groups argue that the most likely source of coal ash contamination at the Waukegan site is the Former Slag and Fly Ash Storage area located west of the ash ponds.

The Board finds that given the groundwater flow direction at the Waukegan site wells MW-10 through 14 are downgradient of the Tannery site, showing contaminants that migrate from the Tannery site. These wells are also upgradient of the Former Slag and Fly Ash Storage area, as well as the ash ponds. EG Br. at 120 (App. E); MWG Exh. 901 at 49; MWG Exh 813. Well MW-6 is downgradient of the boiler site but also upgradient of the Former Slag and Fly Ash Storage area. The Board also finds that monitoring wells MW-8 and MW-9 are likely impacted by the Former Slag and Fly Ash Storage area as they are located in the ash at the edge of this area. The median values of boron in upgradient wells (MW-6, 10 through 14) range from 1 to 3.25 mg/L as compared to median boron value of 32-39 mg/L in wells MW-5 and 7 downgradient of the Former Slag and Fly Ash Storage site and 2 to 2.5 mg/L in wells MW-1 through 4 downgradient of the ash ponds. This comparison of the median boron values of the wells upgradient of the Former Slag and Fly Ash Storage area with those downgradient indicates that the Former Slag and Fly Ash Storage is area is contributing to the exceedances in the downgradient wells. The Board finds that the groundwater monitoring results indicate the Former Slag and Fly Ash Storage area is the likely source of boron exceedances at Waukegan Station in the wells downgradient of the area as well as the ash ponds. The Board, thus, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to these exceedances.

Metals. The monitoring results indicate six exceedances of metallic constituents over the seven-year monitoring period: cadmium (1 in MW-8), chromium (2 in MW-14), selenium (2 in MW-1 and MW-3) and thallium (1 in MW-16). While some of these metals may be present in coal ash leachate, they are not considered as primary indicators of coal ash contamination. MWG's bottom ash NLET results indicate that the level of all four metals were below Part 620 Class I standards. MWG 903 (Table 5-3). The Board finds that given the very few sporadic exceedances of the metallic constituents and their low levels in the bottom ash leachate, the Environmental Groups have not proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to these exceedances.

Sulfate and TDS. There were 57 exceedances of the Class I sulfate standard and 63 exceedances of the Class I TDS standard during the seven-year monitoring period. MWG Exh. 811. Most of the exceedances occurred in two wells (MW-5 and 7) downgradient of the Former Slag and Fly Ash Storage area. There were only two exceedances of TDS in the upgradient wells (MW-12 and 14) and none in wells downgradient of the ash ponds (MW-1 through 4).

Both parties list sulfate as an indicator constituent of coal ash leachate. Dr. Kunkel notes that higher concentration of sulfate may also be accompanied by high concentrations of TDS. EG Exh 401 at 7; MWG Exh. 903 at 40. Further, Seymour's comparison of the monitoring

results from 2014 with indicator constituents in leachate shows that sulfate is an indicator of leachate from Waukegan ash ponds. MWG Exh. 903 at 118-22 (Table 5-4). However, Seymour argues that the leachate from MWG ash ponds does not have the potential to cause groundwater impact above the sulfate and TDS standards because the leachate levels are below the standards. He relies on MWG's bottom ash NLET results of sulfate at 49 mg/L and TDS at 200 mg/L. MWG Exh. 903 at 41; MWG Exh. 901 at 8. Environmental Groups note that sulfate follows the same pattern as boron with median sulfate concentrations approximately 100-200 mg/L upgradient of the Former Slag and Fly Ash Storage area, but 700-800 mg/L in wells MW-5 and MW-7 downgradient of that area. The Environmental Groups argue that this pattern shows that the Former Slag and Fly Ash Storage area is contributing coal ash constituents in the groundwater.

The Board notes that sulfate and TDS are indicators of coal ash contamination in groundwater. Further, the monitoring results show almost no exceedances of sulfate and TDS standards in the upgradient wells indicating there is no migration from offsite sources. Further, as noted by the Environmental Groups, the large percentage of exceedances of sulfate (79%) and TDS (73%) in wells (MW-5 and 7) downgradient of the Former Slag and Fly ash storage area indicate that the storage area is contributing to the exceedances. There were also some exceedances in monitoring wells MW-8 and MW-9, which are likely impacted by the Former Slag and Fly Ash Storage area as they are located in ash at the edge of the area. Therefore, the Board finds that the likely source of the 57 exceedances of sulfate and 63 exceedances of TDS in the downgradient monitoring wells MW- 5, 7, 8 and 9 at Waukegan is the Former Slag and Fly Ash Storage area located west of the ash ponds. The Board, thus, finds that the Environmental Groups have proven that it is more likely than not that coal ash stored onsite, either in the ash ponds or outside of the ponds, is causing or contributing to these exceedances.

v. Background Concentrations Exceedance

Environmental Groups contend that the median concentrations of indicator constituents, boron and sulfate, in most of the wells are higher than the statewide upper-bound 90th percentile background value and not naturally occurring. EG Br. at 64. Seymour asserts that the background levels used by Environmental Groups are based on monitoring data from CWS wells that are not representative of site-specific groundwater quality. 2/2/18 Tr. at 32. Seymour argues that comparing monitoring results with the median background value is not meaningful. He maintains that a valid comparison would be based on a statistical evaluation using an upper bound confidence level of 90 percent. *Id.* at 32-33.

The Board finds that while background values established using site-specific monitoring data is always preferable, in the absence of such data, statewide background values may be used to evaluate groundwater impacts. Because site-specific background values have not been established at the Waukegan site, the Board finds that median values of boron and sulfate in monitoring wells can be compared with the 90th percentile statewide values. This comparison indicates that median concentrations of boron (MW-1 through MW-15) and sulfate (MW-1, 2, 4 through 9, 12 and 15) exceed the 90th percentile statewide values. These exceedances of the statewide background also appear to be consistent with the exceedances of Class I groundwater standards of boron and sulfate in most monitoring wells at Waukegan. Regarding boron, except for upgradient wells MW-10 and 14, the wells exceeding the 90th percentile value also exceeded the Class I boron standard. As to sulfate, wells exceeding the 90th percentile value also

exceeded the Class I standard in downgradient wells MW-5, 7, 8 and 9. The Board, thus finds that the Environmental Groups have proven that it is more likely than not that coal ash stored on-site, either in the ash ponds or outside of the ponds, is causing or contributing to the exceedances of the 90th percentile statewide values for boron and sulfate at Waukegan.

V. BOARD DISCUSSION

The Environmental Groups allege that MWG violated Sections 12(a), 12(d), and 21(a) of the Act (415 ILCS 5/12(a), 12(d), 21(a) (2016)) and Sections 620.115, 620.301(a) and 620.405 of the Board's groundwater quality rules (35 Ill. Adm. Code 620.115, 620.301(a) and 620.405). Am. Comp. at 17 ¶ 51; EG Br. at 4. The Environmental Groups allege that MWG discharged contaminants into the environment "through coal ash disposal ponds, landfills, unconsolidated coal ash fill, and/or other coal ash and coal combustion waste repositories" at the four Stations. Am. Comp. at 17 ¶ 51.

A. Section 12(a) of the Act, Water Pollution

Section 12(a) of the Act prohibits any person from causing, allowing, or threatening a *discharge* of any contaminants into the environment so as to *cause or tend to cause water pollution* or to *violate regulations or standards* adopted by the Board. 415 ILCS 5/12(a) (2016). As discussed below, the Board finds that the record indicates that MWG caused or allowed a discharge of contaminants so as to cause water pollution and to violate the Board's Class I GQS.

The Act defines "water pollution" to include a discharge of any contaminant into any waters of the State that will or is likely to render such waters harmful or detrimental or injurious to public health, safety or welfare or to domestic, commercial, industrial, agricultural, recreational, or other legitimate uses, or to livestock, wild animals, birds, fish, or other aquatic life. *See* 415 ILCS 5/3.545 (2016). The statutory definition of "waters" of the State includes groundwater. *See* 415 ILCS 5/3.550 (2016).

To find that a respondent violated Section 12(a) of the Act, the Board must find that a respondent discharged or threatened to discharge a contaminant that is likely to render waters harmful, detrimental, or injurious to public health. CSX, PCB 7-16, slip op at 16 (July 12, 2007). The Board has also found that a discharge of a contaminant that violated the Board's GQS violates Section 12(a) of the Act. International Union, PCB 94-420 at 33-34 (Aug. 1, 1996). In another case, the Board concluded that "[c]ompliance with a permitted GMZ would provide . . . immunity from violating the Part 620 standards" but not Section 12(a). People v. Texaco Refining and Marketing, Inc., PCB 2-03, slip op. at 9-10 (Nov. 6, 2003). The Board noted that "Section 12(a) of the Act provides no exemption from liability for parties that comply with another regulatory program" and that compliance with GMZ "is not an affirmative defense but rather a factor that may, if anything, mitigate any imposed penalty." *Id*.

The groundwater monitoring data, as discussed in Part IV *supra*, indicates the presence of contaminants in groundwater between December 2010 and April 2017 in concentrations that exceed Class I GQS at all four Stations.

At Joliet 29 Station, monitoring recorded 53 exceedances in monitoring well MW-9, which is a downgradient well located between Ash Pond 2 and Ash Pond 3 at the southwest edge of Ash Pond 3. Exceedances of sulfate occurred in 26 of 53, every quarter of the seven-year groundwater monitoring period of 2010-2017. The TDS standard was exceeded 27 of 53. The other three downgradient wells (MW-02, 03, and 04) also showed exceedances of Class I GQS for antimony seven times (from 2010 to2013) and for TDS once in 2013.

At Powerton Station, the Part 620 Class I arsenic standard was exceeded 83 times in eight downgradient monitoring wells (MW-6, 7, 11, 12, 13, 14, 15, and 17). While some of these exceedances were intermittent (in wells MW-6, 12, 14, and 15), others were consistent exceedances over a period of four to six years (in MW-7, 11, and 13). Monitoring showed 64 exceedances of the Part 620 boron standard in nine downgradient monitoring wells, 83% of which were observed in wells MW-9 (21 exceedances), MW-13 (26) and MW-14 (7). Monitoring also showed less consistent exceedances in MW-11, MW-12, and MW-19. There were 104 exceedances of sulfate standard in nine wells (MW-6, 8, 11, through 15 and 17) and 119 exceedances of TDS standard in the same eight wells and MW-7 and 18. While some wells had intermittent exceedances, MW-12, 13, 14, and 15 had consistent exceedances of sulfate or TDS or both over a period of four or more years.

At Will County, the groundwater monitoring results show 207 boron exceedances in 10 monitoring wells (MW-1 through 10) consistently from 2010 to 2017. The results also show three antimony exceedances in MW-2 in 2011 and 19 arsenic exceedances in MW-02, 6, 8, and 10 in 2011-2017. Between 2010 and 2017, there were consistent exceedance of the sulfate standard (131 exceedances in MW-01 through 10) and the TDS (80 standard in MW-01 through 08).

At Waukegan, monitoring showed 169 exceedances of the boron standard between 2010 and 2017 in 12 of the 15 monitoring wells in (MW-1 through 09, 11, 12, and 15). The Board also found 57 exceedances of the Class I sulfate standard and 63 exceedances of the TDS standard (MW-05, 07, 08, and 09) through the entire monitoring period of 2010-2017.

As discussed in detail in Part IV of this opinion, the Board finds that the preponderance of evidence establishes that it is more probable than not that these exceedances are caused by the MWG operations at the Station.

i. MWG "caused" or "allowed" Release of Contaminants.

Contaminants found in the monitoring wells in all four Stations are recognized by both parties as known constituents of coal ash. *See supra* Part IV (Facts). The record shows that MWG operations produce in coal ash, which MWG processes at its property, and stores temporarily on short or long-term basis before it is removed to permanent landfills. The record also shows that coal ash is present in multiple historical coal ash storage or fill areas, most of which are unlined and not monitored for leaching. Only some of those areas have been tested for beneficial reuse. The rest are just visually inspected. The groundwater monitoring results of the upgradient monitoring wells show that upgradient off-site sources did not contribute to the exceedances. The record provides no persuasive evidence that any of the indicator constituents recorded in these monitoring wells could have originated outside of MWG's property and migrated to the Stations, except for the arsenic at Waukegan. The record shows no other likely

sources of contamination. Thus, the Board finds that contaminants are leaking from MWG's property and that MWG's active coal ash ponds or historical coal ash storage sites of fill areas are the source of that contamination. Thus, the Board concludes that it is more probable than not that MWG caused contamination coming from the ash ponds and allowed contamination from the historic sites and ash fill areas. IEPA v. Rawe, AC 92-5, slip op. at 4 (Oct. 16, 1992); People ex.rel. Ryan v. McFalls, 313 Ill. App. 3d 223, 226-27, 798, 728 N.E.2d 1152, 1155 (3rd Dist. 2000).

It is immaterial whether any specific ash pond or any specific historic ash fill area can be pinpointed as a source to find MWG liable. The groundwater monitoring results narrow the contamination to defined areas within each of MWG Stations delineated by the monitoring wells. Davinroy at 796. As the owner or operator of these Stations, MWG has control over both its active ash ponds and historical coals ash storage areas. People v. Inverse Investments, LLC, PCB 11-79 slip op. at 9 (Feb. 16, 2012); Michel Grain, PCB 96-143, slip op. at 3-4 (Aug. 22, 2002); Meadowlark Farms, Inc. v. PCB, 17 Ill. App. 3d 851, 860, 308 N.E.2d at 836-37 (5th Dist. 1974); People v. Lincoln, 2016 IL App 143487 ¶¶ 48049, 70 N.E.3d 661, 678,; People v. State Oil Co., PCB 97-103, slip op. at 24-25 (Mar 20, 2003); Allaert Rendering, Inc. v. PCB, 91 Ill. App. 3d 153, 155-156, 414 N.E.2d 492, 494-95 (3rd Dist. 1980).

The monitoring results show that contamination persists after MWG concluded corrective actions required by its CCAs and GMZs. MWG is aware of these results but is not undertaking any further actions to stop or even identify the specific source: no further investigation of historic areas is taking place; no additional monitoring wells are installed; and, no further inspection of ash ponds or land around the ash ponds in the locations that show persistent exceedances is taking place. The Board is, thus, not persuaded that MWG took "extensive precautions" to prevent the releases. Davinroy, 249 Ill. App. 3d at 794; Perkinson v. PCB, 187 Ill. App. 3d 689 (3rd Dist. 1989); People v. William Charles, PCB 10-108, slip op. at 25-27 (Mar.17, 2011); City of Chicago v. Speedy Gonzales Landscaping, Inc, AC 06-39, AC 06-40, AC 04-41, AC 07-25, (Mar. 19, 2009); County of Jackson v. Taylor, AC 89-258, (Jan. 10, 1991); Phillips Petro. Co. v. PCB, 72 Ill. App. 3d 217 (2nd Dis. 1979); IEPA v. Coleman, AC04-46, at 7 (Nov. 4, 2004). Other than establishing an ELUC at Powerton, Waukegan, and Will County that restricts use of the area, for example for installing potable wells, MWG also did not take active actions to ensure that the contamination does not spread beyond its property. MWG knew that contaminants that include coal ash constituents are leaking from its property but did not fully investigate specific source or prevent further release, claiming that IEPA did not ask it to do so. MWG, however, cannot use IEPA's actions to excuse for MWG's violations of the Act or the Board rules.

While the VNs for the four Stations also alleged exceedances of Class I GQS for additional contaminants at other wells, the Board notes that the record shows other potential sources from outside of MWG property, that can be linked to those contaminants, as discussed in detail in Part IV of this opinion. The Board, therefore, concludes that the Environmental Groups failed to establish that it is more probable than not that MWG cause or allowed those other exceedances.

Based on the above, the Board finds that the preponderance of evidence indicates that during 2010-2017, MWG caused or allowed discharge of contaminants into the waters of the State with respect to the noted exceedances in monitoring wells at all four Stations.

Next the Board must determine if the discharge violated Board's GQS, or caused or tended to cause water pollution in violation of Section 12(a) of the Act. 415 ILCS 5/12(a) (2016).

ii. Violation of Board Rules

MWG asserts the establishment of GMZs at Joliet 29, Powerton, and Will County as one of its affirmative defenses. MWG 2nd Ans. Def. at 24-26 ¶¶ 82-97. MWG alleges that it did not violate the Board's GQS (35 Ill. Adm. Code 620.410, 620.420, 620.430, and 620.440) because the groundwaters within the GMZ are exempted from those standards by Section 620.450(a)(3). *Id*. at 25 ¶ 86; 2/1/18 Tr. at 107 (Gnat Test.). Because MWG did not violate the Board's GQS, MWG states, it is not in violation of Sections 620.301(a) and 620.405. *Id*. at ¶ 88. The Board disagrees.

The Board notes that, once a GMZ is established, groundwater underlying the GMZ is not subject to Board's Part 620 groundwater standards. *See* 35 Ill. Adm. Code 620.450. MWG relies on the GMZ as a defense from Part 620, even though the record establishes violation of the GQS prior to the development of the GMZ.

The Board finds that MWG is liable for any exceedances of the Part 620 standards that occurred at Waukegan, where no GMZ was established, and any exceedances before the GMZs were established at Joliet 29, Powerton, and Will County. While the establishment of a GMZ does obviate the need to meet standards of Part 620, the Board notes that a GMZ is not a permanent solution and expires upon completion of corrective action as specified in Sections 620.250(a) and 620.450(a). 35 Ill. Adm. Code 620.250(a) and 620.450(a). Based on the Board's rules, the Board finds that MWG failed to establish that the GQS are inapplicable in those GMZs at Joliet 29, Powerton, and Will County Stations because the record does not establish ongoing corrective action as specified in Section 620.450(a) at these sites. 35 Ill. Adm. Code 620.450(a).

a) Part 620 Exceedances at Waukegan

MWG did not establish a GMZ at Waukegan. Therefore, MWG's affirmative defense does not apply to exceedances of the Class I GQS at Waukegan. The record shows that at Waukegan, boron Class I GQS standard was consistently exceeded between 2010 and 2017, 169 times in 12 of the 15 monitoring wells in (MW-1 through 09, 11, 12 and 15). The record also shows 57 exceedances of the Class I sulfate standard and 63 exceedances of the TDS standard (MW-05, 07, 08, and 09) between 2010 and 2017. The preponderance of evidence indicates that these exceedances were caused or allowed by MWG operations at the Station. Thus, the Board concludes that MWG violated Board's Class I GQS in Section 620.410(a) and Sections 620.301(a) and 620.405 with respect to these exceedances.

b) Part 620 Exceedances at Joliet 29, Powerton, and Will County

Pre-GMZ Exceedances

MWG established GMZs at Joliet 29 on August 8, 2013, at Powerton on October 3, 2013, and at Will County on July 2, 2013. MWG Exh. 627 at 1; EG Exh. 638 at 1; MWG Exh. 658 at

1; MWG Exh. 660. The GMZs area is "a three-dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site". EG Exh. 242 at 6; EG Exh. 254 at 6; EG Exh. 276 at 6; Joint Stip. at 4; MWG 2nd Ans. Def. at 25; *see also* 35 Ill Adm. Code 620.250(a). Before each GMZ was established, groundwater resources at all three Stations fell into Class I category. EG Exh. 242 at 9; EG Exh. 254 at 9; EG Exh. 276 at 9.

The Board finds that any exceedances of Class I GQS that occurred before a GMZ was established, violate the Board's standards in Section 620.410, and thus Sections 620.301(a) and 620.405. The groundwater monitoring results show exceedance of Class I GQS at Joliet 29, Powerton, or Will County before the GMZs were established. At Joliet 29 these include: antimony (6 exceedances in MW-02, 03, and 04); sulfate (11 exceedances in MW-09); and TDS (13 exceedances in MW-03 and 09). At Powerton these include a total of: 1 exceedance of antimony standard in MW-02; 32 exceedances of arsenic standard in MW-07, MW-11 through 15; 15 exceedances of boron standard in MW-09, MW-11 through 13; 1 exceedance of selenium standard in MW-14; 15 exceedances of sulfate standard in MW-06, MW-08, MW-12 through 15; and 19 exceedances of TDS standard in MW-06, 07, 08, 13, 14, and 15. At Will County these include a total of: 3 exceedances of antimony standard in MW-01 and 02; 4 exceedances of arsenic standard in MW-08; 74 exceedances of boron standard in MW-01 through 10; 50 exceedances of sulfate standard in MW-01 through 9; and 24 exceedances of TDS standard in MW-03, 04, 05, 07, and 08. As noted in Part IV of this opinion, the Board finds that a preponderance of the evidence indicates that these exceedances were caused or allowed by MWG operation at the Stations.

The Board, therefore, finds that MWG did violate Board's Class I GQS in 620.410(a) and Sections 620.301(a) and 620.405 with respect to the exceedances that took place between 2010 and 2013 before the three GMZs were established at Joliet 29, Powerton, and Will County.

Exceedances During Corrective Actions

Groundwater within a GMZ is subject to standards specified in Section 620.450(a). 35 Ill. Adm. Code 620.450(a)(1). Section 620.450(a)(2) indicates that Sections 620.410, 620.420, 620.430, and 620.440 *do apply* to any chemical constituent in groundwater within a GMZ "[e]xcept as provided in subsections (a)(3) or (a)(4)." 35 Ill. Adm. Code 620.450(a)(2). Section 620.450(a)(3) indicates that Sections 620.410, 620.420, 620.430, and 620.440 do not apply to waters within GMZ prior to completion of a corrective action. 35 Ill. Adm. Code 620.450(a)(3).

The Board finds that under 35 Ill. Adm. Code 620.450(a)(3) any exceedances of Class I GQS during the period when MWG was performing corrective actions under the GMZs between August 8, 2013, and October 9, 2013, at Joliet 29; between October 3, 2013, and October 17, 2013, at Powerton; and between July 2, 2013, and October 17, 2013, at Will County and are exempt from the Board's Part 620 GQS in Section 620.410. The Board, thus, finds no violation of Sections 620.410, 620.420, 620.430, and 620.440 with respect to such exceedances. However, the Board finds that this record establishes serious questions regarding whether or not GMZs continue in effect at Joliet 29, Powerton, and Will County.

At Joliet 29, the GMZ application indicates the following remedy selected for the GMZ: "[t]he agreed upon remedy is specified in Item 5(a) through (h) of the executed [CCA]. . . The

remedy includes lining of Ash Pond 3 with HDPE. This [GMZ] application fulfills requirements set forth under Item 5(f) of the CCA." EG Exh. 242 Att. 2, Part III ¶ 1.

At Powerton, the GMZ application specifies a similar remedy: "[t]he agreed upon remedy is specified in Item 5(a) through (m) of the executed [CCA]. . . The remedy includes lining of the Ash Surge Basin and Ash Settling Basin with HDPE. This [GMZ] application fulfills requirements set forth under Item 5(g) of the CCA." EG Exh. 254 Att. 2, Part III ¶ 1.

And the similar remedy is in the GMZ application for Will County: "[t]he agreed upon remedy is specified in Item 5(a) through (j) of the executed [CCA] . . . The remedy includes lining of the Ash Pond 2S with HDPE, removing Ash Ponds 1S and IN from service and installing a dewatering system within those ponds to keep liquid levels to within no more than one foot of the bottoms of those units. This [GMZ] application fulfills requirements set forth under Item 5(g) of the CCA." EG Exh. 276 Att. 2, Part III ¶ 1.

All three GMZ applications also note that "[at] the completion of the corrective process, a final report is to be filed which includes the confirmation statement included in Part IV." EG Exhs. 242, 254, and 276 at Att. 2, at 1 Note 1. The record does not indicate whether MWG submitted such forms. On October 9, 2013, however, MWG filed a certification with the IEPA stating that all Joliet 29 CCA measures were completed. Joint Stip. at 4; MWG Exh. 630. On October 17, 2013, MWG filed a similar certification with respect to the Powerton CCA and Will County CCA. Joint Stip. at 4; MWG Exhs. 637, 661. MWG's certifications indicate that all CCA actions were completed by the dates of the respective certifications. MWG Exhs. 630, 637, 661. The record shows no other corrective action taking place or planned by MWG under any of the three GMZs after these dates.

The record shows that groundwater monitoring and visual inspections of the active ash ponds required by the CCAs are to continue permanently at Joliet 29, Powerton, and Will County. The CCAs require that "MWG shall continue quarterly monitoring of . . .groundwater monitoring wells for constituents in 35 Ill. Adm. Code 620.410(a) . . .and report its findings to the [IEPA]." MWG Exhs. 626, 636, 656, and 647 all at 3. This requirement comes from the CCAs rather than as a condition to establish a GMZ. Moreover, the same requirement is also present in Waukegan CCA, where no GMZ was required. MWG Exh. 647 at 3-4 ¶ 5; *see also* MWG Exh. 649 at 1 ("[t]he CCA that IEPA approved for Waukegan, didn't include a corrective action (hence no GMZ)"). The CCAs at all four Stations indicate that these actions are intended to avoid and detect any further contamination, or monitor effectiveness of a corrective action, rather than remedy any contamination or remove the contamination source. CCAs at Powerton, Will County, and Waukegan also require MWG to establish ELUC. The Board acknowledges that both ELUC and continuous groundwater monitoring can be effective corrective action tools. However, the record fails to establish that the continuous monitoring, by MWG at the Stations is in fact a corrective action.

While neither the Board rules nor the Act define "corrective action," the "corrective action process" is defined as "those procedures and practices that may be imposed by a regulatory agency when a determination has been made that contamination of groundwater has taken place, and are necessary to address a potential or existing violation of the standards set forth in Subsection D." 35 Ill. Adm Code 620.110. In this case, all three GMZs were established to remedy the violations alleged in the VNs and bring the groundwater at the Stations

into compliance with Class I GQS. EG Exh. 242 at 9 ¶ 10; EG Exh. 254 at 9 ¶ 10; EG Exh. 276 at 9 ¶ 10. Section 620.250(a) states that a GMZ may be established "if an owner or operator provides a written confirmation to the Agency that an adequate corrective action, equivalent to a corrective action process approved by the Agency is being undertaken in a *timely* and *appropriate* manner." EG Exh. 242 at 6; EG Exh. 254 at 6; EG Exh. 276 at 6; *see* 35 Ill. Adm. Code 620.250(a) (emphasis added). Thus, a corrective action process under a GMZ must be "necessary to address a potential or existing violation" of Part 620 standards and must be undertaken in a "timely and appropriate manner."

The continuous monitoring required by CCAs at Joliet 29, Powerton, and Will County does not show how that monitoring may be construed as "timely" or "appropriate" to remedy groundwater quality, or that it will "address a potential or existing violation" of the Class I GQS absent some other actions by MWG. There is no evidence in the record to expect that groundwater quality at Joliet 29, Powerton, and Will County will return to Class I standards naturally, considering the continuous exceedances at these stations that persist even after the relining of the ash ponds. There is also no indication under any of the GMZs that MWG will be taking any actions based on the results of the monitoring, or that it will trigger any actions by the Agency. The Board notes that all four CCAs have almost identical language in Item 5 requiring continuous monitoring of existing and newly installed wells. Items 5(a) though (c) are also almost identical in all the CCAs requiring operation of the ash ponds only as temporary disposal sites and in a manner that protects the liners integrity. MWG Exhs. 626, 636, 656 and 647 all at 3-4 ¶ 5. But, Waukegan's CCA does not require establishing a GMZ or relining the ash ponds. MWG Exh. 647 at 3-4 ¶ 5.

The Board also does not consider the ELUCs established by MWG at Powerton and Will County as part of a "corrective action". The Act and Board rules provide for ELUCs as "an institutional control in order to impose land use limitation or requirements related to environmental contamination so that persons conducting remediation can obtain a No Further Remediation determination." EG Exh. 253 at 3; MWG Exh. 659 at 3; 415 ILCS 5/58.17; 35 Ill. Adm. Code 742. An ELUC establishes limitations that are designed to protect "against exposure to contaminated groundwater," rather than to remedy the contamination. *Id*. Again, Waukegan's CCA did require establishing an ELUC, while it did not require a GMZ. MWG Exh. 647 at 3-4 ¶5.

A GMZ is established "for a period of time" necessary to "mitigate impairment caused by the release of contaminants" and the owner or operator must undertake "an adequate corrective action in a timely and appropriate manner." *See* 35 Ill. Adm. Code 620.250(a)(2), (b); 620.450(a)(3); *see* 35 Ill. Adm. Code 620.250(a). Section 620.250(c) provides that a GMZ "*expires* upon the Agency's receipt of appropriate documentation which confirms the completion of the action taken pursuant to subsection (a) and which confirms the attainment of applicable standards as set forth in Subpart D." 35 Ill. Adm. Code 620.250(c) (emphasis added). Appendix D of Part 620 contains the form entitled "Confirmation of an Adequate Corrective Action Pursuant to 35 Ill. Adm. Code 620.250(a)(2)," which confirms that remediation is completed. 35 Ill. Adm. Code 620.APPENDIX D.

Continuing the GMZ in the absence of pending corrective action appears to be contrary to the purpose of Part 620 and, in particular, Section 620.250(a). The Board promulgated GQS under Section 8 of the Illinois Groundwater Protection Act (IGPA) to protect groundwater from

"those contaminants which have been found in the groundwaters of the State and which are known to cause, or are suspected of causing, cancer, birth defects, or any other adverse effect on human health according to nationally accepted guidelines." IGPA, 415 ILCS 55/8(a) (2016); Groundwater Quality Standards (35 Ill. Adm. Code 620), R89-14(B), slip op. at 3 (Nov. 7, 1991). "[R]educed health risks through decreased exposure to contaminants in groundwater" is the primary benefit of promulgated GQS. *Id*. at 23. IGPA declares that "it is the policy of the State of Illinois to restore, protect, and enhance the groundwaters of the State, as a natural and public resource." 415 ILCS 55/2(b) (2016). It is further the policy of the State "that the groundwater resources of the State be utilized for beneficial and legitimate purposes; that waste and degradation of the resources be prevented; and that the underground water resource be managed to allow for maximum benefit of the people of the State of Illinois." *Id*; *see also* R89-14(B) at 6. Class I groundwaters are recognized as the most valuable groundwater resources, requiring the highest degree of protection, "any successful program of groundwater management must give special focus to potable groundwater". *Id*. at 10. When adopting the GMZ regulations, the Board noted that "in any management zone the goal is remediation, if practicable, of the groundwater to the level of the standards applicable to that class of groundwater." *Id*. at 66.

In this case, the GMZs were established to remedy violations alleged in VNs. However, the groundwater monitoring results indicate that exceedance of Class I GQS persisted at some of the monitoring wells at Joliet 29, Powerton or Will County even upon completion of GMZ corrective actions. Since the record does not indicate when, if, or even how, exceedances found in groundwater monitoring will be addressed, the Board finds MWG did not meet its burden of proving that groundwater in Joliet 29, Powerton, and Will County are exempt from Class I GQS under section 620.450(a)(3). The Board therefore finds that continued violations of the Board's Class I GQS, occurring at Joliet 29, Powerton, and Will County after MWG certified completion of the requirements of the CCA, violate the Class I GQS. Thus, the Board finds that it is more probable than not that MWG violated the Class I GQS at Joliet 29, Powerton, and Will County during those times, in violation of Section 620.410(a) of the Board rules.

c) Violation of Sections 620.115, 620.301(a) and 620.405.

The Board further finds that MWG also violated Sections 620.115, 620.301(a) and 620.405 of the Board rules with respect to exceedances noted above. Section 620.115 prohibits causing, threatening or allowing a violation of the Act or Board regulations, including Part 620. 35 Ill. Adm. Code 620.115. Section 620.405 also prohibits causing, threatening or allowing the release of any contaminant to groundwater so as to cause an exceedance of the Part 620 groundwater quality standards. 35 Ill. Adm. Code 620.405. By exceeding GQS in Section 620.410(a), MWG also violated Sections 620.115 and 620.405.

The Board also finds that MWG violated Section 620.301(a) of the Board rules. 35 Ill. Adm. Code 620.301(a). Section 620.301(a)(2) prohibits causing, threatening or allowing the release of any contaminant to a resource groundwater such that "[a]n existing or potential use of such groundwater is precluded." 35 Ill. Adm. Code 620.301(a). As discussed above, groundwater at the four Stations is defined as Class I in VNs, CCAs, and GMZs. The Board rules define Class I groundwater as "potable resource groundwater." *See* 35 Ill. Adm. Code 620.210. Section 620.302(c) indicates that "if a contaminant exceeds a standard set forth in Section 620.410 . . . the appropriate remedy is corrective action . . .." 35 Ill. Adm. Code

620.302(c). Thus, if the groundwater designated as Class I is contaminated by constituents that exceed Class I GQS standards in Section 620.410(a), the existing and potential use of such groundwater as Class I groundwater is precluded. Therefore, the Board finds that the Environmental Groups established that it is more probable than not that the potential use of the groundwater is precluded, and MWG violated Section 620.301(a).

iii. Water pollution caused by exceedances of background levels

The Board also finds that exceedances of the statewide 90th percentile in some of the monitoring wells for some of the coal ash indicator constituents also constitute water pollution and violation of Article 12(a) of the Act.

As discussed in Part IV *supra*, the Board finds that the monitoring results show consistent exceedances of the sulfate background levels at the Joliet 29 monitoring well MW-09. At Powerton, the Board finds that groundwater monitoring results indicate exceedance of the 90th percentile statewide values for boron and sulfate in 10 downgradient wells. Sulfate and boron in all fifteen downgradient wells are above the median values of those constituents in the upgradient well. The Board finds that these exceedances of the statewide background and site-specific upgradient median appear to be consistent with the exceedances of groundwater standards of sulfate and boron in many of the downgradient wells. At Will County, the Board finds that a comparison of the median values of boron and sulfate in the down gradient wells with the 90th percentile statewide values indicate exceedances of boron above background in all 10 monitoring wells and sulfate in one well (MW-4). At Waukegan, the Board finds exceedances of the 90th percentile statewide values for boron and sulfate.

As noted earlier, sulfate and boron are typical indicators of coal ash. The record shows no off-site source that can be causing such exceedance because upgradient monitoring wells show no similar exceedances. Therefore, the likely source of the exceedance of 90th statewide percentile value for these constituents is coal ash stored in coal ash ponds or deposited outside the ponds.

The Board considers the 90th statewide percentile appropriate to consider water pollution violations because those levels are established to show exceedance of state-wide background levels that IEPA considers to "have potential to degrade water and threaten/preclude its use." EG Exh. 405 at 2 (#019068). The Board finds that exceedance of the 90th statewide percentile as adequate to show water pollution. *See* 415 ILCS 5/3.545 (2016); *see also e.g.,* People v. CSX, PCB 7-16, slip op. at 17 (July 12, 2007) (the Board found violation of Section 12(a) of the Act when discharge of contaminants is likely to render waters harmful, detrimental or injurious to public health in case of exceedance of the remediation objective levels); Central Illinois Public Service Co. v. PCB, 116 Ill. 2d 397, 408, 507 N.E.2d 819, 824 (1987) (the court concurred with Board's interpretation of water pollution to include "any contamination which prevents the State's water resources from being usable" because it allows "the Board to protect those resources from unnecessary diminishment").

The Board thus, finds that MWG violated Article 12(a), because it caused, threatened or allowed the discharge of contaminants into the groundwater at all four Stations, so as to cause or tend to cause water pollution in Illinois, either alone or in combination with matter from other sources. *See* 415 ILCS 5/12(a) (2016).

B. Section 12(d) of the Act, Water Pollution Hazard

The Environmental Groups' amended complaint also alleged violation of Section 12(d) of the Act, but the post-hearing briefs only fully brief Section 12(a). *See* EG Br. at 4, 5-10, 28, 37, 73; EG Resp. Br at 7, 8, 12, 13, 18, 22, 24-25, 33, 34.

Section 12(d) of the Act prohibits depositing any contaminants upon the land in such place and manner so as to create a water pollution hazard. 415 ILCS 5/12(d) (2016). Environmental Groups argue that even though a prior owner or operator of the MWG sites may have deposited the ash in the fill areas, MWG has allowed the ash to remain on the site, and is therefore liable under Sections 12(a) and 12(d) for its inaction to remedy the leaching of contamination into the groundwater. According to the Environmental Groups, MWG's "passive conduct amounts to acquiescence sufficient to find a violation." EG Resp. Br at 24 *citing* Rawe, AC92-5, slip op. at 6 (Oct. 16, 1992). Environmental Groups also rely on Tri-County Landfill Company v. PCB, 41 Ill. App. 3d, 353 N.E.2d 316 (2nd Dist. 1976) to argue that a party is required to show less to establish a 12(d) violation than a 12(a) violation and that a violation of 12(d) exists when "pollution does not yet rise to the level of severity for a 12(a) violation." EG Resp. Br at 22, citing Tri-County, 353 N.E.2d at 324.

The Board notes that, in order to establish a violation of Section 12(d), a party must demonstrate that contaminants were "deposited" on "land." 415 ILCS 5/12(d) (2016). Environmental Groups' reliance on Rawe is misplaced, because Rawe addresses an alleged violation of Section 21 of the Act which prohibits "causing or allowing" open dumping of waste. 415 ILCS 5/12(d) (2016).

At Powerton, the record shows that MWG did deposit contaminants on the land when leaving coal ash cinders directly on the ground, without liners or any other apparent protection from leaching. *See* Part IV.3.B.iii *supra*. The record establishes that storage of coal ash on unlined areas risks of groundwater contamination due to the movement of water through coal ash. EG Br. at 19; 10/24/17 Tr. at 39 (Lux Test.); 10/26/17 Tr. p.m. at 34-35, 83-84 (Kunkel test); 1/29/18 Tr. at 208 (Race Test.); 1/30/18 at 29 (Race Test.). The Powerton CCA specifically prohibits using any unlined areas for permanent or temporary ash storage or ash handling. MWG Exh. 636 at 4 (#555) Item 5(m). The groundwater monitoring results show exceedances of arsenic, sulfate, boron, and TDS standards in the downgradient monitoring wells when the cinders were stored on the ground.

The Board thus concludes that the preponderance of evidence shows that MWG deposited contaminants upon the land at Powerton in such place and manner so as to create a water pollution hazard in violation of Section 12(d) of the Act. 415 ILCS 5/12(d) (2016). The Board, however, finds that Environmental Groups did not establish violation of Section 12(d) of the Act at Joliet 29, Will County, or Waukegan Stations.

C. Section 21(a) of the Act, Open Dumping

Environmental Groups allege that MWG violated the open dumping prohibition of Section 21(a) of the Act (415 ILCS 5/21(a) (2016)). They allege that MWG did so through its

"knowledge of and acquiescence to" coal ash deposited "at unlined repositories like ash landfills and ash fill areas" and "maintaining coal" at the disposal sites that do not fulfill the requirements of sanitary landfills. The Environmental Groups specifically contend that coal ash in the Former Ash Basin and widespread fill areas at Powerton, the coal ash landfills at Joliet 29, the Former Slag and Fly Ash Storage Area at Waukegan and Ponds 1N and 1S at Will County are "landfills, basins, or storage areas." They further contend that there is no evidence that the coal ash was placed there as structural fill." EG Resp. Br. at 31. They allege that water pollution resulted from these deposits. EG Br. at 5, 29, 51. The Environmental Groups maintain that MWG is liable even if they did not place the contaminants on the land or water. To support their argument, the Environmental Groups rely on Lincoln, 2016 IL App 143487 at ¶¶ 48-49; State Oil, PCB 97-103, slip op at 19; Rawe, AC 92-5slip op at 3-5 (Oct. 16, 1992); Coleman, AC 04-46, slip op. at 7 (Nov. 4, 2004). EG Br. at 51. They also contend that the Board must look at the exceedance of MCLs at 40 C.F.R. Part 257, Appendix I, to show violation of Section 21(a). EG Br. at 51. Environmental Groups state that since 2010, groundwater exceeded MCLs 62 times at Powerton, 25 times at Will County, and 106 times at Waukegan. EG Br. at 51, 62, 72.

MWG contends that the Environmental Groups did not prove a violation of Section 21(a). MWG alleges that coal ash at the stations is not abandoned and is reused beneficially. MWG Br. at 54-57; MWG Resp. Br at 30. MWG relies on IEPA v. Michael Gruen and Jon Eric Gruen, d/b/a John's Tree Service, AC 06-49, (Jan. 24, 2008). In that case the Board found that the wood stored on a property for more than two years was not "discarded" and, thus, not waste, because it was eventually removed for beneficial reuse. MWG Resp. Br. at 31. MWG alleges that there is market for the coal ash reuse, and MWG reuses bottom ash beneficially such as structural fill. MWG Resp. Br. at 31. MWG also contends that it did not "allow" open dumping because it took extensive precautions to prevent open dumping and "has not been passive in its response to the coal ash at its Stations." MWG states that it analyzed coal ash inside the ponds, which shows that ash is not a source of contamination. *Id*. It also relined the ponds and established GMZs and ELUCs. *Id*.; MWG Resp. Br. at 56-57.

First, the Board considers whether coal ash at the four Stations is "waste" as defined by the Act and Board rules. Next, the Board reviews at the evidence showing whether areas where coal ash is abandoned fulfill requirements of sanitary landfills. Finally, the Board concludes that MWG caused or allowed open dumping of the coal ash at its Stations.

i. Coal Ash at the Stations is "Waste"

The Act defines "open dumping" as "the consolidation of *refuse* from one or more sources at a disposal site that does not fulfill the requirements of a sanitary landfill." 415 ILCS 5/3.305 (2016). The Act defines "refuse" as "waste." 415 ILCS 5/3.385 (2016). "Waste" is defined, among other, as "*discarded material*, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining and agricultural operations . . .." 415 ILCS 5/3.535 (2016) (emphasis added). While the Act does not define "discarded material" or "discarded," the Act defines "disposal" as "discharge, deposit, injection, dumping, spilling, leaking or placing of any waste or hazardous waste into or on any land or water or into any well so that such waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters." 415 ILCS 5/3.185 (2016). The Act defines "waste disposal site" as a "site on which solid waste is disposed." 415 ILCS 5/3.540 (2016). The Board has found contaminants leaking into groundwater from

temporarily stored material to be "discarded material" for the purposes of Section 21(a) of the Act. *See* State Oil, PCB 97-103, slip op. at 21 (Mar. 20, 2003) ("once petroleum has leaked from underground storage tanks, it becomes a waste.").

Although MWG argues that coal ash stored at the Stations is not "waste" because it is beneficially reused, the record does not support this position. While MWG may send some coal ash to be used beneficially by third parties (1/29/18 Tr. at 172:1-178:15; 1/31/18 Tr. at 224:21-225:4, 249:23-250:6; 10/24/17 Tr. at 15:4-8, 248:9-249:8), significant amounts remain in historic areas. The record also shows the presence of coal ash in areas outside of ash ponds at all four Stations.

"[A]ny fly ash, bottom ash, slag, or flue gas or fluid bed boiler desulfurization by-products generated as a result of the combustion of . . . coal, or . . . coal in combination with [other material]" constitutes "coal combustion *waste*" (or CCW). 415 ILCS 5/3.140 (2016) (emphasis added). Coal combustion waste is not excluded from definition of "waste" under the Act. *See* 415 ILCS 5/3.535 (2016). "Waste" does not include "coal combustion by-products as defined in Section 3.135." 415 ILCS 5/3.535 (2016). "Coal combustion by-product" or (CCB) is defined as "coal combustion waste when used beneficially in any of the following ways: . . ." 415 ILCS 5/3.135 (2016). Coal combustion waste, including coal ash, meets the definition of CCB, and is excluded from definition of "waste" if it is used as specified in Section 3.135. 415 ILCS 5/3.135 (2016).

Strict requirements apply to uses permitted under Section 3.135(a). To be used beneficially as structural fill, foundation backfill, antiskid material, soil stabilization, pavement, or mine subsidence, CCW must satisfy certain quality requirements:

a) it must not be mixed with hazardous materials (415 ILCS 5/3.135(a-5)(A) (2016));
b) it must not exceed Class I GQS for metals when tested using ASTM D3987-85 method (415 ILCS 5/3.135(a-5)(B) (2016));
c) a notification must be provided to IEPA for each project using CCB "documenting the quantity of CCB utilized and certification of compliance with conditions (A) and (B) of [subsection 3.135(a-5)]" (415 ILCS 5/3.135(a-5)(C) (2016));
d) CCB must not be accumulated speculatively (less than 75% of CCB weight or volume accumulated at the beginning of the period) (415 ILCS 5/3.135(a-5)(E) (2016));
e) CCB must include any prescribed mixture of fly ash, bottom ash, boiler slag, flue gas desulfurization scrubber sludge, fluidized bed combustion ash, and stoker boiler ash and shall be tested as intended for use (415 ILCS 5/3.135(a-5)(F) (2016)).

To be used as structural fill, CCB must be designed and constructed "according to ASTM standard E2277-03" or "Illinois Department of Transportation specifications." It also must be "in an engineered application or combined with cement, sand, or water to produce a controlled strength fill material and covered with 12 inches of soil unless infiltration is prevented by the material itself or other cover material." 415 ILCS 5/3.135(a)(7) (2016).

Other uses do not qualify CCW as CCB, unless an applicant obtains a "beneficial use determination." To obtain a determination from IEPA, an applicant must demonstrate that coal-combustion waste satisfies all the following criteria:

- the use will not cause, threaten, or allow the discharge of any contaminant into the environment;
- the use will otherwise protect human health and safety and the environment; and
- the use constitutes a legitimate use of the coal-combustion waste as an ingredient or raw material that is an effective substitute for an analogous ingredient or raw material. 415 ILCS 5/3.135(b) (2016).

The record does not show that coal ash from the Stations met these requirements. First, the record shows that out of all identified historical areas and active ash ponds, coal ash was tested for compliance with CCB requirements under Section 3.135 only from three locations: 1) Northwest Area at Joliet 29; 2) Limestone Runoff Basin at Powerton; and 3) the area right outside the east side of 1N at Will County. *See* Part IV *supra* for details; EG Exh. 293; MWG Exh. 635; EG Exh. 284; MWG Exh. 901 at 9. The record provides no information on any CCB testing at Waukegan Station.

Second, MWG did not provide evidence showing that any of this material was used in compliance with the requirements of Section 3.135 of the Act. No evidence was provided to demonstrate that coal ash present in fill areas complies with IDOT specifications or ASTM standard E2277-03. Also, the record does not indicate whether or what material was removed from the Stations, sold or otherwise transferred to other entities for beneficial reuse. The existence of a market for a material that qualifies as CCB by itself does not qualify the material as CCB. To qualify as CCB, the material must comply with Section 3.135.

Accordingly, the Board concludes that a preponderance of evidence does not support MWG argument that coal ash from the Stations qualifies as CCB. The Board is not persuaded that coal ash from any of the historic coal ash storage locations or fill areas is "not discarded." MWG admits that "coal ash at various parts of the Stations was used at least 30 years ago or more as fill to support construction." MWG Resp. Br. at 55. The record also shows the widespread presence of coal ash outside of the ash ponds through the stations. Such as the widespread presence of coal ash in fill areas at Powerton and Will County, and coal ash left in historic storage areas at all four Stations. The evidence shows no plans to remove such coal ash from these areas for beneficial reuse or for any other purposes. The Board finds, thus, that coal ash at all four Stations left in areas outside of the ash ponds is "discarded" and constitutes "waste" for the purposes of Section 21(a) of the Act.

ii. Coal ash stored in areas that are not sanitary landfills

To establish an "open dumping," the evidence must show the presence of waste "at a disposal site that does not fulfill the requirements of a sanitary landfill." 415 ILCS 5/3.305 (2016). The Act defines "waste disposal site" as a "site on which solid waste is disposed" (415 ILCS 5/3.540 (2016) and "site" include "any location . . . used for purposes subject to regulation or control" by the Act or regulations under the Act (415 ILCS 5/3.460 (2016)). The Act defines "sanitary landfill" as "a facility permitted by the Agency for the disposal of waste on land" that

meets specific requirements does not "create nuisances or hazards to public health or safety" and confining the refuse "to the smallest practical volume and covering it with a layer of earth at the conclusion of each day's operation, or by such other methods and intervals as the Board may provide by regulation." 415 ILCS 5/3.445 (2016).

The Board has concluded that "under these definitions, an area on which waste is deposited can be a "disposal site" if the waste deposition is conducted in a manner that allows waste material to enter the environment, including groundwater" even if it is a permitted or otherwise lawful facility. Sierra Club, PCB 13-15, slip op. at 25-27 (Oct. 3, 2013). The Board found that Section 21(a) may apply to ash ponds because it applies "to permitted or otherwise lawful facilities that improperly fail to contain waste." *Id*.

As indicated in Part IV, the instant record shows that historic ash landfills at all four Stations contain ash, as evidenced by testing for CCB compliance, boring results, MWG admissions and testimony, and groundwater monitoring results. At Joliet 29, MWG admitted that all three historic coal ash sites (Northwest, Northeast, and Southeast areas) contain historic ash; additionally, the 1998 Phase II Environmental Assessment and 2005 testing for CCB confirmed the existence of the historic ash. MWG Br. at 11; MWG Exh. 901 at 23; EG Exh. 20D; EG Exh. 293. Soil borings also identified the presence of coal ash in fill areas outside of the ash ponds (near MW-11, MW-09, and MW-10) and historic ash areas (north of the Southwest Ash Placement Area). EG Exh. 201 at 27, 29, 31, 34 (#24290, 92, 94, 97).

The Board finds that evidence from groundwater monitoring shows that some of MWG ash ponds and historic coal ash storage areas are leaking contaminants that cause exceedances of Class I GQS. At Joliet 29, the record shows Ash Pond 3 or coal ash deposited outside of but close to that ash pond is the cause of consistent exceedances of Class I GQS in MW-09. At Waukegan, the evidence shows that the source of sulfate and of TDS exceedances is the Former Slag and Fly Ash Storage area located west of the ash ponds. At Will County and Powerton, the groundwater monitoring results show that consistent exceedances of Class I GQS are also caused by MWG operations at the Stations and are not coming from outside.

The record also shows soil borings taken in 1998, 2005, and 2010 by different consultants for different purposes. All of these borings indicate the presence of coal ash in the fill buried directly into the ground around the ponds and other unlined areas at all for Stations, going as deep as 9-20 feet below the surface at Powerton, Will County, and Waukegan. EG Exhs. 12C-15C and 17D-20D; EG Exh. 201.

And finally, the results of the CCB testing at Joliet 29, Powerton, and Will County indicate the presence of the historic coal ash in the tested areas. EG Exh. 284, 293, and 635; MWG Exh. 901 at 9. The testing showed some of these areas contain coal combustion waste that does not meet the quality criteria of CCB because it contains coal ash constituents in concentrations above Class I GQS. *Id*.; *see* Part IV for details.

None of these areas fulfill the requirements of a sanitary landfill. None of them are facilities "permitted by the Agency for the disposal of waste on land." None of the ash ponds at the four Station are permitted "for the disposal of waste". The four CCAs specifically prohibit using any of the ash ponds as permanent disposal sites. MWG Exhs. 626 at 2 ¶ 3; 636 at 2 ¶ 3; 656 at 2 ¶ 3; 647 at 2 ¶ 3. None of the fill areas of the historic coal ash storage areas has any

permits at all. None of them "confine the refuse" to ensure that no nuisances or hazards to public health or safety exists because, other than ash ponds, none of the other areas separate the coal ash from the ground or surface water infiltration and leaking into the groundwater. Other than the historical Northeast former coal ash placement area, record indicates no cover been placed over the area, either. The Board, thus, concludes, that the areas that contain coal ash at the four Stations do not fulfill requirements of sanitary landfill. 415 ILCS 5/3.445 (2016).

Next, the Board discusses whether MWG caused or allowed consolidation of coal ash in violation of Section 21(a) of the Act.

iii. MWG caused or allowed consolidation of coal ash at its Stations

To "cause or allow" open dumping, the alleged polluter must have the "capability of control over the pollution" or "control of the premises where the pollution occurred. Davinroy, 249 Ill. App. 3d at 793-96, *see also* Sierra Club, PCB 13-15, slip op. at 26 (Oct. 3, 2013). The record indicates that MWG, as the owner or operator at the four Stations had control over the areas that contain coal ash since 1999, when it began operating the Stations. Rawe, AC92-5, slip op. at 4 (Oct. 16, 1992); McFalls, 313 Ill. App. 3d at 226-27, Inverse Investments, PCB 11-79 at 9; Michel Grain, PCB 96-143, at 3-4, (Aug. 22, 2002); Meadowlark Farms, 17 Ill. App. 3d at 860, Lincoln, 70 N.E.3d at 678, State Oil, PCB 97-103, slip op at 24-25; Allaert Rendering, 414 N.E.2d at 494-95 .

MWG was aware of presence of coal ash buried at the four stations before it began operations. The 2005 and 2010 borings confirmed the presence of coal ash. Groundwater monitoring results showed the locations where contaminants were seeping into the groundwater at each of the Stations. MWG also recognizes that contaminants present in the groundwater monitoring results are known constituents of coal ash. The groundwater monitoring results do not indicate off-site sources as the cause of contamination with respect for constituents indicated in Part IV (Facts) of this opinion. Thus, the Board concludes that the record does not support MWG "took extensive precautions to prevent open dumping" and "has not been passive in its response to the coal ash at its Stations." Davinroy, 249 Ill. App. 3d 788; Perkinson, 187 Ill. App. 3d 689; People v. William Charles, PCB 10-108, slip op. at 25-27 (Mar.17, 2011); Gonzales, AC 06-39, AC 06-40, AC 04-41, AC0 7-25; County of Jackson v. Taylor, AC 89-258, (Jan. 10, 1991); Phillips Petro. Co. v. PCB, 72 Ill. App. 3d 217 (2nd Dis. 1979); IEPA v. Coleman, AC04-46, at 7 (Nov. 4, 2004).

The Board concluded that respondents "allowed" the waste to be consolidated on the site when they failed to conduct any soil removal. *See* State Oil, PCB 97-103, slip op. at 21-22 (Mar. 20, 2003). The record in this case shows the presence of coal ash in the fill areas and historic storage sites that have no liners, covers or any other protection from the surface of groundwaters. The record shows no actions by MWG to remove the coal ash from those areas or prevent leaking of contaminants from those areas in any other way. Thus, the Board finds that MWG did allow consolidation of coal ash by failing to remove it from the fill areas and historical coal ash storage areas, and by allowing contaminants to leak into the environment.

Accordingly, the Board finds that MWG violated Section 21(a) of the Act by allowing the coal ash to be consolidated in the fill areas around ash ponds and in historical coal ash storage areas at all four Stations.

VI. CONCLUSIONS

The Board finds that the Environmental Groups met their burden in establishing that it is more probable than not that MWG violated the Act and Board regulations as alleged in the amended complaint. Specifically, the Board finds that MWG violated Section 12(a) of the Act at all four Stations. 415 ILCS 5/12(a) (2016). The Board finds that MWG caused or allowed discharge of coal ash constituents into groundwater at all four Stations, thereby causing exceedances of the Board's Class I antimony (Joliet 29, Will County), arsenic (Powerton, Will County), boron (Powerton, Will County, and Waukegan), sulfate (Joliet 29, Powerton, Will County, and Waukegan) and TDS (Joliet 29, Powerton, Will County, and Waukegan) GQS during 2010-2017, violating Sections 620.115, 620.301(a), and 620.405 of the Board's regulations (35 Ill. Adm. Code 620.115, 620.301(a), 620.405). 415 ILCS 5/12(a) (2016).).

The Board also finds that MWG violated Section 12(a) of the Act at all four Stations by causing or allowing discharge of contaminants into groundwater causing water pollution. Specifically, the Board finds that MWG exceeded the statewide 90th percentile levels for sulfate and boron at all four Stations between 2010 and 2017. 415 ILCS 5/12(a)(2016). The Board, however, finds no violation of Section 12(a) of the Act at Joliet 29, Powerton, and Will County during the performance of corrective actions in October 2013 under the GMZs established at those three Stations.

The Board finds that MWG also violated Section 12(d) of the Act at Powerton Station by depositing coal ash cinders directly upon the land, thereby creating a water pollution hazard. 415 ILCS 5/12(d) (2016). The Board, however, finds that Environmental Groups did not establish violations of Section 12(d) of the Act at Joliet 29, Will County, or Waukegan Stations.

Lastly, the Board finds that MWG violated Section 21(a) of the Act at all four Stations by allowing coal ash to consolidate in the fill areas around the ash ponds and in historical coal ash storage areas. The Board finds that MWG did not take measures to remove it or prevent its leaking of contaminants into the groundwaters.

The Board finds the record is insufficient to determine the appropriate relief in this proceeding. Therefore, the Board directs the hearing officer to hold additional hearings to determine the appropriate relief.

ORDER

1. The Board finds that respondent Midwest Generation, LLC (MWG) violated Section 12(a) of the Environmental Protection Act (Act) (415 ILCS 5/12(a) (2016)).

2. The Board finds that MWG violated Section 12(d) of the Act (415 ILCS 5/12(d) (2016)).

3. The Board finds that MWG violated Section 21(a) of the Act (415 ILC21(a) (2016)).

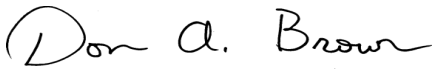
4. The Board finds that MWG violated Sections 620.115, 620.301(a), and 620.405 of the Board regulations (35 Ill. Adm. Code 620.115, 620.301(a), 620.405).

5. The Board finds the record lacks sufficient information to determine the appropriate remedy. Therefore, the Board directs the hearing officer to hold additional hearings to determine the appropriate relief and any remedy, considering Sections 33(c) and 42(h) of the Act (415 ILCS 5/33(c) and 42 (h) (2016)).

IT IS SO ORDERED.

Board Member Brenda Carter abstained.

I, Don A. Brown, Clerk of the Illinois Pollution Control Board, certify that the Board adopted the above order on June 20, 2019, by a vote of 4-0.



Don A. Brown Clerk
Illinois Pollution Control Board