

ILLINOIS POLLUTION CONTROL BOARD

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

Report of Proceedings had at the Hearing on October 26th, 2017, at the hour of 11:45 a.m, pursuant to notice, in at 100 West Randolph Street, Ninth Floor, Chicago, Illinois, before HEARING OFFICER BRADLEY P. HALLORAN.

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I N D E X

WITNESS:

PAGE

RICHARD GNAT

Redirect - Ms. Wannier

4

JAMES. R. KUNKEL

Direct Examination - Mr. Russ

24

E X H I B I T S

Complainant Exhibit No.

Admitted

400

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401

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1 MS. GALE: All right. Thank you, we're back on
2 the record. It is approximately 11:50. Mr. Gnat is
3 still on the stand.

4 Mr. Wannier is going to do a redirect.
5 You may proceed, sir. Thank you.

6 MR. WANNIER: Thank you, your Honor.

7 REDIRECT EXAMINATION

8 BY MR. WANNIER:

9 Q. Mr. Gnat, I guess it's afternoon. Good
10 afternoon.

11 You mentioned in questioning by defense
12 counsel that sometimes there could be some flaws in
13 data tables that are prepared by Test America?

14 A. Uncertainties.

15 Q. Uncertainties, excuse me. Thank for you
16 that clarification.

17 You mentioned it was, I believe, an
18 PH-related issue?

19 A. The PH issue is not related to anything in
20 Test America reports. Those are field measurements
21 collected during sampling with the PH meter in the
22 field. That is not in the Test America reports.

23 Q. Understood. Thank you for that
24 clarification.

1 Did you flag -- have you flagged that
2 issue for Midwest Generation?

3 A. I believe that was brought out. It was an
4 early issue that we saw. I believe that was brought
5 out. PH values, in and of themselves, are good
6 indicators. It's the lab data that is actually
7 looked at.

8 Q. And just, generally speaking, when you
9 discovered an error that might impact any of the
10 data that you present, you would flag that for
11 Midwest Generation, right?

12 A. Sure, making them aware of an issue, yes.

13 Q. And to the extent it's relevant to a
14 specific report, you would flag it in that report,
15 right?

16 A. I believe so, yes.

17 Q. Okay. So, you said PH values are good
18 indicators. What are they good indicators of?

19 A. The PH of the water that you are sampling.

20 Q. The PH values, just to be clear, PH values
21 are a good indication of the PH value of the water?

22 A. That is correct. That is what you're
23 measuring with the meter.

24 Q. Okay. Are they a good indicator of

1 anything else or -- sorry.

2 Can you just clarify what you meant, then,
3 when you said the lab data or better?

4 MS. GALE: Objection, mischaracterization. I
5 don't know if he said the lab data was better.

6 MR. WANNIER: That's fine.

7 MS. GALE: Certainly the clarification of his
8 indication.

9 THE WITNESS: Right. You have two types of
10 data. You have your field indicator parameters,
11 which include PH.

12 That's data that you collect in the field
13 with field instruments. Then you have your
14 analytical data from the laboratory, which is the
15 data analyses performed on the samples collected in
16 the field and sent to the laboratory under chain of
17 custody.

18 Q. Okay. That's very helpful. Thank you.
19 Counsel also asked you about CCA versus CCR data.

20 I believe you testified the CCA data is
21 filtered before it is sent to the lab, correct?

22 A. It is filtered in the field, yes.

23 Q. The CCR data is unfiltered, correct?

24 A. Correct.

1 Q. In your reports for CCA data, which is
2 pre-filtered, you record that as dissolved
3 measurements, right?

4 A. Correct.

5 MS. GALE: It's not pre-filtered. It is just
6 filtered.

7 MR. WANNIER: I meant filter, your Honor. I
8 meant filtered before it's tested.

9 HEARING OFFICER HALLORAN: Objection. We can
10 work it out. Thank you.

11 BY MR. WANNIER:

12 Q. And the CCR data, which is not filtered is
13 recorded as total recoverable concentration,
14 correct?

15 A. Correct.

16 Q. Okay. As you said, you tested the same
17 well for both CCR and CCA purposes, correct?

18 A. In some instances, yes. In other
19 instances, there are wells we sample for CCA that we
20 don't sample for CCR and vice-versa.

21 Q. And vice-versa, understood. For a single
22 sample at a single well, would the total recoverable
23 value be the same as the dissolved value?

24 A. It may, but it may not be. That is again

1 a function of filtered versus non-filtered and the
2 way the sample is preserved.

3 Q. Okay. For two different samples at the
4 same well, we'll say one is in the first quarter and
5 one is in the second quarter, will the change in
6 concentration over time be the same for the total
7 recoverable and the dissolved values?

8 MS. GALE: Objection, compound and vague.

9 HEARING OFFICER HALLORAN: I'll accept the
10 compound. Could you rephrase? Please, go ahead.

11 MR. WANNIER: I could try to rephrase.

12 HEARING OFFICER HALLORAN: Thank you.

13 BY MR. WANNIER:

14 Q. Over time, will the measured total
15 dissolved concentrations change at the exact same
16 rate as the dissolved concentrations?

17 A. I'm not sure I understand the question.
18 Can you please rephrase that?

19 Q. Is it possible that testing a well -- is
20 it possible that in samples between two wells over
21 time -- in a single well, excuse me, over time, that
22 for a given pair of samples, the total recoverable
23 concentration might go up, while the total dissolved
24 concentration -- well, the dissolved concentration

1 goes down?

2 A. That's a good question. I believe that
3 could happen, and the reason that could happen for
4 the total concentration to go up, while the
5 dissolved concentration goes down, my understanding
6 this can occur if the sample that I collected has an
7 additional sediment load for -- my total analysis
8 has an additional sediment load that when you
9 preserve it on acid, it releases additional metals
10 from that sediment load into the dissolved phase
11 into the sample that that's going to be analyzed.

12 So, you artificially get a higher number
13 for that total. And, in fact, your dissolved
14 concentration might have dropped. So, if anything,
15 it's skewing your metals concentration high because
16 you've preserved the sample with slightly additional
17 sediment, and it's releasing metals not -- that are
18 present in the mobile phase, the dissolved phase,
19 you're adding to it by the reaction of the
20 mineralogy of that sediment with the acids that it's
21 being preserved on so it artificially gives you a
22 higher total number.

23 Q. Okay. I think I'm going to need to
24 clarify that.

1 Are you talking about what would happen to
2 a sample that is preserved over time?

3 A. You asked me -- my understanding of your
4 question was: Can there be a case where between one
5 sampling and the next, that the total value at that
6 sampling time where I collect, say, two samples, one
7 total, one dissolved, that the difference in that
8 sampling showed, between the two sampling events,
9 showed a decrease in the dissolved phase, yet it
10 showed an increase in the total.

11 That was my understanding of your
12 question, and I answered your question: Yes, that
13 can happen, and that increase in the total is, my
14 belief, probably artificial because this may have
15 had more sediment load, which hits the nitric acid
16 that it's being preserved with, which releases
17 additional metals from that suspended into the
18 liquid that's going to be analyzed for your thing.

19 I don't know if you can follow that, but
20 that's a function of the sediment load within that
21 sample.

22 Q. I did follow that. Thank you. That is
23 helpful. Let me try to get at it a different way.

24 When you are testing for, say, the first

1 quarter of 2015, when would you take that sample?

2 A. In the first quarter of 2015, whichever
3 date that was that's collected on.

4 Q. Understood. For a sample value in the
5 second quarter of 2015, when would you take that
6 sample?

7 A. It depends on scheduling. We don't have
8 -- we usually require a minimum of 45 days. So, at
9 the end of one quarter and the beginning of the next
10 quarter starts abutting, the minimum of 45 days
11 between samples, and then we kind of do it by
12 schedule, and when the person -- we can schedule
13 them out in the field.

14 Q. Okay. When you're taking a sample, you're
15 taking it directly from the well, correct?

16 A. Correct.

17 Q. Okay. For the first quarter sample I'm
18 asking about, you would test that.

19 How long would it take for you to run the
20 test analysis of the first quarter sample?

21 A. Well, we collect the sample, send it to
22 the lab. The lab has usually got a two-week
23 turn-around or so.

24 Q. Okay. Would there be the same two-week

1 turn-around for the testing of the sample taken in
2 the second quarter?

3 A. Yes, it's based on lab schedules as well
4 and their holding times that the lab knows samples
5 have to be analyzed within.

6 Q. And my question was: Can you imagine a
7 circumstance where the total recoverable
8 concentration for the first goes -- goes up between
9 the first and the second quarter; whereas, the
10 dissolved goes down between the first and the second
11 quarter?

12 MS. GALE: I'm going to object to the form of
13 the question as imagining a scenario. He is not an
14 expert. He's not here to create hypotheticals.
15 He's simply here as a fact witness.

16 HEARING OFFICER HALLORAN: Speculative?

17 MS. GALE: And speculative.

18 HEARING OFFICER HALLORAN: I'm going to allow
19 him to answer if he's able. I think he is more than
20 capable. If he can answer it.

21 THE WITNESS: I believe I did answer it. His
22 exact question, the way I understood and phrased to
23 me right now, is exactly the answer that I gave a
24 couple minutes ago.

1 HEARING OFFICER HALLORAN: Thank you, sir.

2 BY MR. WANNIER:

3 Q. Thank you very much. You testified also
4 about your inspections of the former ash burial area
5 at Joliet 29 site?

6 A. Yes.

7 Q. And you conducted an inspection in roughly
8 August 2009, correct?

9 A. That sounds correct, yes.

10 Q. And again in August 2010?

11 A. It sounds correct, yes.

12 Q. And then, again, I believe, August, maybe
13 September of 2011?

14 A. Correct.

15 Q. Again, August, maybe September 2012?

16 A. Yes.

17 Q. And in 2013 as well?

18 A. Yes.

19 Q. And 2014?

20 A. Yes.

21 Q. Okay. Did you conduct any inspections
22 between those August dates?

23 A. No, I did not.

24 Q. Okay. I would like to -- if you could

1 turn to Complainant Exhibit 242, and if you could
2 turn to page 690.

3 This is, again, where you were talking
4 with the four-lane highway that runs past the ash
5 pond?

6 A. Yes.

7 Q. And you said that you discussed the road
8 -- the salt that is used on the roads in the winter,
9 right?

10 A. I said, yes, salt is used in the area in
11 the winter.

12 Q. And salt has chloride in it, as you said?

13 A. Yes.

14 Q. Salt is NaCl, sodium chloride, correct?

15 A. I'm not exactly sure of the nature of the
16 salt that's used on the roads.

17 Q. Okay. Does this salt have iron in it?

18 A. I do not know.

19 Q. Do you know if this salt has manganese in
20 it?

21 A. I do not know.

22 Q. Do you know if the salt has sulfate in it?

23 A. I do not know.

24 Q. Do you know if the salt has boron in it?

1 A. I do not know.

2 Q. Okay. If you can turn to Exhibit 293.

3 You can put that one aside. Thank you.

4 And this is the Joliet CCB's
5 determination, right?

6 A. Okay.

7 Q. If you can turn to page -- if you could
8 turn to page 15 -- sorry, one second.

9 Actually, sorry, you can put that one
10 aside for now and instead take up 255. My
11 apologies.

12 A. Okay.

13 Q. Now, this mentions existing ash at
14 Powerton, right?

15 MS. GALE: Objection to the characterization of
16 what it mentions in this document as existing ash at
17 Powerton.

18 HEARING OFFICER HALLORAN: Rephrase, please.

19 BY MR. WANNIER:

20 Q. Yes. Do you have any personal -- how did
21 you get -- sorry about that.

22 If you can turn -- stay on that first page
23 in that first paragraph, the third to the bottom
24 line.

1 A. Yes.

2 Q. You see the phrase, "Historical
3 ash-related activities"?

4 A. Yes, I do see that phrase within the
5 sentence.

6 Q. You wrote this letter, correct?

7 A. I wrote that letter and that sentence, I
8 believe as I said yesterday, paraphrases my
9 understanding of what Lynn Dunaway from Illinois EPA
10 was relaying to me.

11 Q. Okay. So, Lynn Dunaway at Illinois EPA
12 was the source of your awareness of this area?

13 A. It was not the source of the awareness.
14 I'm paraphrasing what I believe is what he said was
15 the basis for his feeling that we needed another
16 up-gradient monitoring well.

17 Q. Okay, thank you. And if you can turn to
18 Exhibit 264. If you could turn to 14528.

19 A. Okay.

20 Q. When defense counsel was asking you --
21 this is the map right the 1961 aerial photo?

22 A. Yes, this is the 161 aerial photo.

23 Q. And when defense counsel was asking you
24 about these the circle beneath the words "North

1 plant MGT"?

2 A. Yes.

3 Q. The full phrase there being "Former north
4 share gas north plant MGP?

5 A. MGP, yes.

6 Q. What did you say was in the circular --
7 the white circle?

8 A. I said it appears to be an above-ground
9 tank, and I believe I said coal tank. It could be a
10 gas holder. Those are the types of tanks -- the gas
11 holder is a type of tank that would normally be
12 associated with a manufactured gas plant site.

13 Q. Okay. And do you have any personal
14 knowledge of what was in that tank?

15 A. No, I do not.

16 Q. Okay. You said the tank normally would
17 have gas in it?

18 A. Referred to as a gas holder tank. I'd
19 call it a coal tank as well. Again, that's just
20 based on what historical manufactured gas plant
21 operations would include.

22 Q. Okay. Thank you. You can set that aside.

23 If you can turn to Exhibit 275. If you
24 can turn to page 597, please?

1 A. Okay.

2 Q. Did you take this boring?

3 A. No, my company did. It was logged by Pat
4 Allenstein, a senior geologist with us.

5 Q. You don't have personal information as to
6 what was in this boring, correct?

7 A. I am reviewing the boring of a geologist
8 that I've worked with for 14 plus years.

9 Q. I understand that. I am just confirming
10 that you don't have personal firsthand knowledge of
11 what was in these borings?

12 A. I was not physically on the property, no.

13 Q. Okay. And that would apply to the boring
14 on page 598 as well, correct?

15 A. That is correct.

16 Q. Sorry?

17 A. Excuse me, if I could just further
18 clarify.

19 When I was asked about the other borings
20 that Mr. Allenstein logged, that have the actual
21 indication of potentially ash or cinders, in that
22 case I can also say I was not present when that was
23 collected; and, therefore, I can't attest, in fact,
24 that is what is at that location as well.

1 So, we are if we're going to apply that
2 standard to me here, I would also like it to be
3 applied to my testimony on the other ones you asked
4 me about.

5 Q. Absolutely. I don't think -- I think
6 that's very fair. I don't think we're attesting
7 that you were there at the other boring sites
8 either.

9 And if you could turn now to Exhibit 274. Specifically, if
10 you turn to 12828.

11 A. Okay.

12 Q. And you see in that fourth line under
13 "Project objective," where it says, "Midwest
14 Generation requested an independent third-party
15 review"?

16 A. Yes, I do.

17 Q. Okay. One moment. How much business do
18 you do for Midwest Generation, or what percentage of
19 your business is for Midwest Generation, roughly?

20 A. It depends on the year. Right now, maybe
21 20 percent.

22 Q. Okay. And what percentage of your
23 business was for Midwest Generation in 2005?

24 A. Oh, boy. I don't know.

1 Q. That's fair. Do you have any estimate?

2 A. I'm not sure. It was probably similar.

3 Q. Probably similar? And has that amount --
4 I believe you testified yesterday that the work you
5 had done for Midwest Generation had generally
6 expanded as they had become more comfortable with
7 your work; is that right?

8 A. That's correct. Some years we'll do a
9 little bit more than others, depending on the
10 project that we're working on, projects that we're
11 working on.

12 Q. Okay. What percentage of your work, if
13 you remember, was for Midwest Generation in 2012 to
14 2013?

15 A. I really don't remember. I would have to
16 go back and take a look. Similar, maybe a little
17 bit more than 20 percent, maybe 30 percent.

18 Q. Okay.

19 A. And this is my workload.

20 Q. You're -- sorry, can you clarify that?

21 A. My workload within my office and so on.
22 For example, my partners would have less.

23 For example, Dave Pyles, who is also on
24 here, does much less work with Midwest Generation.

1 I'm the primary contact.

2 Q. Okay. If you can please turn to
3 Exhibit 248N.

4 I'm sorry, I don't think we put that in
5 your stack, but we can help you find it.

6 A. Okay.

7 Q. If you can turn back -- actually, stay on
8 that first page, please, and look at the second
9 paragraph.

10 Again, where it says, "During the
11 inspection, KPRG identified five areas outside the
12 fenced boundary of the Joliet No. 29 facility where
13 either sheet wash erosion or rilling has exposed the
14 underlying ash/slag and may transport the material
15 to the Des Plaines River."

16 Do you see that?

17 A. Yes.

18 Q. Is that statement accurate in this report?

19 A. Reading through all five locations right
20 now, the statement is correct that I did see ash in
21 the six locations, some ash or slag exposed. That
22 statement is correct.

23 Q. Is the statement correct that this erosion
24 or rilling be discovered has exposed the underlying

1 ash slag?

2 A. I noted that I did see in all six
3 locations some indication of exposed ash and slag.

4 Q. Okay.

5 MR. WANNIER: No further questions.

6 HEARING OFFICER HALLORAN: Thank you, sir.

7 Ms. Gale?

8 CROSS-EXAMINATION

9 BY MS. GALE:

10 Q. Mr. Gnat, very briefly. You were asked if
11 you would find errors in the reports, you would flag
12 them for Midwest Generation.

13 Do you recall that testimony?

14 A. Yes.

15 Q. And you would only do that, though, if you
16 know of those errors, correct?

17 A. Yes.

18 Q. Looking at Exhibit 248N, you were just
19 discussing?

20 A. Yes.

21 Q. When you say "May transport material to
22 the Des Plaines River," you didn't actually see any
23 material in the Des Plaines River, did you?

24 A. No.

1 MS. GALE: Thank you. Nothing further.

2 HEARING OFFICER HALLORAN: Mr. Wannier?

3 MR. WANNIER: No further questions.

4 HEARING OFFICER HALLORAN: All right. Thank
5 you. I think what we'll do now -- obviously
6 Mr. Gnat, I think, is finished.

7 It's approximately, I don't know, 12:18 or
8 something. Let's take a lunch break until 1:18.
9 Thank you.

10 MS. GALE: Thank you.

11 (Recess taken.)

12 HEARING OFFICER HALLORAN: We're back on the
13 record. It is approximately 1:25. At present, I
14 believe Mr. Abel is going to be directing their
15 witness, Mr. Kunkel.

16 Can you please raise your right hand, and
17 the court reporter will swear you in.

18 (Witness was duly sworn.)

19 HEARING OFFICER HALLORAN: You may proceed.

20 MR. RUSS: These are exhibits we're going to be
21 using today that are not also in the record.

22 MS. NIJMAN: I like it.

23 MR. RUSS: We got it from you.

24 MS. NIJMAN: You like our ideas.

1 HEARING OFFICER HALLORAN: Thank you.

2 (Witness was duly sworn.)

3 JAMES. R. KUNKEL,

4 called as a witness herein, after having been first duly
5 sworn, was examined and testified as follows:

6 DIRECT EXAMINATION

7 BY MR. RUSS:

8 Q. Mr. Kunkel, can you state your name, for
9 the record?

10 A. My name is James, middle initial R,
11 Kunkel, K-u-n-k-e-l.

12 Q. Can you please turn to the very first
13 exhibit in the binder there, No. 400.

14 Can you tell us what that is?

15 A. That is a resume, a curriculum vitae, my
16 curriculum vitae.

17 Q. Does it look accurate?

18 A. It is. It is from 2015.

19 Q. Before we talk about things that might
20 have been added, can you please briefly describe
21 your educational background?

22 A. Sure. I have a Bachelor's Degree in Civil
23 Engineering, a Master's Degree in what was then
24 sanitary engineering. It is now environmental

1 engineering, which is also civil, civil department.
2 And a Doctorate in Hydrology and Water Resources
3 Engineering.

4 Q. Can you briefly describe your professional
5 experience?

6 A. My professional experience spans 50 years
7 with a Master's Degree in 1967, and it includes a
8 variety of civil and environmental projects over the
9 years, many of which have been involved in a coal
10 mining, municipal refuse, disposal of coal waste and
11 mine waste, including ash, coal.

12 I spent tannings in coal ash, civil design
13 for highways, for roads, related mostly to coal and
14 metals mining projects, as well as civil design for
15 heat bleach pads which required many, many square
16 meters of plastic, HTP plastic.

17 And, more recently, experience related to
18 specifically coal ash residues.

19 Q. Can we go back just a second?

20 Can you give a summary of your hydrology
21 experience specifically?

22 A. Yes, my hydrology experience is well
23 surface water and ground water. My surface water
24 experience, of course, is related to my civil

1 curriculum in my 50 years of experience in flood
2 control, water runoff control, and my ground water
3 experience is also 50 years of experience with
4 ground water hydrology related to primarily
5 environmental impact statements and industry
6 projects, lots of water quality experience.

7 And I was on the faculty for 17 years at
8 Colorado School of Mines where I taught graduate
9 courses on flow -- basically ground water hydrology
10 courses with specialization in flow and transporting
11 fractured rock, as well as unsaturated zone
12 hydrology. These were graduate courses at School of
13 Mines.

14 Q. And can you talk about your experience
15 with impoundments?

16 A. My experience with impoundments goes back
17 to when I was a young engineer, I did work for
18 various offices, inside a consulting firm where I
19 was employed, related to coal ash impoundments,
20 specifically in Kansas, Missouri, and Colorado, as
21 well as Wyoming.

22 And the secondary affluent storage from
23 domestic waste water treatment plants -- typically,
24 it is either secondary or tertiary, and that water

1 was either land lined or reused in some other way.

2 And those, of course, require ponds that
3 were lined with plastic of some kind. I also have a
4 lot of experience, maybe 15 years, in the nuclear
5 industry, doing work at nuclear power plants,
6 uranium mines, and their residuals, as well as
7 storage of water from uranium processing plants,
8 which required large ponds that are lined with
9 plastic.

10 Q. And you mentioned that you had some
11 experience with liners, and Mr. Gnat was saying
12 earlier there is a big difference between the liner
13 designers and liner install installers.

14 Can you describe --

15 A. I agree with Rich Gnat on that. A lot of
16 times if I design a liner system, between the time I
17 designed it and the time it went to construction,
18 they moved me to another project.

19 So, someone else came on and watched the
20 construction and vice-versa. Someone else would
21 design a liner system. They would be moved to
22 another project, and then I would inherit that, in
23 terms of doing -- not personally doing the
24 construction, but directing the inspection.

1 While I wasn't there full-time, the
2 companies I worked for had people on site
3 100 percent of the time, and there was a good reason
4 for that. It was economic, as well as liability.

5 And the reason it was economics. We did a
6 lot of work for the mining industries and nuclear
7 industries. And if we didn't have people there
8 100 percent of the time, we could not certify that
9 those liners were properly installed.

10 Q. So, just to clarify, you worked on both
11 the design and installation?

12 A. Not necessarily on the same project.

13 Q. Got it. Thank you.

14 A. And not necessarily all plastic. Some
15 were soil liners back in the '70s, when I first
16 started doing it.

17 Q. Okay, thank you. You mentioned that there
18 are a couple of projects on your resume.

19 Can you describe what those are?

20 A. Yes, these are coal ash projects that I've
21 done in the last two years since this resume was
22 produced. One is Little Blue. This is probably the
23 largest fly ash reservoir in the country.

24 Q. Where is that located?

1 A. On the border between West Virginia and
2 Pennsylvania. I was hired to do standard of care
3 for another consulting firm that was claiming some
4 structures, some design structures that would limit
5 contamination of the ground water at a site.

6 And, so, I felt -- and also for
7 Pennsylvania power, that I felt didn't exercise the
8 standard of care of the profession when they
9 authorized the construction of these facilities.

10 Another project is related to coal ash
11 disposal in Montana, Coal Strip, Montana. That was
12 related to, again, pond construction, liner
13 installation where I reviewed as-built drawings,
14 which clearly showed that the plastic liners were
15 most likely laid improperly.

16 I had as-built drawings, so I knew they
17 put the plastic on over the top of the gravel grains
18 without separation, which is not good engineering
19 practice.

20 Q. Can you describe what an as-built drawing
21 is?

22 A. An as built drawing --

23 HEARING OFFICER HALLORAN: Keep your voice up.
24 I'm sorry.

1 MR. RUSS: Sorry. Sure.

2 THE WITNESS: An as-built drawing is one that,
3 first of all, it says on the drawing -- it's stamped
4 "as-built" or "as-built" is somewhere in the title
5 block or somewhere on the sheet.

6 What that means is that that is a drawing
7 that represents exactly what was constructed,
8 exactly. So, it's an important drawing because it
9 does essentially dictate, regardless of what the
10 construction drawing say, the engineer of the design
11 drawings, this is what was built in the field, and
12 that's super important.

13 Q. Thank you.

14 MR. RUSS: I move to introduce Exhibit 400 into
15 the record.

16 MS. NIJMAN: No objection.

17 HEARING OFFICER HALLORAN: Thank you.

18 Complainant Exhibit 400 is admitted.

19 (Complainant Exhibit No. 400 was
20 admitted into evidence.)

21 BY MR. RUSS:

22 Q. What does the term "coal ash" mean to you?

23 A. Well, I use the old EPA definition where
24 coal ash is boiler slag. That's the kind of shiny

1 high temperature stuff that drops to the bottom of
2 the boilers.

3 Then there's bottom ash, which is the more
4 smaller granular, sharp-edged result of coal
5 combustion, and then there's fly ash, generally fly
6 ash. It's called several different things.

7 Bottom ash is the ash that doesn't go up
8 through the stacks because it's too heavy, and the
9 fly ash is what goes up through the stacks and, of
10 course, boiler slag goes to the bottom.

11 Q. Can you turn to Exhibit 406 in the binder?
12 Do you recognize this document?

13 A. I do.

14 Q. Can you tell us what it is?

15 A. This is the federal register dated --
16 excuse me, April 17th, 2015, which is the most
17 recent EPA coal ash rule, we call it, I guess.

18 Q. Can you turn to -- I'm sorry, did you
19 review this rule when you were developing opinions
20 in this case?

21 A. Yes, I did.

22 Q. Can you look at page 21469 up at the top?

23 A. Yes.

24 Q. Do you see the definition of coal

1 combustion residuals on that page, in alphabetical
2 order?

3 A. A, B, C.

4 Q. Uh-huh.

5 A. I see coal combustion residuals, CCR, yes,
6 and it says -- you want me to read it?

7 Q. Sure.

8 A. It says that "CCR coal combustion
9 residuals means fly ash, bottom ash, boiler slag and
10 they include flu gas desulfurization material,"
11 which we call MGD, "generated from burning coal for
12 the purposes of generating electricity."

13 Q. And when you refer to the EPA definition,
14 is this what you meant?

15 A. Yes.

16 Q. You agree with that definition?

17 A. Yes.

18 Q. Now, when did we contact you about working
19 on this case?

20 A. I can tell you exactly. I was sitting in
21 the San Francisco Airport. It was in 2014. It was
22 before July. Maybe as early as April, which is when
23 we would have been in San Francisco.

24 Q. Did you prepare any reports for us?

1 A. Yes, maybe five reports.

2 Q. When was the first report?

3 A. The first report was a review of previous
4 work that had been done by your previous consultant.

5 Q. And then when was the second report?

6 A. The second report was my report on
7 contamination for the four plant sites of interest
8 in this case.

9 Q. Can you turn to Exhibit 401? Is that the
10 report you're talking about?

11 A. Yes.

12 Q. Does that look like an accurate copy of
13 your report? You can flip through it, if you want.

14 A. Yes.

15 Q. Very generally, what questions were you
16 trying to answer in writing this report?

17 A. What I was trying to answer is I already
18 knew from my previous review of the information and
19 data by the previous consultants, and the State of
20 Illinois, there was ground water contamination at
21 these power sites, alleged ground water
22 contamination.

23 So, my charge was to, I guess, assess and
24 give an opinion as to whether the ground water at

1 these four sites is contaminated and also the
2 potential source or sources of contamination.

3 Q. Can you turn to page 2 of your report?
4 Can you summarize your general conclusions?

5 A. My general conclusions for all four sites
6 is that boron manganese and sulfates, first of all,
7 are indicators of coal ash contamination.

8 What that means if boron, manganese and
9 sulfate occur in high concentrations together, then
10 that is a clear indication of coal ash as the source
11 of the contamination.

12 All the power plant sites, the four power
13 plant sites that I looked at, boron, manganese and
14 sulfate measured in the ground water.

15 Their concentrations matched the leachate
16 characteristics of coal ash, and those leachate
17 characteristic's have well been identified by EPRI,
18 EPA, and other State of Illinois.

19 So, I felt comfortable that, in fact, that
20 was true. And that at all the power plant sites,
21 coal ash has been deposited in ash ponds. And that
22 either of those ash ponds weren't lined, or they
23 were lined with a Poz-O-Pac or, in some cases,
24 unlined; or, in some cases, with plastic liners,

1 that they leaked. All liners leak. I think
2 everybody would agree to that.

3 And that core coal ash removal and
4 maintenance practices, that is dredging that we
5 talked about before, could possibly have caused
6 liner damage in the plastic liners.

7 That at all the sites, the ash was used as
8 filler construction materials or stored at these
9 four sites, somewhere on the site in the immediate
10 vicinity of the ash ponds, which is important later
11 on.

12 And at ground water elevations at all the
13 power plant sites are strongly influenced by changes
14 in adjacent surface water elevations.

15 That is, that rivers and even Lake
16 Michigan are influential in not only the water
17 levels at the plant sites going up and down but, in
18 fact, there may be gradient reversals from that
19 surface water volume back towards the ash ponds,
20 back towards the site.

21 And that ground water at all the four
22 power plant sites would probably require -- it will
23 require treatment to be used as a drinking water
24 source, under the IEPA Class 1 Ground Water

1 Protection Standards.

2 And at the proposed compliance commitment
3 agreements, CCRs, each of the four sites, in my
4 opinion, was not reducing the existing or featured
5 ground water contamination from either the leaking
6 coal ash ponds, leaky liners or from coal ash being
7 leached outside the ponds.

8 And that probably most likely relining the
9 ash ponds would not substantially reduce the
10 contamination that I was seeing is.

11 MR. RUSS: I move to introduce Exhibit 401.

12 HEARING OFFICER HALLORAN: Ms. Nijman?

13 MS. NIJMAN: To the extent -- I know in
14 Illinois courts, they don't usually allow expert
15 opinion reports.

16 To the extent the Board would prefer them
17 in the record, I have no objection.

18 HEARING OFFICER HALLORAN: I think it would
19 assist the Board. Thank you. Complainant's Exhibit
20 401 is admitted.

21 (Complainant Exhibit No. 401 was
22 admitted into evidence.)

23 BY MR. RUSS:

24 Q. Can you please turn now to Exhibit 402?

1 A. Yes.

2 Q. Can you describe what this is?

3 A. This is a memorandum that I wrote to
4 Jennifer Duggan at the environmental -- what is it?

5 Q. Where I work?

6 A. Yes, where you work.

7 Q. Do you recognize this?

8 A. I do recognize.

9 Q. Is this an E-mail you wrote?

10 A. Yes, in 2014 September.

11 Q. Who is Jen Duggan?

12 A. I understood that she was your boss, or
13 she was ran the office there in Washington, D.C.

14 Q. Yep.

15 A. And that I contacted her because you
16 weren't available.

17 Q. The E-mail says, "Abel," and, for the
18 record, that's me?

19 A. CC to Abel, yes.

20 Q. The E-mail states that "Abel has charged
21 me with writing a technical report which presents a
22 solid case showing that the ground water
23 contamination at Midwest Generation's coal ponds
24 were sourced from those ponds."

1 I was reading acronyms, but is that
2 correct?

3 A. Yes, that's correct.

4 Q. Can you explain what you meant by that?

5 A. What I meant by that -- well, I had
6 already reviewed, as I said previously, information.
7 So, I knew there was contamination at the ground
8 water site.

9 I reviewed the previous consultants
10 reports and looked at some of the data that was
11 available. That isn't the real reason for my -- I
12 guess for my E-mail to Jennifer Duggan. It was to
13 solicit information on NPDES permits.

14 Q. Before we get to that, had you reviewed
15 information in the records in this case before you
16 sent that E-mail?

17 A. Yes.

18 Q. You had you reviewed all the information
19 in the record?

20 A. Not all of it, no.

21 Q. Did you review more information after
22 sending this E-mail?

23 A. Much more.

24 Q. How did your initial conclusions change

1 after you reviewed it?

2 A. You know, in all honesty, my initial
3 conclusions changed only in that I became much more
4 aware that it was coal ash deposited outside the
5 pond that was a large contributor -- could be a
6 large contributor, and be a potential source of the
7 ground water contamination, as well as leaky liners,
8 leaky ponds.

9 Q. And then you went on to discuss NPDES
10 permits.

11 Can you explain what a NPDES permit is?

12 A. Yeah, it's part of the national
13 elimination system. Every point source, since I
14 think public II500 came effect has to have a permit.

15 As for point sources, I don't consider the
16 necessarily the ponds are point sources, but ash
17 outside the ponds might not be a point source.

18 But the idea was that I knew at the time
19 that in all four power plants, they were discharging
20 decaying water off the top of the coal ash ponds
21 into surface water.

22 So, I felt that if the NPDES permit, which
23 I already had a lot of experience with NPDES
24 permits, there's always a chance that the regulator

1 in this case, the State of Illinois, asked the power
2 plant to analyze for things that we normally don't
3 analyze for an NPDES permit, such as BOD,
4 biochemical oxygen demand; chemical oxygen demand,
5 COD; suspended solids, SS; total dissolved solids,
6 TDS; and maybe some other constituents primarily.

7 Primarily, NDB if regulated to discharge
8 of biochemical constituents, as opposed to
9 biological constituents, which produce oxygen in the
10 streams and lakes.

11 But I thought perhaps that they also would
12 contain metal concentrations, trace metal
13 concentrations, possibly boron, sulfate and
14 manganese, which would give me a clue and an
15 indicator of the true, I guess, potency, if you
16 will, of the coal ash which was stored in those
17 ponds.

18 Q. Did you ever make use of NPDES data?

19 A. No, because the data I needed has the
20 boron, manganese, sulfate. They were not analyzed
21 for these NPDES.

22 Q. For purposes of your report, how did you
23 define contamination?

24 A. Well, contamination, in all my experience

1 with environmental impact statements, is ground
2 water concentrations that are higher than background
3 or baseline, if you will; or concentrations or
4 constituents in the ground water that are higher
5 than some numeric standard, for example.

6 Q. Did you clarify in your report which
7 definition did you use?

8 A. I used both definitions.

9 Q. Did the ground water at all four sites
10 meet both definitions of contamination?

11 A. No. No. I can elaborate.

12 Q. Please do.

13 A. In fact, at all four sites, I'll show
14 later that the ground -- that the concentrations of
15 boron and at least boron, sulfate, and even possibly
16 manganese, and maybe other constituents, never met
17 background or baseline conditions to the extent that
18 we had those values.

19 In many cases, those concentrations also
20 exceeded the Illinois Environmental Protection
21 Agency, IEPA, Class 1 prevalent quality standards.

22 Q. So, to clarify, when I asked you if it met
23 both definitions, you said "no"?

24 A. Well, I'm sorry, it does meet the

1 definition of contaminated water, yes, based on
2 those two -- yes, those two criteria.

3 Q. Thank you. Based on your experience, can
4 coal ash contaminate ground water?

5 A. Yes, absolutely.

6 Q. What are some of the coal ash constituents
7 that can contaminate ground water?

8 A. They are a fairly lengthy list, both
9 metals and non-metals, and both conservative and
10 non-conservative constituents.

11 And by that I mean conservative
12 constituents which move with the ground water and
13 either sorb bond with the soils or desorb with the
14 soils over time, and sorb being constituents, mostly
15 metals, which will sorb and bond to a soil; or as
16 geochemically changed during transport and becomes
17 either insoluble or just lags behind the ground
18 water flow.

19 The two conspicuous ones are the
20 conservative traces are boron and sulfate, but there
21 are many others as well. Chloride, for example, is
22 also a coal ash contaminant, but more likely it is
23 metal, such as molybdenum, lithium, gomide
24 potassium, sodium, fluoride, which would also be a

1 conservative tracer as defined by --

2 Q. Can you turn to Exhibit 403?

3 A. I am on 403.

4 Q. You may be on it. Do you recognize this
5 document?

6 A. Yes.

7 Q. Can you describe what it is?

8 A. Yes, this is an abstract of an EPRI
9 document which talks about ground water quality
10 signatures for assessing potential impacts from coal
11 combustion product leaching, and it lists those
12 constituents that I just mentioned as being
13 signatures.

14 That is, if they appear together in high
15 concentrations, then the source is almost certainly
16 coal ash, not almost certainly, but certainly coal
17 ash.

18 Q. Can you read the first sentence there?

19 A. The first sentence says boron sulfate are
20 recognized as potential indicators of the influence
21 of leachate from coal combustion products, CCPs, on
22 ground water quality."

23 Q. Do you agree with that statement?

24 A. Yes, absolutely.

1 Q. In your professional opinion, what does
2 "indicators" mean?

3 A. Indicators means that if you see boron
4 sulfate in the ground water in high concentrations
5 together, then coal ash is the source.

6 MR. RUSS: I move to introduce Exhibit 403, for
7 the record?

8 MS. NIJMAN: I object. This is an abstract of
9 an entire paper off of the Internet, and I'm
10 struggling with not being able to assess what the
11 paper actually says.

12 MR. RUSS: Okay with me. It's not really
13 essential.

14 HEARING OFFICER HALLORAN: Yeah, I'm going to
15 sustain Ms. Nijman's objection. Complainant
16 Exhibit 403 is not admitted. I can take it as an
17 offer of proof.

18 MR. RUSS: Sure. Thank you.

19 MS. NIJMAN: I would move to strike the related
20 testimony reading from that document.

21 HEARING OFFICER HALLORAN: I take his whole
22 testimony regarding Complainant's Exhibit 403 as an
23 offer of proof as well.

24

1 BY MR. RUSS:

2 Q. Can you now turn to Exhibit 404?

3 A. Yes.

4 Q. Do you recognize this document?

5 A. Yes, this is another EPRI document. EPRI
6 is the Electric Power Research Institution, E-P-R-I.

7 Q. Did you review this document while you
8 were developing your opinions?

9 A. Yes.

10 Q. Is this one of the documents you relied
11 on?

12 A. Yes.

13 Q. Can you describe what it contains?

14 A. This is a document which compares the
15 risks for leaching from coal combustion product
16 landfills that is leaching from coal landfills, and
17 impoundments which risks for leaching from municipal
18 solid waste landfill facilities. So, it's a
19 comparison of the risks for these two different
20 kinds of leaching.

21 Q. Can you turn to page 1-1?

22 A. Yes.

23 Q. You see there is a term CCP? I think it's
24 spelled out in some way.

1 A. Yes, it's coal combustion product, CCP.

2 Q. In your professional opinion, what's the
3 difference between CCP and coal ash?

4 A. Coal ash is a coal combustion product so
5 it falls within the realm of CCP.

6 Q. Can you turn to page 3-4? Can you please
7 read the first bullet under heading 3.2?

8 A. "Leaching samples from coal fired power
9 plants are included in the report here. Samples
10 from oil fired plants were not included unless the
11 oil fired capacity of the plant was much less than
12 the coal firing capacity and/or infrequently used."

13 Q. The first bullet under heading 3.2 is that
14 what you were reading?

15 A. No, I was reading the second bullet.

16 Q. Could you read the first bullet?

17 A. The first bullet is leachate samples,
18 "Collected in the field, not laboratory, but in the
19 field, from landfills and impoundments were selected
20 as data for this entry report, and laboratory
21 generated leachate samples that were obtained by
22 either displacement meets or by leaching tests were
23 not included."

24 Q. Can you explain the difference between

1 leachate samples collected in the field and
2 laboratory-generated leachate samples?

3 A. Leachate samples collected in the field
4 are samples which are extracted from either the
5 outside saturated zone immediately beneath the
6 ponds, or the landfill. Actually, from the sumps of
7 the landfill it could be.

8 Most likely, one of those two sources, and
9 laboratory-generated leechate samples are samples
10 that are generated in the laboratory by many, many
11 differently methods, excluding the ASTM test that we
12 heard about earlier this morning, as well as other
13 laboratory tests.

14 Q. Do you know why EPRI would choose one over
15 the other?

16 A. Certainly. Field leechate samples
17 represent the true leechate that one would see from
18 coal ash.

19 Laboratory-generated samples, whether they
20 are shake test or a leach test, or even a
21 displacement test, tend to have different
22 characteristics because they are artificially
23 generated with artificial leechate materials, that
24 is water or some kind of modified water in the lab,

1 distilled water or some kind of water that is
2 slightly acid filed.

3 And are not representative, due to the
4 liquid solids ratios that are involved in some tests
5 with the actual leechate that is produced in the
6 real world by water seeping through coal ash.

7 Q. Reviewing the evidence in this case, did
8 you see any site-specific field leechate data?

9 A. In this report, yes.

10 Q. No, in the evidence in this case?

11 A. At the four power plant sites?

12 Q. Uh-huh.

13 A. No, none.

14 Q. Can you read the third bullet under
15 heading 3.2?

16 A. The third bullet in this document, EPRI
17 document, is "The samples represent leechate from
18 coal fly ash and bottom ash."

19 Q. And the fourth bullet?

20 A. The fourth bullet is "For this analysis,
21 MGD," which we've already said was flu gas and
22 desulfurization solids, "and MGD gypsum were not
23 included and leechate samples from MGD materials
24 from fly ash were not included."

1 Q. Was that significant to your conclusions?

2 A. Of course, because our -- you know, our
3 sites don't deal with MGD, as far as I know, gypsum
4 or MGD solid materials. They are bottom ash with
5 maybe some fly ash mixed in plus some soil.

6 Q. Can you turn over to the next page 3-5?
7 Can you find how many coal ash leechate samples were
8 represented in this report?

9 A. This report says they had a data set
10 containing 4,419 analytical results from 222
11 samples. So, the answer is 222 samples, which were
12 obtained from 30 management units, CCP management
13 units.

14 Q. And can you turn to page D1, near the
15 back?

16 HEARING OFFICER HALLORAN: B as in boy?

17 MR. RUSS: D as in dog, sorry.

18 THE WITNESS: D1?

19 BY MR. RUSS:

20 Q. What does table D1 show?

21 A. This is the EPRI CCP leechate database
22 summary.

23 Q. And if you turn to the next page, I
24 believe it shows constituent data.

1 A. Yes.

2 Q. What's the average boron concentration in
3 the samples in this data?

4 A. The average boron concentration is 50
5 percentile is 200 milligrams per liter -- no,
6 micrograms per liter. I'm sorry. 1.99 times 10 to
7 the 2.

8 Q. I think you might be looking one line
9 down.

10 A. That's Bromide. This is 6,350, I'm sorry,
11 micrograms per liter, which is the same as
12 6.35 milligrams per liter.

13 Q. What's the maximum boron concentration?

14 A. The maximum boron concentration was 109.
15 It's 1.09 times 10 to the 5. So, that is 109,000
16 micrograms per liter, which is 109 milligrams per
17 liter.

18 Q. On the next page you'll find sulfate.
19 What's the 50th percentile?

20 A. The 50th percentile sulfate is over a
21 million -- 1.3 million micrograms per liter and
22 divide that by 1,000, so you get 1300 milligrams per
23 liter.

24 Q. And the maximum sulfate?

1 A. Maximum was 6,000,000 micrograms per
2 liter, which is 6,000 milligrams per liter.

3 Q. Why are those numbers significant?

4 A. They are significant in that, first of
5 all, they are very large, extremely large. They are
6 also from, as the report said, leechate --
7 real-world leechate from real-world ash land fills.

8 MR. RUSS: I move to introduce Exhibit 404 into
9 the record.

10 MS. NIJMAN: No objection.

11 HEARING OFFICER HALLORAN: Ms. Nijman?

12 MS. NIJMAN: No objection.

13 HEARING OFFICER HALLORAN: Thank you.

14 Complainant's Exhibit 404 is admitted.

15 (Complainant Exhibit No. 404 was
16 admitted into evidence.)

17 BY MR. RUSS:

18 Q. Can you now turn to Exhibit 405, for the
19 record. The exhibit, itself, starts on the next
20 page, but I included a cover page to show this is an
21 attachment to an Illinois Pollution Control Board
22 rulemaking filing.

23 I didn't include the whole filing as an
24 applicable standard.

1 HEARING OFFICER HALLORAN: Okay. So noted.

2 BY MR. RUSS:

3 Q. Do you recognize this document?

4 A. I do.

5 Q. Can you describe what it is?

6 A. This is attachment A to IEPA's technical
7 support document for rulemaking for coal combustion
8 impoundments at coal fired power plants.

9 It contains the methodology that IEPA used
10 in their technical evaluation of certain things
11 related to coal ash and to the environment in
12 Illinois.

13 Q. Did you rely on this document in
14 developing your opinion?

15 A. Yes, I did.

16 Q. Can you turn to page 2? It's --
17 unfortunately, it's not the second page. It has a 2
18 on the bottom of the page.

19 It says here -- well, can you explain what
20 this page meant?

21 A. This page is IEPA's opinion of, first of
22 all -- well, of the constituents that are found in
23 coal ash leechate nationwide and also in the State
24 of Illinois.

1 Q. What does it say about boron and sulfate
2 and manganese, the three indicators you mentioned
3 earlier?

4 HEARING OFFICER HALLORAN: Could you keep your
5 voice up?

6 MR. RUSS: I'm sorry.

7 HEARING OFFICER HALLORAN: What page are we on?

8 MR. RUSS: Page 2 of the technical support
9 document. The page numbers are on the bottom.

10 HEARING OFFICER HALLORAN: I'm sorry. Thank
11 you.

12 BY MR. RUSS:

13 Q. To repeat my question, what does it say
14 here about -- you mentioned the three indicators
15 boron, sulfate, Manganese?

16 A. Boron, sulfate and manganese are the same
17 constituents that are found in recent
18 hydrogeological assessments in ground water in
19 multiple concerned sample results collected from
20 down gradient dedicated monitoring wells adjacent to
21 surface impoundment units containing CCW, which is
22 in this case is coal combustion waste, at power
23 plant generating facilities in Illinois.

24 Q. Now, so far we've talked about coal ash,

1 coal combustion products, coal combustion
2 byproducts, now coal combustion waste.

3 Can you explain the relationship of those
4 various terms?

5 A. I think CCW and coal combustion, CCP, are
6 the same, essentially.

7 Q. Are they the same as coal ash?

8 A. Coal ash would be a subset of CCP and CCW,
9 as I said before.

10 Q. At the bottom of page 2, Illinois EPA
11 states that, "The mobility of other I or C
12 contaminants, NCCW, as being attenuated due to such
13 process as oxidation and reduction cad-ion and ion
14 exchange."

15 Can you explain what that means presented?

16 A. Show me exactly where it is on the page.

17 Q. It's the last full paragraph and the last
18 sentence.

19 A. Highly soluble?

20 Q. And the last sentence.

21 A. There it is. It says, "The mobility of
22 other IOC, that is other than boron, sulfate and
23 manganese, contaminants and CCW" --

24 Q. Sorry to interpret you.

1 A. It's being attenuated to such processes as
2 oxidation and reduction/cad-ion exchange. What that
3 means is what I was talking about before that the
4 mobility of some coal ash constituents, primarily
5 metals, trace metals, arsenic, led, zinc, iron, are
6 either sorbed on to the soil particles, or they are
7 oxidized to a different valent state that is iron.

8 FE becomes FE03, or something like that,
9 which is an oxide of iron, and it then becomes
10 immobile and also precipitates out on to soil
11 particles.

12 And then reduction cad ion exchange occurs
13 when certain metals and/or even non-metals are
14 reduced in their own state from an oxidized form to
15 a reduced form, and/or they exchange cad ions, which
16 are neutrons with the soil particles.

17 Okay, that's an absorption/desorption
18 issue right there. So, like, iron with sorb bond
19 and particles, it's to sorb bond to soil particles.

20 The point with this whole thing is that
21 manganese, boron sulfite for sure, and manganese,
22 too, tend to travel with the ground water and not be
23 held back by these processes that I just named.

24 So, I know it's highly technical. I

1 apologize for that.

2 Q. That's fine. Do you agree with that
3 statement?

4 A. Yes.

5 MS. NIJMAN: Objection, vague. I'm not sure
6 what statement. They were all his statements.

7 MR. RUSS: I mean the one he was just
8 explaining.

9 THE WITNESS: The mobility attenuation.

10 MR. RUSS: I can clarify.

11 THE WITNESS: Oxidation reduction.

12 BY MR. RUSS:

13 Q. The sentences you were just describing is
14 the one -- the last sentence on page 2, right?

15 A. Yes, correct.

16 Q. "The mobility of other IOC contaminants in
17 CCW is being attenuated due to such processes as
18 oxidation and reduction/cad ion and ion exchange."

19 Is that your professional understanding
20 how the ground water chemistry would work?

21 A. This has to do with the mobility of
22 constituents; that is, they move with the ground
23 water, or they sorb and then desorb, so they don't
24 move at the same rate the ground water moves.

1 That's important if we're looking at
2 movement of boron sulfate. They move with the
3 ground water. So, if we know how the ground water
4 behaves, where it goes, then we know where the boron
5 sulfate go.

6 Q. Okay, thank you. That's good enough. Can
7 we turn back to Exhibit 406 briefly.

8 Page 21456, the third column, the first
9 full paragraph, can you read what that says,
10 Dr. Kunkel?

11 A. Starting with, "The high mobility"?

12 Q. Very small print, just that sentence.

13 A. "The high mobility of boron sulfate
14 explains the prevalence of these constituents in
15 damage cases that are associated with ground water
16 impacts."

17 Q. Can you explain what that means?

18 A. Sure, because sulfate and boron have high
19 mobility; that is, they move with the ground water.

20 Then they appear, most of the time, nearly
21 all of the time, very prevalent, in ground water
22 impact damage cases where someone has claimed
23 damages due to ground water contamination.

24 MR. RUSS: Can I go off the record for a

1 second?

2 HEARING OFFICER HALLORAN: Yes, you may.

3 (Discussion off the record.)

4 HEARING OFFICER HALLORAN: We're back on the
5 record. Thank you.

6 MR. RUSS: I move to admit Exhibit 405, which
7 is the technical support document from the Illinois
8 EPA rulemaking.

9 HEARING OFFICER HALLORAN: Ms. Nijman?

10 MS. NIJMAN: My only hesitation is, of course,
11 that rulemaking ended, and I believe there were
12 subsequent participates as well from this one.

13 So, I'm not sure this was the actual final
14 version. I have all kinds of authenticity problems
15 with the document.

16 HEARING OFFICER HALLORAN: I understand. This
17 has been filed with the Board. So, I'm going to
18 take it under administrative notice.

19 I'm sure the rest of the copies are at the
20 Board. They will know the full extent of this
21 rulemaking. Thank you.

22 BY MR. RUSS:

23 Q. Did you identify coal ash indicators in
24 your report?

1 A. Yes, I did.

2 Q. What were they?

3 A. Boron, manganese and sulfate.

4 Q. Why did you select those three?

5 A. For the reasons we just talked about in
6 that EPRI and IEPA and USEPA have agreed boron,
7 manganese sulfate are indicators of coal ash
8 contamination if they occur to get in high
9 concentrations in the ground.

10 Q. How did you use these indicators in your
11 analysis?

12 A. I used these indicators to show ground
13 water contamination was occurring at all four of the
14 power plant sites under consideration.

15 Q. We'll get into it more later. Why did you
16 not collect other coal ash constituents?

17 A. For the reasons we've already given, that
18 I felt that interpretation of data that resulted --
19 that were the result of some trace metals, which
20 would sorb and desorb, would be difficult to
21 present.

22 In other words, the interpretation of that
23 data is difficult, because we don't know exactly
24 what the concentrations are, say, upgrading,

1 downgrading or anything, but because boron and
2 sulfate and manganese also are what we call
3 conservative tracers, they are much more easy to
4 interpret.

5 It's much more easy to interpret their
6 concentrations in the ground water.

7 Q. Can those other coal ash concentration
8 curves constituents also contaminant the ground
9 water?

10 A. Absolutely, they can.

11 Q. Now, for your report, what did background
12 mean?

13 A. Well, background is defined as ground
14 water, which has not been influenced by these high
15 concentrations of the indicators, and are from
16 samples that are located well away from any coal ash
17 sources.

18 Q. Can you turn to Exhibit 401, which is your
19 report table 3.

20 Can you explain that table?

21 MS. NIJMAN: Into sorry, I'm not there yet.

22 MR. RUSS: I'm sorry.

23 HEARING OFFICER HALLORAN: Where is the table?

24 MS. NIJMAN: I'm having trouble.

1 THE WITNESS: Table 3?

2 MS. NIJMAN: Where is it? Is it behind the
3 maps?

4 THE WITNESS: It's in front of the drawing
5 tables first and then drawings or maps.

6 BY MR. RUSS:

7 Q. Can you explain what that table shows?

8 A. This table is a summary of meeting
9 concentrations of the indicator pollutants and IEPA
10 background network wells, which is both sand and
11 gravel and bedrock.

12 This data came directly from that
13 attachment A of the technical support document that
14 IEPA used during their rulemaking, and the reason
15 that I use both sand and gravel and bedrock
16 background values is because three of the four
17 sites, that is Joliet, Powerton and Waukegan, are in
18 what we could call sand gravel rock.

19 Whereas, the wells that are at Will County
20 are located in bedrock. This is the dolomite that
21 is beneath the ponds, almost immediately beneath the
22 ponds.

23 So, at two different conditions, sand and
24 gravel at three sites, and bedrock at one site, and

1 the medium background concentrations are listed
2 there.

3 In addition to that, at Powerton, there
4 was a well which we've already discussed, I think,
5 called well MW-16.

6 Q. Hold on just a second, Jim. This is a map
7 from one of the ground watering sources we looked
8 at.

9 Do you have a laser pointer?

10 A. I happen to have one here.

11 MS. NIJMAN: The one you bought yesterday.

12 THE WITNESS: No, he has the one I bought
13 yesterday.

14 BY MR. RUSS:

15 Q. Can you show us where MW-16 is?

16 A. This is MW-16, this is where it is. So,
17 it is up-gradient. The Illinois River you see is
18 down here. So, as we go south, we go uphill
19 upgrading from the Illinois River.

20 Q. There is a copy of this map in the back of
21 the binder in the section of demonstrative exhibits
22 as well.

23 Why did you believe MW-16 was a reliable
24 up grading well?

1 A. Well, because I think that IEPA, as well
2 as two reasons: One is IEPA, as well as Midwest
3 Gen, agreed that that was a background well with
4 concentrations of boron, Manganese and sulfate would
5 represent background.

6 The other reason is because after looking
7 at all the data that I had, and I'll show you a
8 graph later on in my demonstrative, the
9 concentrations of boron sulfate nearly match the
10 regional IEPA concentrations for boron and sulfate
11 in background wells at this well 16, the median of
12 all the data I had very close.

13 Q. Is there anything about the layout of the
14 site that affected your conclusions about that well?

15 A. Well, this well is up-gradient. Clearly,
16 when you look at the water level, it's the highest
17 water level well away from the river. That's the
18 highest water level of all the rest of the wells.

19 Q. Can you please turn to Exhibit 255?

20 MS. NIJMAN: I put them in the order that you
21 gave me.

22 MR. RUSS: I'm sorry, I wasn't sure how this
23 outline was going to go.

24 HEARING OFFICER HALLORAN: That has been

1 previously admitted?

2 MR. RUSS: It has.

3 HEARING OFFICER HALLORAN: Thank you.

4 MR. RUSS: That's not a copy of it here.

5 HEARING OFFICER HALLORAN: We're off the
6 record.

7 (Discussion off the record.)

8 HEARING OFFICER HALLORAN: We're back on the
9 record.

10 MR. RUSS: Sorry about that.

11 BY MR. RUSS:

12 Q. This is the one that was attempted to be
13 introduced twice, and it has two Bates numbers, two
14 exhibits numbers.

15 This is Exhibit 255. Are you familiar
16 with this letter?

17 A. Yes, I've seen it.

18 MS. NIJMAN: I'm sorry, I just need to object.
19 I'm not sure what the witness is looking at. It's
20 very different than Exhibit 255 that I have.

21 MR. RUSS: Okay, I'm sorry.

22 HEARING OFFICER HALLORAN: Can we go off the
23 record?

24 (Discussion off the record.)

1 HEARING OFFICER HALLORAN: We're back on the
2 record.

3 MR. RUSS: I think we all have the same
4 exhibit.

5 BY MR. RUSS:

6 Q. Are you familiar with this lever?

7 A. I have two letters. It's the same letter
8 twice. What is it? Anyway, yes, I am.

9 Q. Have you read it before?

10 A. Yes, I have read it before.

11 Q. Is this something that formed your
12 opinions?

13 A. It did.

14 Q. How so?

15 A. Because this is a letter from JPRC,
16 consultants for Midwest Gen, relevant to the
17 Powerton generating station in 2013, which I think
18 talks about what is an up-gradient and monitoring
19 well.

20 And IEPA requested that monitoring wells
21 MW-1, which is -- if I could show it on the slide.
22 It's way down here. MW-9, which is right in there,
23 and MW-10, which I'm not sure exactly where it is.
24 It's somewhere in here (indicating), Will not be

1 identified as up-gradient wells anymore because they
2 showed contamination.

3 I think the letter goes on to say that the
4 existing IEPA approved ground watering network at
5 the site consists of 16 monitoring wells, of which
6 it's pretty messy here, that MW-16 is considered an
7 up-gradient monitoring well outside the area of the
8 ground water impact associated with historical
9 ash-related handling activities.

10 Q. Okay. Thank you. I'm going to stop with
11 the general background now and get into some
12 site-specific questions.

13 So, in the back of each binder, in the
14 section of demonstratives, it has a tab marked DEM.
15 We're also going to put at least the site maps on
16 the screen while we go through these.

17 So, turn your attention to the very first
18 page of the demonstrative, it's a map, Dr. Kunkel.
19 Are you familiar with this?

20 A. I am.

21 Q. What is this showing?

22 A. This shows the three ash ponds at Joliet
23 station, Joliet 29 station.

24 Q. And can you briefly describe the site

1 hydrology, as you understand it?

2 A. Yes, the three ponds are boarded on the
3 south by the Des Plaines River. As he talked about
4 previously, US 6 here, a highway, and I think that
5 is Larkin.

6 And then up here between US 6 and the
7 interstate is another canal, Michigan canal of some
8 kind. So, there are water bodies on both sides
9 north and south, and north and south of these ponds.

10 The general hydrology that I guess I would
11 interpret is that ground water generally flows in
12 two directions from, say, the pond area as one.
13 There is a pretty strong gradient that takes ground
14 water directly to the Des Plaines River.

15 There is a component of that ground water
16 that probably takes it, takes the ground water
17 southwest, what eventually gets into the Des Plaines
18 River downstream.

19 Q. Why do you think there is a component that
20 flows southwest?

21 A. Well, because that's if we have a stream
22 that was a steady state, it is neither going up or
23 down. That's what typical ground water contours
24 near rivers look like is that we have a contour that

1 is a certain elevation here. It goes up, crosses
2 the river and comes down the other side.

3 And then the next contour goes up the
4 river, crosses it and goes down the other side. So,
5 there is a component, not necessarily a strong
6 component, but a component that goes this way and a
7 component towards the river.

8 Q. Okay.

9 A. That is hydrology 101.

10 Q. Thanks. Did you review ground water
11 quality data for this site?

12 A. I did.

13 Q. What wells were the ground water samples
14 collected from?

15 A. From all 11 wells.

16 Q. I'm going to leave the map up on the
17 screen, in case people want to refer to it, but for
18 the people with binders, could you turn to the first
19 page of data after the Joliet 29 map?

20 Dr. Kunkel, is this a table data that you
21 prepared?

22 A. Yes, for Joliet 29, it is MW-1 and 2.

23 Q. Can you explain what that page shows?

24 A. This page shows the time series, all data

1 collected by Midwest Gen since the inception of the
2 monitoring program in December 2010 through the
3 second quarter of 2017, and the concentrations are
4 for boron and sulfate in this case.

5 At the bottom we have univariant
6 statistics median means, standard deviation,
7 maximum, minimum and a number of data points that
8 are included in the various statistics.

9 Q. Can you turn to the next page? Explain
10 that page to us.

11 A. Yes, this is a summary at Joliet 29. The
12 median Boron sulfate concentrations compared to
13 background.

14 Since there is no background well here at
15 Joliet 29, I utilized as my background the State of
16 Illinois' background for sand gravel applicants,
17 which for boron is 1.2 milligrams per liter, and
18 for sulfate it's 54 milligrams per liter for
19 alluvial -- what I call alluvial or sandy gravel.

20 My interpretation of this data, where we
21 show the median versus the median background, is
22 that we're always above background for both sulfate
23 and boron at Joliet 29.

24 Q. There's no upgrade at Joliet. Can you

1 explain?

2 A. You can see where the wells are. They are
3 all located really very close to the ponds.

4 I wouldn't consider any of these to be
5 background, because if there's leaks in the ponds,
6 or even leaching of on-site ash, that leechate finds
7 these wells, almost certainly to see -- those wells
8 to see the contamination from the leechate.

9 Q. Turning to the next page in your
10 demonstrative here, there's a series of charts.

11 Can you give us a sense of the
12 organization of this? We are going to see a lot of
13 these.

14 A. Right. This is for Joliet 29, and what I
15 plotted are those time series, the examples of which
16 I gave on the very first sheet we looked at for
17 boron sulfate.

18 Boron is on the left side of the page,
19 sulfate is on the right side of the page, and this
20 is for all 11 wells. And you'll see in well like
21 MW-3, I show not only the CCA, which is the blue
22 line dissolved, but the CCR, which is the total
23 recoverable boron as well for the CCR sampling.

24 Q. And to clarify for the record, I know

1 we've been discussing this for the past couple of
2 days, what are CCA and CCR?

3 A. CCA is --

4 Q. What do they represent, in terms of data?

5 A. In terms of data, they -- well, the CCA
6 are dissolved constituents. So, those are filtered
7 samples, as we talked about before. The CCR are
8 unfiltered samples. If I can opine on those.

9 Q. Sure.

10 A. My opinion is that the -- you know, having
11 looked at many, many -- super many, over 50 years of
12 ground water quality data, that the total
13 recoverable and dissolved are the same for all
14 practical purposes.

15 I think Rich tried to explain it, Rich
16 Gnat this morning, where he said the difference
17 between total undissolved is the total recoverable
18 might have some sediment in the sample, because they
19 extract the sample from the well.

20 So, there is a stress put on the well, and
21 that the gravel pack or the sand pack around the
22 well doesn't filter out all -- maybe it doesn't
23 filter out all the sediment.

24 As we talked before, we may get some

1 difference between the total recoverable and the
2 dissolved. But for practical purposes, I guess if I
3 was a regulator, I wouldn't quibble about the
4 difference.

5 Q. Looking at your charts for MW-3, just to
6 clarify, when you say the same, how precisely are
7 you using that word?

8 A. Well, pretty precisely. If you look at,
9 say, the boron concentrations, the difference is
10 between, and I don't have -- between .4 and, say,
11 .5 milligrams per liter for boron, and that's well
12 within the error of laboratory analyses and things
13 like that.

14 Sometimes -- I think if you look at these,
15 sometimes the total recoverable is less than the
16 dissolved and sometimes it's the other way around.

17 So, I mean, I'm not going to quibble with
18 that as a professional engineer. I think that's the
19 way life is. Life is not perfect and neither is
20 hydrology.

21 Q. Okay. Anyway, going back to these wells,
22 can you walk us through the data well by well and
23 tell us what you see?

24 A. Yeah, I sure can. Well MW-1, which is

1 located on the upper end of the upstream end near
2 ash pond 3, you can see it has intermittent data,
3 because that well was either frozen or dry or a
4 sample wasn't collected.

5 So, it's hard to interpret what's going
6 on, but it would appear, as I said from the table,
7 that nearly all of the time both boron sulfate are
8 above background, near or above background.

9 But MW-1 it looks like the trend might be
10 slightly downward over time. MW-2 is similar. In
11 other words, boron sulfate are nearly always higher
12 than background.

13 It would appear that for boron, the time
14 trend of concentrations is downward sulfate is kind
15 of a wash. It bounces up and down, but it appears
16 that sulfate doesn't necessarily decrease the same
17 way boron does with time.

18 MW-3, boron appears again above
19 background, but not above the class 1 Illinois
20 Ground Water Standard, and it appears to be slightly
21 increasing in MW-3 over time.

22 Sulfate, on the other hand, appears to be
23 decreasing slightly, but always above background,
24 but not above the Illinois state ground water

1 standard, which is 400 milligrams per liter for
2 sulfate and 2 for boron is the Illinois state
3 professional standard.

4 If you turn the page to MW-4, the same
5 situation, boron is flat. In other words, it's
6 neither decreasing, nor increasing, always above
7 background, but below Class 1 Illinois Ground Water
8 Standards. Sulfate slightly decreasing but always
9 above background.

10 MW-5 boron is increasing over time, it
11 appears, but below the Illinois State Ground Water
12 Standard, but higher than baseline and background.

13 Sulfate is similar, although at times it
14 approached the 400 milligrams per liter at MW-5 for
15 Class 1 Illinois Ground Water Standards.

16 MW-6 boron below the Class 1 Standard,
17 higher than background, decreasing in sulfate.
18 Neither increasing, nor decreasing, but always above
19 the background and below the Illinois standard.

20 MW-7, decreasing boron flat and neither
21 increasing, nor decreasing, in sulfate. MW-8, boron
22 at times appears to be in more recently right at
23 background. Sulfate as well in that well MW-8, it's
24 approaching background.

1 MW-9, boron flat, but still above
2 background, but below the Class 1 Standard. MW-9 is
3 the problem child at Joliet 29, in that the
4 concentrations of sulfate are typically and more
5 recently well above the 400 milligram-per-liter
6 concentrations for Illinois Class 1 Ground Water
7 Standard.

8 MW-10, boron is perhaps slightly
9 decreasing and above background, but below standard.
10 Sulfate, again, appears to be slightly decreasing
11 above background, below standard.

12 MW-11, boron is neither increasing nor
13 decreasing, but has been above the Illinois State
14 Ground Water Standard of 2 early on, and always
15 above background and MW-11 sulfate. The same,
16 neither increasing or decreasing above background,
17 below the state standard, Class 1 State Standard.

18 Q. What's the general conclusion from these
19 charts?

20 A. Because even though the boron
21 concentrations are not above the Illinois Class 1
22 Water Standard, a lot of boron concentrations are
23 well above background, except for that one well.

24 And they are also not necessarily

1 decreasing, which says that there's a continued
2 source of boron sulfate. It supplies itself as well
3 in the vicinity of those ponds. And if the ponds --
4 you didn't ask that question.

5 Q. Well, I'm going to ask a slightly
6 different question.

7 A. If the ponds aren't leaking, then that
8 source has to be ash around the ponds. We've pretty
9 much established that there is ash outside the ponds
10 in the vicinity of the monitoring wells.

11 Q. So, are you aware -- before we talk about
12 that, are you aware of any off-site sources of boron
13 and sulfate that could be causing these elevated
14 concentrations?

15 A. Yes, we looked earlier on -- Rich Gnat
16 testified that this area in the northeast part up
17 river from the ponds is an old ash storage facility,
18 which is fairly extensive.

19 That's the one when the Illinois or when
20 the Des Plaines River floods, it erodes the cap off
21 of that ash. It has to be repaired.

22 MS. NIJMAN: Objection, no facts in evidence on
23 that point.

24 THE WITNESS: Yes.

1 HEARING OFFICER HALLORAN: Sustained.

2 THE WITNESS: But there is ash up here, and we
3 know it's there.

4 And I looked at data from KPRG, which
5 showed the general extent of that ash because it
6 showed where KPRG had made those repairs along the
7 Des Plaines River from whenever they started those
8 repairs, doing those repairs, in 2008, '09, up to
9 present.

10 So, the ash is fairly extensive. It's not
11 monitored. There are no ground water monitoring up
12 there, but that ash is subject to leaching by
13 meteoric water and potentially by Des Plaines River
14 water. When the river comes up, water goes into the
15 embankment.

16 MS. NIJMAN: Again, same objection. We're
17 speculating now.

18 HEARING OFFICER HALLORAN: He can speculate.

19 THE WITNESS: That's my opinion is there it
20 could be contamination occurring in these wells as a
21 result of that ash northeast of the site.

22 BY MR. RUSS:

23 Q. Can you clarify what you mean by "river
24 water running into the embankment"?

1 A. Well, obviously --

2 MS. NIJMAN: I'm sorry. I thought that was --
3 he removed that statement.

4 HEARING OFFICER HALLORAN: That was sustained,
5 that question.

6 MR. RUSS: I thought that opinion was --

7 HEARING OFFICER HALLORAN: I'm not sure it was
8 part and parcel.

9 MR. RUSS: If I remember correctly, you
10 objected when he said the river was eroding the ash
11 area and that was sustained.

12 MS. NIJMAN: And the river flooding. He put
13 that altogether.

14 HEARING OFFICER HALLORAN: When the river was
15 flooding.

16 MR. RUSS: I don't think he said "flooding,"
17 but that's what I was trying to clarify.

18 HEARING OFFICER HALLORAN: I think he did.

19 MS. NIJMAN: Yeah, he did.

20 THE WITNESS: Well, hydrologically, it flooded.

21 MS. NIJMAN: I move to strike the prior
22 testimony and this testimony.

23 HEARING OFFICER HALLORAN: The Board will take
24 note. I already ruled on one of yours. The Board

1 will take note what's in the record. Mr. Russ?

2 BY MR. RUSS:

3 Q. Dr. Kunkel, can you explain how ground
4 water is affected by the river in that area?

5 A. Ground water, surface water interactions,
6 are fairly -- really well known, and they've been
7 studied for a long time.

8 And, typically, when the water levels and
9 the river raise, and they rise above the adjacent
10 ground water levels, then water flows from the river
11 into the ground water and then those ground water
12 levels rise.

13 And then when the river goes down, which
14 is fairly suddenly, compared to how the ground water
15 flows, since it flows much, much slower than the
16 river rises and falls, and then that ground water
17 flows back towards the river.

18 So, having quarterly data is typical to
19 assess whether or not -- what's the actual extent of
20 ground water surface/water interaction.

21 But at this particular site, I did not
22 have a U.S. geological survey gauge on the Des
23 Plaines River that would let me interpret that
24 relationship between the river elevation and the

1 ground water elevation, but it's certainly possible
2 and likely that when the Des Plaines River rises,
3 water flows back into the banks and recharges the
4 ground water system, at least partly back.

5 MS. NIJMAN: Same objection. He first states
6 he has no evidence and couldn't interpret and then
7 says it's likely.

8 THE WITNESS: It's likely.

9 MS. NIJMAN: I move to strike the second part
10 of the testimony.

11 HEARING OFFICER HALLORAN: Mr. Abel?

12 MR. RUSS: If I can try to -- I think what's
13 happening he's talking about the river water moving
14 through the embankment into the ground water.

15 MS. NIJMAN: Okay. I don't need your
16 testimony.

17 MR. RUSS: Not over the top.

18 HEARING OFFICER HALLORAN: One person at a
19 time. Thank you. Mr. Russ?

20 THE WITNESS: That's what I'm saying.

21 MR. RUSS: I thought he said that pretty clear.

22 HEARING OFFICER HALLORAN: Mr. Russ, when I
23 talk, again, you stop talking.

24 MR. RUSS: I'm sorry. When you said

1 "Mr. Russ," I thought you were asking me to talk.

2 HEARING OFFICER HALLORAN: But I was still
3 talking and you continued. Go ahead.

4 MR. RUSS: I don't have anything to say.

5 HEARING OFFICER HALLORAN: Okay. Ms. Nijman?

6 MS. NIJMAN: The witness clearly stated he had
7 no gauge for the river water. He could not
8 interpret in this case, but then went on to state
9 that it was like likely.

10 And, so, I'm moving to strike the second
11 part of that testimony.

12 HEARING OFFICER HALLORAN: I can't strike. I
13 can sustain.

14 MS. NIJMAN: Thank you.

15 HEARING OFFICER HALLORAN: Thank you. Russ,
16 you may proceed.

17 BY MR. RUSS:

18 Q. I think there was an earlier question that
19 was still unanswered on the record so I'm going to
20 ask that.

21 Are you aware of any off-site sources of
22 boron sulfate that could be off the property site
23 that could be causing the elevated boron sulfate
24 concentration?

1 A. I think the property includes this ash
2 area up here to the northeast.

3 Q. I'm asking if you're aware of --

4 A. Any others?

5 Q. Off the property site.

6 A. The information I had showed an old ash
7 landfill further down river, but my opinion is that
8 ash doesn't impact the wells.

9 Q. Are there any off-site sources of boron
10 sulfate to the north that could be causing elevated
11 water?

12 A. No, because I already testified that
13 there's a canal up here, which would cut things off.
14 I don't think there is any ash between that canal
15 and US 6, and there is nothing up river except the
16 other ash.

17 Q. Do you believe the ground water has been
18 contaminated by coal ash? I think I might have
19 already asked that question.

20 A. The answer is, yes, based on my definition
21 of the concentrations of boron and sulfate in the
22 background.

23 Q. I believe you stated that the ash pond
24 could be a source?

1 MS. NIJMAN: Could you -- objection to the form
2 of the question and leading.

3 MR. RUSS: It is, but I'll --

4 HEARING OFFICER HALLORAN: All right.
5 Rephrase, please.

6 MR. RUSS: Sure.

7 BY MR. RUSS:

8 Q. What are the sources of ash on site that
9 you think could be causing that contamination?

10 A. The sources of ash on site are potentially
11 ash in the ponds, that the ponds were leaking, ash
12 outside the ponds in the immediate vicinity of the
13 ponds, and that old ash landfill up river. Those
14 are the three sources that I see.

15 Q. Why do you think the ponds could be a
16 source?

17 A. If they were leaking, they would be a
18 source.

19 Q. Why do you think the ash outside the ponds
20 could be a source?

21 A. Because it's leached by -- that ash is
22 leached by meteoric water, or river water causing
23 ground water levels to go up and down and leaching
24 ash from the soil column, which was placed outside.

1 That's the mechanism outside the ponds.

2 Q. As far as you are aware, were these ponds
3 relined at some point in the last ten years?

4 A. Yes, they were.

5 Q. How did that affect the risk of
6 contamination from the ponds?

7 A. Well, obviously we can see from the data,
8 that I've just shown you, that the 11 wells -- that
9 there's no clear, I guess, indication that relining
10 the ponds substantially changed ground water
11 contamination at the site.

12 Q. I guess I'm asking a slightly different
13 question.

14 How did the relining of the ponds change
15 the risk of contamination from the pond?

16 A. The risk of contamination, while
17 theoretically if the ponds were relined, and the
18 liner was properly installed, then the risk would
19 decrease substantially, risk of contamination from
20 coal ash.

21 Q. You mentioned ash ponds and ash fill
22 outside of the ponds as a potential source of the
23 elevated boron sulfate that you see at the site.

24 Can you definitively attributable the

1 elevated boron sulfate to one source or another?

2 A. No, I can't.

3 Q. Can you rule either source out?

4 A. No, I can't.

5 Q. Can you give us your opinion about when
6 this contamination occurred?

7 A. Well, in general, it appears from the
8 ground water data we have, the concentration data,
9 that when monitoring started in 2010, the
10 concentrations were either the same or higher, in
11 general, at many of the wells. But I can't
12 definitively say when it started.

13 Q. Has it stopped?

14 A. It doesn't appear to have, no. We can see
15 that from the data.

16 Q. Do you believe the contamination is
17 continuing?

18 A. Yes.

19 Q. Did you also review data for other ground
20 water monitoring parameters aside from boron and
21 sulfate?

22 A. Manganese.

23 Q. Were those data consistent with your
24 conclusions?

1 MS. NIJMAN: Objection to leading.

2 HEARING OFFICER HALLORAN: You're starting to
3 lead, Mr. Russ.

4 BY MR. RUSS:

5 Q. I guess -- let see if I can as this
6 another way.

7 You reviewed other data. How did that
8 affect your conclusions?

9 A. In addition to boron and sulfate, I
10 interpreted manganese concentration data through the
11 end of my report, which was in 2015.

12 So, I haven't looked in detail at the
13 manganese data for the last several quarters. But
14 manganese also tracked with boron and sulfate, and
15 that it's there in high concentrations.

16 Along with boron and sulfate, which
17 according to all the experts here, the IBPA, EPRI,
18 USEPA, that is an indication of coal ash
19 contamination of the ground water.

20 Q. Can you turn to the very last page of the
21 demonstrative table? This includes the word
22 "Exceedance." I think this is going to be
23 contentious.

24 MS. NIJMAN: I'm sure it is.

1 MR. RUSS: So, I want to get it out in the open
2 right away.

3 BY MR. RUSS:

4 Q. First of all, when we were originally
5 briefing this case many years ago --

6 MS. NIJMAN: I'm sorry?

7 HEARING OFFICER HALLORAN: What are we doing?

8 MS. NIJMAN: Let's not go there.

9 MR. RUSS: I'm just trying to explain why the
10 word "exceedance" was used here because we have
11 been --

12 HEARING OFFICER HALLORAN: She has an
13 objection, then you have a response.

14 MS. NIJMAN: Of course I have an objection.

15 MR. RUSS: Okay.

16 MS. NIJMAN: I object to the use of this page
17 and the word "exceedance" on that page.

18 HEARING OFFICER HALLORAN: Okay. Now,
19 Mr. Russ.

20 MR. RUSS: So, when we started briefing this
21 case many years ago, we were using the word
22 "Violation." We all understand that in a ground
23 water management zone, there are no violations.

24 We switched to the word "exceedance"

1 because we thought that was a value-neutral word.
2 One number is greater than another number. We're
3 not trying to imply any legal liability.

4 We're not trying to call this a violation.
5 We're just saying this number is higher than another
6 number.

7 MS. NIJMAN: I understand, except this was
8 given to us three days ago. So, there was plenty of
9 time to change it; and, secondly -- or even today,
10 you could have changed it.

11 Secondly, it has been determined, and we
12 know that in the State of Illinois the word
13 "Exceedance" is interpreted a slightly different
14 way. So, I understand your intent was innocent, but
15 the document says something that does not appear to
16 be innocent. So, sorry, I can't accept it.

17 HEARING OFFICER HALLORAN: Mr. Russ?

18 MR. RUSS: Well, I stand by the use of the word
19 "exceedance" because I believe the definition of
20 exceedance is simply a number that is greater than
21 another number.

22 MS. NIJMAN: Yes, in the dictionary.

23 MR. RUSS: Yes. And I can stipulate on the
24 record, if you want, that we're not calling these --

1 we don't think this is a violation.

2 We're not calling this a violation. We're
3 not saying these are exceedances that have any legal
4 ramification.

5 MS. NIJMAN: If you could just give us the last
6 page that's got the word out, we can take the last
7 page, if you want.

8 MR. RUSS: So, the question I had was: How I
9 would rephrase this in another way.

10 Would we say "Instances in which ground
11 water data were greater than the Illinois Class 1
12 Ground Water Quality Standards."

13 MS. NIJMAN: The witness has been using "above"
14 and "below" all the time.

15 THE WITNESS: Higher than lower than.

16 MR. RUSS: Would that be acceptable substitute?
17 It is just a demonstrative, but would that be a
18 acceptable substitute?

19 HEARING OFFICER HALLORAN: I think Ms. Nijman
20 would accept that, but still have the problem with
21 word "exceedance" in the last page. You can
22 stipulate, maybe, Ms. Nijman?

23 MS. NIJMAN: If you can just present a
24 different page with one word changed.

1 MR. RUSS: I can't do that right now, of
2 course.

3 MS. NIJMAN: I understand that.

4 MR. RUSS: I can stipulate we will do that, if
5 Dr. Kunkel could testify about it.

6 MS. NIJMAN: And this exhibit will be changed?

7 MR. RUSS: Absolutely. We're not moving to
8 introduce it. It will be changed.

9 MS. NIJMAN: You're not moving to introduce any
10 of this?

11 MR. RUSS: We're not moving to introduce this
12 as demonstrative, if that makes any difference. I'm
13 sorry, I may have misspoken. We may be.

14 I made a mistake. I'm sorry. So, this
15 will be changed if that other wording is acceptable
16 to you.

17 HEARING OFFICER HALLORAN: You may proceed.

18 MR. RUSS: I have to make one more comment
19 about this. I'm sorry. This is off the record.

20 HEARING OFFICER HALLORAN: Off the record.

21 (Discussion off the record.)

22 HEARING OFFICER HALLORAN: We're back on the
23 record.

24

1 BY MR. RUSS:

2 Q. Now, I would like to turn to the Powerton
3 site. I'm sorry, we haven't talked about this yet.
4 Looking at this page, Dr. Kunkel, you were talking
5 about manganese at the Joliet site.

6 Can you explain how this table forms your
7 opinion on that?

8 A. Well, if we just look at table 3 -- is
9 this table 3 the combined? Yes.

10 You can see that the number of times that
11 boron, manganese and sulfate were higher than the
12 Illinois ground water quality standard of
13 2 milligrams per liter. Manganese was --

14 Q. Jim, I'm sorry, the manganese standard, is
15 it 2?

16 A. Well, no, I'm just talking about -- no,
17 the manganese standard is .15, I think. Isn't it,
18 for Illinois ground water?

19 This is just a number on the county table.
20 The number of times the manganese was higher than
21 the Illinois Class 1 Standard, and the number of
22 times that sulfate was higher, one is 32, one is 20.

23 Sulfate is 20. Manganese is 32. So,
24 manganese stands to track kind of with sulfate, in

1 that they are both present along with boron in
2 fairly significant concentrations, higher than
3 background for sure.

4 MS. NIJMAN: I've got to object to the
5 testimony, in the sense that it misrepresents what's
6 on this table. This says boron 2. For the witness
7 to state that it's all high --

8 HEARING OFFICER HALLORAN: Well, you still have
9 a chance to cross. Mr. Russ?

10 BY MR. RUSS:

11 Q. Jim, Dr. Kunkel, can you explain what you
12 were saying about boron being high at Joliet?

13 A. Boron exceeded the Illinois state --
14 Illinois state twice. That was earlier in the time
15 series, the first few samples, but it's been
16 persistent.

17 It hasn't gone back to background, except
18 in one well. So, if we would look at the number of
19 times that it exceeded background, it will still be
20 tracking along with manganese and sulfate.

21 Sulfate, on the other hand, has been
22 consistently 20 times and manganese 32 times
23 concentrations higher than the Illinois State Class
24 1 Ground Water Standard.

1 Q. Thank you. Now we're going to talk about
2 Powerton. The Powerton section of the demonstrative
3 exhibit starts right after the Joliet section.

4 There is a bunch of Joliet data tables and
5 then there is a map for Powerton in the binder.
6 It's a busy map. Dr. Kunkel, are you familiar with
7 this map?

8 A. Yes.

9 Q. Can you briefly describe the layout of the
10 site, as shown on this map?

11 A. This site is located south of the Illinois
12 River, which is at the north end of the map, and
13 it's comprised of several active ash basins, former
14 ash basins.

15 And the complication here hydrologically
16 is that, as Mr. Gnat testified to yesterday, there
17 are two aquifers here.

18 One is a sand-and-gravel unit, which is
19 the lower most aquifer, and then there is a silty
20 clay aquifer, which is between that aquifer and the
21 massive amount of fill that was used at this site.

22 MS. NIJMAN: Objection, misstates testimony.
23 No facts in evidence.

24

1 BY MR. RUSS:

2 Q. Dr. Kunkel, did you review --

3 HEARING OFFICER HALLORAN: Sustained.

4 BY MR. RUSS:

5 Q. Dr. Kunkel, did you review soil boring
6 logs at the Powerton site?

7 A. I did.

8 Q. What did you see in those boring logs?

9 A. I saw a fill on the top, I don't remember,
10 20 or 25 feet. Then I saw at some places this
11 silty-clay aquifer, which underlaid that, but not --
12 it wasn't extensive throughout the whole area, and
13 then beneath that was the sand and gravel.

14 Q. Did you review ground water quality data
15 for Powerton?

16 A. I did.

17 Q. What wells were the ground water samples
18 collected from?

19 A. All the wells.

20 Q. By all the wells, do you mean all the
21 wells shown on this map?

22 A. All the wells shown on this map, yes.

23 Q. We're going to leave the map on the screen
24 and turn to the -- can you explain what the first

1 page of data tables is after the map?

2 A. It's an example of, again, the time series
3 data that I utilized to do the following table, plus
4 the subsequent demonstratives that you'll see, the
5 time series plots.

6 Q. Can you explain what the blue highlighting
7 on the table means?

8 A. The blue highlighting, as the footnote
9 indicates, means that it's the concentration of
10 total recoverable, whatever the constituent is,
11 boron or sulfate; and that those values are not
12 included in the statistics, which are generally at
13 the bottom of the page, always at the bottom of the
14 page.

15 Q. Can you point out what the yellow
16 highlighting means?

17 A. The yellow highlight means that the
18 constituent was not detected, but I replaced it with
19 one-half the detection limit at that time.

20 HEARING OFFICER HALLORAN: Speak up, please.
21 I'm sorry.

22 THE WITNESS: It's one-half the detection
23 limit, which is a standard method of including data
24 so we don't have non-detects showing up in the

1 statistics.

2 BY MR. RUSS:

3 Q. And at bottom next to the blue
4 highlighting, you wrote, "Means the concentration is
5 total recoverable not included in the statistics."

6 Can you explain what that means?

7 A. That means anything that is blue
8 highlighted wasn't include in the median means and
9 saying it didn't actually match mano or ham domine
10 that are shown here and used on the next table to
11 compare it to background.

12 Q. Okay. Can you go to the next table and
13 explain that to us, please?

14 A. Certainly. The next table is similar to
15 the one for Joliet 29, in that it shows the median
16 concentrations at all the wells that have been
17 sampled over their time series, over their period of
18 record, for boron and sulfate.

19 You'll notice that MW-16, we consider to
20 be a background well. So, I used that median value
21 for that well, which is on another sheet somewhere,
22 as background, and compared all the rest of the data
23 to that value for both boron and sulfate.

24 Q. So, to clarify, does this table compare

1 ground water monitoring data to a site specific
2 background?

3 MS. NIJMAN: Objection, leading.

4 THE WITNESS: Well, MW-16 is our background
5 well.

6 HEARING OFFICER HALLORAN: Sustained. Can you
7 rephrase that, please?

8 BY MR. RUSS:

9 Q. What does this table compare?

10 A. Well, I've already testified that it
11 compares the median concentration of boron and
12 sulfate to background and the background comes from
13 well MW-16.

14 Q. Okay, thank you. And what does the data
15 show?

16 A. The data shows that median boron
17 concentrations at all the wells, except the
18 background well, of course, is higher than
19 background.

20 And that sulfate, also at all the wells,
21 is higher than background over the time series.
22 This is a median value for all the data at MW-1, et
23 cetera, through MW-17.

24 Q. How do these values compare --

1 A. 16.

2 Q. -- to other definitions of contamination?

3 MS. NIJMAN: Objection. I'm sorry, I can't
4 hear you.

5 MR. RUSS: I'm sorry.

6 BY MR. RUSS:

7 Q. You discussed that you used two
8 definitions of contamination in your report.

9 What did these data show, as far as your
10 second definition of contamination?

11 A. My second definition of contamination is
12 that if we have concentrations higher than the
13 Illinois Class 1 Water Quality Standard, which for
14 boron is 2, and for sulfate is 400 milligrams per
15 liter, then that's considered to be contamination.

16 But in this table, we're looking at median
17 values, okay, which are kind of like average values;
18 in other words, half are higher and half are lower.

19 And, so, this shows that well MW-9 has a
20 median concentration higher than the Illinois state
21 standard and MW-13, and then MW-14 is close. It's
22 1.9 compared to 2.

23 For sulfate, which is 400, there is wells
24 MW12, 13, 14 and 15, which are always higher than

1 the Class 1 Standard.

2 And then if we go down to the total
3 recoverable, which I've already testified have
4 concentrations that, for all practical purposes, are
5 the same as the other wells, CCR and CCA. They are
6 basically about the same.

7 Those wells also, except for MW-18 for
8 boron, show -- and 17 for boron, show concentrations
9 higher than then the state standard.

10 Q. Can you point out the locations of those
11 last three wells on the map?

12 MS. NIJMAN: I'm sorry, before you continue, I
13 think I missed your comment on MW-17. Did you say
14 that was lower than the state standard?

15 THE WITNESS: It is 1.4 for boron, but it's
16 higher for sulfate.

17 MS. NIJMAN: Thank you.

18 THE WITNESS: Yeah. I'm sorry. The data speak
19 for themselves when the report comes out of my
20 mouth.

21 MS. NIJMAN: Yes. Thank you.

22 THE WITNESS: Wells MW-17, 18 and 19 are new
23 wells that were installed, and they are these pink
24 things here these, kind of pink there, here, and

1 down here.

2 BY MR. RUSS:

3 Q. Okay, thank you. Turning to the next
4 page, these are the charts. Walk us through these.

5 A. Sure. These are my time series plots of
6 all the data for Powerton for each well, starting in
7 December 2010 and extending through second quarter
8 2017. And MW-1, which is way up north here, okay,
9 which is really kind of outside -- you can't see it.

10 MS. GALE: It's not way up north.

11 MR. RUSS: I'm sorry.

12 MS. NIJMAN: Objection to the witness'
13 testimony.

14 THE WITNESS: Isn't this MW-1 on here?

15 MR. RUSS: I'm sorry, they are jumping all
16 over.

17 HEARING OFFICER HALLORAN: Yes. One person.
18 Ms. Nijman witnessed your objection.

19 THE WITNESS: MW-1 is right here, but it's
20 clearly outside areas of known ash contamination.
21 It's what we know, anyway.

22 HEARING OFFICER HALLORAN: Thank you.

23 THE WITNESS: And then -- so, this is 1, 2, 3
24 as we go north, and then around the horn is 4, 5.

1 And then we come to wells that are around
2 the ash ponds, but are judged, at -- 1, 2, 3 and 4
3 and maybe 5 are outside known ash deposits, and
4 we'll see if the data, in fact, say that. And they
5 do and they don't.

6 In other words, MW-1 for boron either set
7 early on in the time series, possibly before the
8 ponds were relined. I don't know exactly the dates
9 they were relined.

10 They show very high concentrations back in
11 2012, and then decreasing in concentrations down to
12 background, and also below the Illinois standard.

13 For sulfate, MW-1 is, except for some
14 excursions here in 2015, is either right at
15 background or well below the 400 milligrams per
16 liter for sulfate Illinois standard. MW-2 is
17 similar.

18 There were some excursions in late 2013
19 and early 2014. I'm not sure why that happened. It
20 could be rising and falling ground water levels due
21 to the Illinois River going up and down.

22 But, again, it's remained fairly steady in
23 near background and below, except for I think one
24 data point for boron and below the ground water

1 standard for sulfate.

2 MW-3, which is I think the furthest north
3 well up here, also boron concentrations decreasing
4 with time, and approaching background now, and below
5 background in the past, and below the Illinois
6 Ground Water Standard.

7 Sulfate similarly for MW-3. MW-4
8 concentrations are relatively constant for boron,
9 and above background for boron. For sulfate, they
10 decline to near background and below the Illinois
11 state standard.

12 MW-5, similar, but still kind of a
13 constant boron concentration, and the actual median
14 values for these are on the tables that are attached
15 to this demonstrative, if you want to see the actual
16 numbers, but below -- above the standard -- above
17 the baseline, but below the standard.

18 And MW-5 for sulfate is similar. MW-6 --
19 now we're getting into wells. MW-6 is located just
20 to the north here of the ash settling basin right
21 there, 6, 6 and 7.

22 MS. NIJMAN: Wandering points.

23 THE WITNESS: No. You know, it's old age. 6
24 and 7, which show that boron concentrations are

1 fairly stable, but still above background for
2 sulfate. Standards are -- it's at or above the
3 Illinois Ground Water Standard. Of course, well
4 above background.

5 That well, of course, is right on the
6 north side of that ash settling basin. So, it's
7 being continuously contaminated from coal ash.

8 MW-7, which is just on the west side of
9 the ash settling basin, again shows concentrations
10 of boron above background, but below the standard.

11 And sulfate above and below background,
12 and well below the standard. MW-8 is located next
13 to the ash basin right here, and just on the west of
14 the ash surge basin, and it shows boron
15 concentrations increasing over time, I guess in
16 general, although down in the last few quarters, but
17 well above background. Sulfate tracks the same way.

18 And MW-9, which is that well which is the
19 old background well, which is located way down here,
20 which everybody agreed it wasn't really a background
21 well.

22 MS. NIJMAN: Objection, misstates testimony.
23 Midwest Gen did not agree.

24 HEARING OFFICER HALLORAN: Sustained.

1 THE WITNESS: Okay. The state, and I think I
2 had shown here it is not a background well because
3 the concentrations are not only well above
4 background, but even well above the Illinois State
5 Boron Standard, Class 1 Standard of 2 milligrams per
6 liter, and appear to be not decreasing.

7 Sulfate, the same way, although the
8 sulfate concentrations are below the 500 milligrams
9 per liter of the state standard, but well above
10 background.

11 MW-10 is located right here. That's
12 MW-10. So, it's quite a ways east of the ash surge
13 basin and south of an old ash storage basin, and
14 so --

15 MR. RUSS: I'm sorry. Do you want to take a
16 break?

17 HEARING OFFICER HALLORAN: I was thinking we've
18 been at this for about an hour and 15 minute. You
19 want to take a break?

20 MR. RUSS: Yes, we can take a break.

21 HEARING OFFICER HALLORAN: Let's take no more
22 than a 15-minute break.

23 (Recess taken.)

24 HEARING OFFICER HALLORAN: We're back on the

1 record after a short break. It's approximately
2 3:25. Mr. Russ, you may continue.

3 BY MR. RUSS:

4 Q. So, Dr. Kunkel, could you continue to
5 present your analysis of the data on this chart?

6 A. Yes, we are at Powerton Station, and we're
7 at MW-10, which is this well that's east of the ash
8 surge basin and south of the old former ash storage
9 basin, and we can see that sulfate -- or, I'm sorry,
10 boron at that well, MW-10, has been higher than the
11 Illinois State Standard for several quarters. It
12 has now dribbled out.

13 MW-10 for sulfate, well below the state
14 standard of 400, but still above background. MW-11,
15 that well is located in the southeast corner of the
16 ash surge basin, just outside the basin, and shows
17 relatively persistent and much higher than
18 background concentrations of boron and sulfate.

19 The sulfate actually increasing here
20 recently to either at or slightly above the State
21 Ground Water Standard of 400 milligrams per liter.

22 MW-12 is at the really south end of the
23 ash surge basin, and just on the northeast -- sorry,
24 the northwest corner of the ash bypass basin, and it

1 shows concentrations of -- historically, of boron
2 being above the 2 milligrams per liter Illinois
3 State Standard, and always above background sulfate
4 at or near the 400 milligrams per liter state
5 standard and above background.

6 Moving to MW-13, which is located over in
7 the southeast corner of the ash surge basin. I'm
8 sorry, that's 12. 13 is at the south end of the
9 metal cleaning basin and west of the ash surge
10 basin.

11 13, 14 and 15 are all around the metal
12 cleaning basin, and those wells show persistently
13 high, and in some cases increasing boron and sulfate
14 high. And that their concentrations of boron are
15 nearly always above the state standard of 2 at 13,
16 near 2 at we, and slightly less than 2 at 15. And
17 either increasing or staying the same.

18 And for sulfate, much higher
19 concentrations of sulfate, well above the 400
20 milligrams per liter state standard for 13 and 14
21 and increasing. And, right now, well above the
22 state standard for 15, and maybe slightly starting
23 to go down, but still fairly high.

24 16 is the background well that we already

1 talked about, and you can see that the
2 concentrations of boron are low; and, on average, or
3 right at the baseline, which is what we used, .18, I
4 think it was, milligrams per liter. And sulfate is,
5 again, the background.

6 Well 17, 18 and 19 are those three that
7 came on line late in the time series, which measure
8 total recoverable boron and sulfate, and they are
9 located north to south. Yeah, north to south.

10 Is that right? Yes. I can't read the
11 map. 19 is south. 17 is here, and 18 is up north
12 of the ash surge basin. Those values indicate that
13 sulfate is high, and higher than the 17 and 18.
14 Higher than the Illinois State Ground Water
15 Standard.

16 And for 19, boron is high, higher than the
17 state standard, sulfate is not, but they are both
18 well above background. And that's all I have to say
19 about those.

20 Q. Great. That site has the most wells?

21 A. Yes.

22 Q. Turning back to MW-16 -- I'm sorry, before
23 we do that, can you give us your general sense of
24 all these trends that you were just talking about?

1 A. Yes, I think it's the same -- in general,
2 it's the same at all sites that contamination is
3 still occurring; and in some cases increasing, but
4 still occurring. Some cases decreasing or staying
5 the same, but still occurring.

6 Q. On MW-16, when did you write your report,
7 relative to this time period?

8 A. July 2015, wasn't it? I think so. I have
9 to look at the date. The date on the front is
10 July 2015. July 1, yes.

11 Q. Now, subsequent, what's the highest
12 reading of boron at the Powerton No. 16?

13 A. The background well was 1. There were two
14 values that were kind of high. That one and the
15 quarter after that in 20 -- I guess -- I don't know
16 when it was. I can't tell from my time series. It
17 was either 15 or 16.

18 Q. Can those affect your conclusions of that
19 well?

20 A. No, of course not. When you do the
21 statistics, it doesn't appear to impact the
22 statistics at all. In fact, I think in my original
23 report, I had .2 as the background for boron and now
24 .18, if you take all those other data.

1 Q. Okay. Are you aware of any off-site
2 sources of boron and sulfate that could be causing
3 the elevated boron and sulfate data that you just
4 described?

5 A. At Powerton, I'm not aware. I don't know
6 of any other sources.

7 Q. In your opinion, is the ground water at
8 Powerton contaminated by coal ash?

9 MS. NIJMAN: I'm sorry, objection, leading.

10 HEARING OFFICER HALLORAN: Sustained.

11 BY MR. RUSS:

12 Q. Can you give us your conclusion regarding
13 coal ash and ground water at Powerton?

14 A. Certainly. The ground water at Powerton
15 is being contaminated by coal ash because we have
16 boron and sulfate, and in my report manganese
17 present in high concentrations together, which is an
18 indicator of coal ash contamination.

19 Q. In your opinion, based on everything
20 you've reviewed, where is that contamination coming
21 from?

22 A. Either from leaky ponds or from ash stored
23 or ash on the surface or near the surface, but
24 outside the ponds.

1 Q. Did you review ash pond elevation data for
2 this?

3 A. Ash pond bottom elevation data? Yes, I
4 did.

5 Q. Why was that significant to your report?

6 A. Well, because this site, plus Joliet, plus
7 the site at -- well, all the sites are highly
8 influenced. The ground water elevations are highly
9 influenced by nearby surface water sources. In this
10 case, the Illinois River.

11 So, when the Illinois River rises, we've
12 already heard testimony I think by Ms. Race, that
13 the Illinois River came up to elevation in -- I
14 can't remember what year, '07 or something like
15 that. She testified to that.

16 MS. NIJMAN: Objection, misstates testimony.

17 BY MR. RUSS:

18 Q. I think that's accurate.

19 A. I think that's accurate.

20 HEARING OFFICER HALLORAN: I'll let it stand.
21 You may proceed.

22 THE WITNESS: But, anyway, the point is that
23 when the Illinois River comes up, the water levels
24 rise, because these canals, which are the water

1 source for cooling water, are reflections of the
2 Illinois River.

3 In other words, when the Illinois River
4 goes up, the water levels in these canals go up, and
5 they tend to recharge the ground water, which means
6 the ground water goes up.

7 So, you get the sloshing back and forth,
8 which is why you see a lot -- my opinion, why you
9 see a lot of noise in the data concentrations going
10 up and down.

11 Part of that is due to rainfall and snow
12 melt leaching, but also due to ground water rising
13 and falling and leaching the ash that is outside the
14 ponds.

15 Q. Can we turn to your report, Exhibit 401
16 and Figure 12. I'll wait a second.

17 HEARING OFFICER HALLORAN: I'm sorry, I'm
18 having des deja vu again.

19 MR. RUSS: They are at the back.

20 HEARING OFFICER HALLORAN: Thank you.

21 THE WITNESS: I am here.

22 BY MR. RUSS:

23 Q. Can you explain what this figure shows?

24 A. This figure shows -- both 11 and 12 show

1 ground water levels -- ground water elevations, I'm
2 sorry, in place of the unit, which immediately
3 underlies the fill at the site, and the gravelly
4 sand unit, which is beneath that silt-clay unit, and
5 compares those ground water elevations to Illinois
6 River elevations from USGS data.

7 And you can see that when the river goes
8 up, the ground water elevations go up, not
9 immediately, but with a lag time. When the river
10 goes down, the ground water elevations go down.

11 Q. You said earlier that you were looking at
12 the elevations of the pond bottoms.

13 Why is that significant to you?

14 A. Well, because if the bottom elevations of
15 the ponds are beneath the water table, or near the
16 water table.

17 If they they're beneath the water table,
18 it's possible that if the pond is not full, there's
19 no weight on the liner, then it will tend to try to
20 float away called hydrostatic uplift.

21 Q. Are you familiar with the coal ash rule
22 that we were discussing earlier?

23 A. Yes.

24 Q. Can you turn to that Exhibit 406 in the

1 binder?

2 A. Yes.

3 Q. Page 21471 down in the lower right corner.

4 A. Yep, I have it.

5 Q. Is this something you reviewed in
6 developing your opinions?

7 A. Yes. You know, none of the sites, maybe
8 Joliet might be this.

9 Q. Well, can you explain what this is?

10 A. This is the coal ash rule that EPA has
11 promulgated for existing and CCR -- for new CCR
12 landfills, existing and new CCR surface
13 impoundments, which these are existing CCR surface
14 impoundments, and all lateral expansions to those
15 kinds of facilities.

16 And it says that "The base of the landfill
17 or the pond must be located no less than five feet
18 above the upper limit of the upper most aquifer, or
19 must demonstrate they will not be an intermittent,
20 recurring -- intermittent, recurring or sustained
21 hydraulic connection between any portion of the
22 base of the CCR unit, and the upper most aquifer,
23 due to normal fluctuations in ground water
24 elevations, including the seasonal high water

1 table."

2 MS. NIJMAN: I'm going to object to the use of
3 this document to set any kind of a standard in the
4 sense that it was issued long after the ponds were
5 lined and relined; and it's not, therefore,
6 applicable as to a standard to those ponds. It's,
7 therefore, irrelevant and immaterial in that regard.

8 HEARING OFFICER HALLORAN: Mr. Russ?

9 MR. RUSS: This is just going to Dr. Kunkel's
10 awareness of the industry standard on pond
11 construction.

12 MS. NIJMAN: But how can it be an industry
13 standard if it was issued after all of these ponds?

14 MR. RUSS: I don't know why the rule couldn't
15 have been -- I don't know why the rule couldn't have
16 been setting into law standards that has been
17 adopted by the industry before.

18 MS. NIJMAN: Now you're testifying. Objection.

19 HEARING OFFICER HALLORAN: Excuse me. I'm
20 listening to Mr. Russ.

21 MR. RUSS: This is foundation for Dr. Kunkel
22 expert's opinion about pond construction.

23 HEARING OFFICER HALLORAN: I'm going to allow
24 it. Overruled.

1 MR. RUSS: For the record, this is
2 Section 257.60 of -- I can't remember what rule,
3 40CFR, Section 257.60.

4 BY MR. RUSS:

5 Q. Dr. Kunkel, is this consistent with your
6 understanding of industry standards?

7 MS. NIJMAN: Objection to leading.

8 BY MR. RUSS:

9 Q. Dr. Kunkel, what is your understanding of
10 the industry standard for impoundment construction?

11 MS. NIJMAN: Objection to vague, lack of time.

12 HEARING OFFICER HALLORAN: Overruled. You may
13 answer, if you are able.

14 THE WITNESS: My understanding is the 5-foot
15 limit is the industry standard for existing and new
16 CCR surface impoundments.

17 BY MR. RUSS:

18 Q. Was that true before this rule was
19 promulgated?

20 A. It depends on the state, plus engineering
21 judgment. We design lots of them. We always try to
22 keep them at least three feet, but maybe more.

23 Q. I'm sorry, can you clarify? You designed
24 impoundments that --

1 A. Yes. Depending on where we were working,
2 a lot of the states had state standards already for
3 construction of any water or any water-holding
4 facility, any pond, whether it is a water pond or a
5 waste water pond, coal ash pond, that it should be
6 so many feet above the high water table, so that we
7 didn't get failure of the liner if the water table
8 went up or down.

9 That, plus, what don't want water even in
10 the vicinity of the liner, because it could
11 compromise the structural integrity of the soils,
12 themselves, and cause settling and things like that.

13 Q. Can you describe how that happens?

14 A. Repeated wetting and drying is one.

15 Q. I'm sorry, can you explain what that
16 means, repeated wetting and drying?

17 A. If the water table rises and wets the
18 soils, then those soils may move a little bit; or
19 when the water table goes down, you could have high
20 par pressures, which might cause the soils to
21 collapse or settle or move and would compromise the
22 liner.

23 Not to mention hydrostatic uplift if the
24 water levels actually came up to under the liner.

1 Q. To the best of your knowledge, do you know
2 why the EPA required this five-foot separation?

3 A. That's exactly why.

4 MS. NIJMAN: Objection, foundation.

5 HEARING OFFICER HALLORAN: Mr. Russ?

6 MR. RUSS: I'm just asking if he has an idea of
7 why.

8 HEARING OFFICER HALLORAN: He can answer, if
9 he's able.

10 THE WITNESS: That's exactly why is because
11 EPA, in conjunction with the energy industry, which
12 helped draft these regs, said it's only fair that
13 you set some kind of standard so everybody is
14 operating on the same set of rules.

15 Because some states are some things and
16 some states are others. So, that's why it was set.
17 The five feet, not arbitrary, by any means.

18 BY MR. RUSS:

19 Q. Okay, thank you. Did you compare ash pond
20 bottom elevations to ground water data in your
21 analysis?

22 A. Oh, I did, yes.

23 Q. What did you find at Powerton?

24 A. At Powerton, according to my figure, that

1 you just pointed out, 12, was it?

2 Q. I'm sorry, in Exhibit 401?

3 A. In my report.

4 Q. Figure 12, yes.

5 A. I show the -- if I can find it now. The
6 range of ash pond bottom elevations at Powerton
7 compared to both ground water and the Illinois River
8 water levels showed that the ash pond bottom
9 elevations varied from the data I had roughly
10 between 440 and 459 feet above Mean Sea Level.

11 And that obviously at least some of the
12 ponds, and I think in particular the ash settling
13 basin at 440 feet was subject to frequent ground
14 water, that was either at or close to the bottom of
15 the pond.

16 Q. Can you turn to Exhibit 33, please, page
17 9? Do you have it, Jen?

18 MS. NIJMAN: I do. Thank you.

19 BY MR. RUSS:

20 Q. Page 9728. You just mentioned the
21 settling basin.

22 Is this what you're talking about?

23 A. Yes.

24 Q. Can you describe what this is?

1 A. This is a drawing of not for construction
2 of existing conditions of the secondary ash settling
3 basin, which I just mentioned, which is the basin up
4 in the northeast -- northwest corner, I'm sorry, of
5 the site.

6 Q. What is the bottom elevation?

7 A. The approximate bottom elevation is what I
8 have in my report, 440 feet above Mean Sea Level.

9 Q. Do you know, based on your experience
10 looking at these kinds of drawings, whether that's
11 the top of the bottom, or the bottom of the bottom?
12 If you understand that, I'm asking.

13 A. Yes, I understand. Typically, what they
14 would show on this drawing would be the top of the
15 bottom, if you will.

16 This would be the bottom elevation where
17 the ash would first touch the bottom of the pond.
18 There may be structural just below that.

19 Q. Okay. What is the 440 feet in reference
20 to?

21 A. Mean Sea Level.

22 Q. Can you explain what that means?

23 A. Well, it's the -- mean sea level is a
24 datum that is utilized by federal, state and

1 engineering companies in the industry as a datum for
2 elevations at their site. They may vary, but mean
3 sea level is mean sea level.

4 Q. With feet? I get confused sometimes.
5 When the numbers get larger, is the elevation
6 getting greater?

7 A. The elevation gets higher, yes.

8 Q. Looking at the demonstrative, which ground
9 water monitoring well is closest to that pond?

10 A. I'll look in my chart here. I said before
11 MW-6 and MW-7. MW-6 is on the north side of that
12 pond. MW-7 is on the west side of the ash settling
13 basin.

14 Q. Can we now turn to Exhibit 2600?

15 MS. NIJMAN: Are we done with this?

16 MR. RUSS: Yes, we're done with that other one.

17 BY MR. RUSS:

18 Q. Can you turn to page -- do you have that
19 exhibit in front of you?

20 A. Yes.

21 Q. 62542. And can you state, for the record,
22 what we're looking at here?

23 A. I'm looking at a table that was prepared
24 that's called "Ground Water Elevations Powerton

1 Station, Midwest Generation," and the cover sheet is
2 second quarter 2017, ground water monitoring report.

3 Q. What's the range of ground water
4 elevations for monitoring well 6 during this period
5 shown?

6 A. For monitoring well 6, they vary. Well, I
7 only have two years here or three years, '15, '16
8 and '17, and those ground water elevations vary from
9 461.22 to 461.27. So, it's pretty tight.

10 MS. NIJMAN: I'm sorry, but where are we
11 looking?

12 THE WITNESS: Ground water elevation. It's
13 like the fourth column in.

14 BY MR. RUSS:

15 Q. Just make sure you're looking at the
16 ground water elevation.

17 A. Ground water elevation, yes, that's what
18 it says. I'm sorry, that's ground elevation.
19 Ground water elevation, thank you.

20 It's the fifth column in, and it varies
21 from 47, 45 -- let's see, it's tough to tell 45.36
22 above sea level.

23 Q. 45.36?

24 A. I think that's the lowest one. To 400 --

1 445.36 to 450.73, I think.

2 Q. Okay. What do you conclude from that?

3 A. Well, that it's above the bottom -- it's
4 higher than 440 all the time.

5 Q. Why is that significant to you?

6 A. Because it says that if that pond was
7 relined, and the water level in the pond is below
8 any of those elevations, there's going to be some
9 hydrostatic uplift in the bottom on the liner, on
10 the liner.

11 Q. You also mentioned that a potential source
12 of coal ash contamination at the site was ash fill
13 outside of the ash ponds.

14 How do you know that fill exists?

15 A. Well, again, we have soil borings by
16 several other consulting firms, including ENSR,
17 E-N-S-R, and KPRG had some, Patrick Engineering had
18 some drawings around the site.

19 Those are not necessarily in the ponds.
20 They are outside the ponds, I'm sure.

21 Q. Let's turn to Exhibit 13C. I'm going to
22 put this one up on the screen. I don't have a copy.

23 Turn to page 7113. Can you describe what
24 this shows?

1 A. Yes, this is the Patrick hydrologic
2 assessment report for the Powerton Station, and this
3 particular page, 7113 Bates, shows the boring log
4 for MW-6.

5 Q. Can you explain what the boring log shows?

6 A. Well, the boring log shows typically the
7 strategy which things were drilled, to which the
8 drill penetrated. It shows the water level at the
9 time. It shows what samples were taken.

10 Q. Where does it show the water level?

11 A. The little float down here at 17 feet.

12 Q. So we're clear, that little white triangle
13 in the lower left?

14 A. Yes, the white triangle that's floating on
15 the water, that is the time they drill it. It isn't
16 necessarily the true water level, because of some
17 erring on the side of the bore hole. It has the
18 soil rock description and then notes and test
19 results.

20 Q. You mentioned that you looked at -- you
21 learned that there was fill outside of the ash ponds
22 through the boring logs. Is this an example of one
23 of the boring logs?

24 You said that you looked at -- you are

1 aware of coal ash outside of the ash ponds because
2 of the boring logs?

3 A. Yes.

4 Q. Is this one of the boring logs you're
5 referring to?

6 MS. NIJMAN: Objection leading.

7 THE WITNESS: Yes, it is.

8 HEARING OFFICER HALLORAN: Overruled.

9 BY MR. RUSS:

10 Q. Can you describe how this formed your
11 opinion?

12 A. Well, this boring log is in fill, which
13 overlies the silt-clay unit, which is that uppermost
14 unit beneath the fill, which overlies the sand and
15 gravel. So, there is a substantial amount of fill
16 at this site, like I said, up to 20 feet or even
17 more.

18 That fill was constructed using the
19 combination of coal ash or native soils, whatever
20 happened to be around. They scrape together and use
21 this as fill.

22 So, when they do these boring logs, this
23 is all fill. And if I can just talk about what the
24 soil rock description is in the fill, as we go from

1 say, say, zero to 10 feet, it says, "Gravel, clay
2 and coal cinders."

3 Now, when drillers do that, okay -- you
4 know, my experience, which is very extensive with
5 core drilling and drillers, is that they identify
6 something and then the next identification is
7 because there's a change.

8 It is what we call a change in the
9 stratigraphic section, stratigraphic unit. So this
10 one says, "Gravel, clay and coal cinders, top 10
11 feet." So, we would spec to see gravel, clay and
12 coal cinders smeared out to this top 10 feet. Okay?

13 It doesn't just disappear after the first
14 inch. All right? Then the next thing that the
15 driller saw was he got a change in the type of soil
16 here, the type of fill, dark gray clay-silt organics
17 very sift and moist. Still in the fill, but from 10
18 to 14 feet that's what he saw.

19 Then he saw another change at 14 feet,
20 black coal cinders, loose, wet. And that stayed
21 there until he got to 18 feet, when he hit that
22 silt-clay unit.

23 So, this says we have coal cinders up on
24 the top 10 feet, the little section of 4 feet of no

1 cinders, okay, or no coal ash, organics very soft,
2 moist, and then we got coal cinders again from 14 to
3 18 feet.

4 But, remember, that this bore hole is a
5 single point, a very small sample in a very large
6 area. So, we don't know what happens outside this
7 very small hole in a very large area.

8 There could be more ash. There could be
9 more extensive. We just don't know. But,
10 typically, that is what you see.

11 Q. We were just looking at ground water
12 elevations for this same well, I believe?

13 A. Yes.

14 Q. And they showed -- what did they show?

15 A. Well, obviously, they showed that the
16 water level was up into this fill area above 440,
17 and so we can see that the little water level.

18 Even at the time they drilled this bore
19 hole, was into the black coal cinders, wet, loose.
20 So, it's leaching that coal ash.

21 As it moves up and down -- when it goes
22 down, not all the water drains out. Okay? There is
23 water that stays in the pours held by gravity. What
24 happens to that water? It equilibrates chemically

1 with coal ash.

2 Then the next time there is a flush of
3 water from the top, or the ground water rises and
4 then lowers again, it takes all that contamination
5 with it, and it shows up in the monitoring wells.

6 Q. Have you seen other examples -- I don't
7 want to run through all of the boring logs you've
8 been talking about all week.

9 Let's turn to your Exhibit 401 table 7.
10 I'm sorry, table 6.

11 HEARING OFFICER HALLORAN: Table 6?

12 MR. RUSS: Table 6. I'm sorry.

13 THE WITNESS: Yes, got it.

14 BY MR. RUSS:

15 Q. Can you explain what this table shows?

16 A. Well, this table is my summary of ash
17 deposits located outside the ash ponds at the
18 Powerton Station, and it shows the thickness of what
19 I consider to be ash, even though there may be other
20 materials mixed in with it.

21 It's my opinion this is what the depths of
22 ash that could be leached either by meteoric water
23 or rising and falling water tables.

24 Q. Are these all from the same source?

1 A. These were all from Patrick in 2008,
2 and --

3 Q. Are we looking at the same table?

4 A. Table 6.

5 Q. Table 6 is on two pages.

6 A. Oh, okay. If you turn the page, we were
7 looking at MW-6.

8 Q. I think you actually want to go back.

9 A. Back a page?

10 Q. You are on table 7 now. Table 6 is two
11 pages?

12 A. Here we go. Yes, okay. I'm sorry. MW-6
13 is zero to 18 feet, which is what the boring showed
14 that there's ash somewhere in that top 18 feet in
15 the fill, and maybe a lot of it, maybe a little of
16 it, but there is still ash.

17 Q. You used the word "substantial amount."
18 Can you explain?

19 A. Well, 18 feet is substance.

20 Q. Can you explain how this table informed
21 your opinion that there is a substantial amount of
22 ash at the site?

23 A. If you start to look at the total
24 thickness where ash was seen in the borings, like I

1 said, it goes up to 24-and-a-half feet at MW-8, and
2 then I have subsequent -- also borings by others,
3 but that's fairly substantial.

4 Q. Okay, thank you. You mentioned ash ponds
5 and coal ash fill outside of the coal ash pond as a
6 potential source of the elevated bore on the sulfate
7 concentrations that you've seen.

8 Can you definitively attribute elevated
9 coal ash indicators to one source or another?

10 MS. NIJMAN: Objection to leading. We're
11 testifying in this question.

12 HEARING OFFICER HALLORAN: You're leading
13 again. We're having problems with the question.
14 You did it before.

15 MR. RUSS: I just read it exactly the way I
16 read it the first time. Okay.

17 BY MR. RUSS:

18 Q. Can you give your opinion about those two
19 categories of sources of contamination?

20 A. We know from the time series data that
21 ground water contamination is occurring at the site,
22 and it's the contamination comes from coal ash.

23 I can't say if it's coming from the ponds
24 or the ash outside the ponds, but it's definitely

1 occurring.

2 Q. Can you rule either source out?

3 A. I can't rule out either source. The risk,
4 of course, is contamination if the ponds were
5 relined, goes down, obviously, but contamination
6 continues to occur.

7 Q. Going back to your selection of coal ash
8 indicators, did you evaluate any indicators other
9 than boron and sulfate?

10 A. Yes, I looked at manganese in my report in
11 2015.

12 Q. Why did you choose not to include
13 manganese in your demonstrative charts?

14 A. The reason I didn't include manganese here
15 was because manganese can be chemically changed if
16 the PHs are right in the ground water and form
17 manganese oxides, which are insoluble.

18 And, so, I selected boron and sulfate,
19 which we've already established through the Illinois
20 State EPA, are -- that move with the ground water
21 and are insoluble -- or, I mean, are non-sorbing the
22 soluble in the ground water.

23 Q. Did the manganese -- well, let's turn to
24 the last page of the demonstrative again, the

1 contention table.

2 MS. NIJMAN: I've already crossed the word out
3 on mine.

4 HEARING OFFICER HALLORAN: Should I as well, or
5 just wait for a clean copy?

6 MS. NIJMAN: Well, we'll get as new one as
7 well; but, yes.

8 HEARING OFFICER HALLORAN: All right.

9 BY MR. RUSS:

10 Q. Dr. Kunkel, looking at summary table 3 at
11 the bottom of this, you were just talking about
12 manganese.

13 Can you discuss your conclusion about
14 manganese at Powerton in light of this chart?

15 MS. NIJMAN: Are you all right?

16 MR. RUSS: Yeah, I'm okay.

17 THE WITNESS: The manganese had the highest
18 number of values, which were above the Illinois
19 state standard, 246 times out of the whole time
20 series, 246 times manganese was higher than the
21 Illinois State Ground Water Standard.

22 Sulfate at 94 times, where the value is
23 higher, and boron 58 times in the time series the
24 value was higher than the Illinois state Ground

1 Water Standard.

2 Q. The data, other than boron and sulfate,
3 how did they affect your conclusions about boron and
4 sulfate?

5 A. I think that the variables that are listed
6 here, the constituents that are listed here from
7 antimony to vanadium, have all been identified as
8 potential indicators of coal ash contamination.

9 I think I've already testified that I
10 picked boron, manganese and sulfate in my report as
11 good indicators because for various reasons. First
12 of all, if they are found together in high
13 concentrations, that's a definite indication that
14 coal ash is there.

15 Some of these other variables could come
16 from other sources, as well as coal ash. So, that's
17 why they really didn't impact.

18 It's good -- they didn't impact my
19 opinions. It's good to see that they're there, and
20 they vary a lot.

21 Q. Okay.

22 A. From site to site.

23 Q. We're going to turn to Waukegan now.

24 HEARING OFFICER HALLORAN: Do you want to -- I

1 don't think we can complete Waukegan today.

2 MR. RUSS: Probably not. Do you want to stop
3 now?

4 HEARING OFFICER HALLORAN: It's up to you. I
5 mean, you can get a quarter of the way through, and
6 then we'll stop.

7 MS. NIJMAN: I was going to say you don't look
8 happy. I was there yesterday with a migraine.

9 MR. RUSS: I can do it. I don't know, for you,
10 get your cross in tomorrow.

11 HEARING OFFICER HALLORAN: We're off the
12 record.

13 (Discussion off the record.)

14 HEARING OFFICER HALLORAN: We're back on the
15 record.

16 MR. RUSS: Okay, thank you.

17 BY MR. RUSS:

18 Q. So, Dr. Kunkel, can you turn in the
19 demonstrative section of this binder?

20 After all the Powerton data, there are a
21 couple of maps of Waukegan, and there's one that you
22 generated?

23 A. Right.

24 Q. And that's up on the screen?

1 A. Yes, the third page, yes.

2 Q. It's hard to see on the screen. Everybody
3 has a copy?

4 A. Well, Waukegan Generating Station and the
5 ash ponds, west and east ash ponds, and then the
6 famous east Griess-Pfleger Tannery site.

7 And then the former general boiler
8 property west of the west and pond. And then
9 between the general boiler property and the west ash
10 pond is this blue rectangle, which we've already
11 identified as the former ash slag storage area.

12 Q. Okay.

13 A. And to the south is the Waukegan waste
14 water treatment plant.

15 Q. Can you briefly describe the site
16 hydrology?

17 If you would like to look at some figures
18 in your report, let us know.

19 A. You know, the ground water or the geology
20 site, according to Patrick, is kind of a jumble of
21 sand, typical beach material, with no clay lenses or
22 anything like that.

23 I don't know exactly how deep it is, but
24 the wells didn't penetrate anything exciting, other

1 than this soils and sand.

2 Q. And the hydrology?

3 A. The hydrology, the general flow direction
4 of the ground water at the site, is towards Lake
5 Michigan or it's arms.

6 In other words, it would flow towards this
7 area of the lake is used as cooling water. It's
8 just the same elevation as the rest of the lake out
9 here.

10 So, the flow directions are generally to
11 the east, but could be to the northeast and to the
12 southeast, because I think these ponds are built up
13 on a little bit of high elevation, and I think it's
14 been established by myself and others that ground
15 water flows in response to topography.

16 Q. Okay.

17 A. In directions in response to typography.

18 Q. Did you read the ground water quality data
19 for this site?

20 A. Yes.

21 Q. What wells were the ground water data
22 collected from?

23 A. All the wells that I show on this map.

24 Q. Okay.

1 A. Which are midwest wells 1 through 16, the
2 ELUC wells 10, 11, 12, 14 and 15.

3 Q. Okay.

4 A. No, 1 through 16, meaning 1 through 9, and
5 then 16, which is a new well that is installed at
6 the south end of the pond. And then the ELUC wells
7 10, 11, 12, 14 and 15.

8 Q. Okay.

9 A. They are the red dots on the map.

10 Q. Got it. And skip a few pages, the first
11 page many numbers.

12 A. Yes.

13 Q. You've already explained this.

14 A. Typical example. The footnotes are the
15 same where yellow highlight means I replaced the
16 value with half the detection limit.

17 It doesn't show on this one, but some of
18 the other wells, and the blue line or the blue
19 shaded areas mean that the concentration was totally
20 recoverable. It wasn't included in the statistics
21 at the bottom of the tables.

22 Q. Okay. On the next page, it says at the
23 top, "Median boron and sulfate."

24 Can you explain what this is for the

1 record, even though we've already looked at other
2 ones?

3 A. Yeah, this is similar. This is my summary
4 of concentrations, of median concentrations of boron
5 and sulfate compared to background.

6 Again, I'm using alluvial regional
7 background from IEPA, .12 for boron and 54 for
8 sulfate milligrams per liter.

9 You can see from the boron data that wells
10 1, 2, 4, 5, 6, 7, 8, 9, 16, and ELUC wells 11 and 15
11 all have concentrations of median boron, higher than
12 the Illinois state standard and, of course, well
13 above background.

14 And for sulfate, the Illinois State Ground
15 Water Standard is 400 milligrams per liter for
16 sulfate, and the median concentrations of sulfate in
17 wells MW-5, 7, 16 are all higher than the Illinois
18 state standard, and all of the wells have
19 concentrations of sulfate higher than background,
20 regional background.

21 Q. Okay. You want to walk us through your
22 chart?

23 A. Sure, quickly. MW-1, the wells along the
24 east boundary of the east pond are wells 1 through

1 4. And, unfortunately, there is three on one page
2 and four on another.

3 But they typically hover, in terms of
4 boron, either at or slightly above the Illinois
5 State Ground Water Standard of 2 milligrams per
6 liter and well above background, of course.

7 And, in fact, in wells 1, 2, 3 and even 4,
8 if you go onto the next page, that boron
9 concentration is remaining -- increasing in value
10 over time, in the time series.

11 Sulfate is also not going down. It's
12 pretty much increasing over time. You can see that
13 the boron -- or that the sulfate concentrations,
14 pardon me, are -- for wells 1, 2 and 3 are either at
15 or below the Illinois state standard, or well above
16 background, and the same is true for well 4.

17 I need to see. I need to cheat here since
18 I have old eyes. Well 5 -- wells 5, 6, 7, 8 and 9
19 are all around this blue rectangle, which is that
20 former ash slag storage area.

21 So, they essentially monitor beneath that
22 old ash storage area, along with the ELUC, E-L-U-C,
23 well 15. And, as you can see from the MW-5 boron
24 concentrations, sulfate concentrations, MW-5 is

1 right here.

2 It's receiving contaminants in
3 concentrations that are much higher than
4 2 milligrams per liter for boron, and much higher
5 than 400 milligrams per liter of sulfate throughout
6 the time series.

7 MW-6, which is located on the east side --
8 I think 6 is right there.

9 Q. I'm sorry, can you clarify east, west?

10 A. Oh, 6 is on the west side, I'm sorry, of
11 this blue rectangle, which is the old former ash
12 slag storage area. That is the green field now, but
13 it's still there.

14 The concentrations of boron are above
15 background and sulfate above background. And boron
16 many times has been above 2 milligrams per liter of
17 state standard. And sulfate hovers just below 400
18 and less.

19 Well, MW-7 is a well that is located -- I
20 think we already saw the log again today, outside
21 this former ash slag storage area right there.

22 So, it's like on the southeast --
23 southwest side of the pond, and on the southeast
24 side of that ash storage area.

1 It also shows very high concentrations of
2 sulfate well above 2 -- or, I'm sorry, boron well
3 above 2; and sulfate, for the most part, above 400
4 and not decreasing with time.

5 Well, MW-8 is a relatively new well, which
6 is right up here on the west side of the ash storage
7 area, former ash slag storage area, and it also has
8 concentrations both dissolved and total recoverable
9 that are much higher than the Illinois state
10 standard and background.

11 Sulfate is borderline, and sometimes
12 higher, sometimes lower, than the state standard,
13 but always higher than background.

14 MW-9 is a well at the north end, the north
15 side of this site up here of the old former ash slag
16 storage site. And it also has very high
17 concentrations of boron and not so high
18 concentrations of sulfate, but still near the state
19 standard for sulfate and well above the
20 2-milligram-per-liter standard for boron.

21 The other well -- I'm going to skip all
22 the way to well 16, which is a new well, that was
23 installed on the south side, kind of in between the
24 two ash ponds.

1 Outside the ash ponds, it only has
2 background data, but it also shows that boron
3 concentrations are always above 2 the state
4 standard; and, for the most part, sulfate as well.

5 It only has total recoverable, but as we
6 said, those are approximately the same as dissolved.
7 It wasn't very much, assuming that the well was
8 halfway decently completed.

9 Then we go to the ELUC wells, and those
10 are the old monitoring wells, the environmental
11 land-use wells, that monitored contaminants from the
12 Griess-Pfleger Tannery site, and those are 10, 11,
13 12, 14 and 15.

14 And, again, they show -- 10, 11, show --
15 10, anyway, shows concentrations of -- let me point
16 out where 10 is. 10 and 15 are right together,
17 these two little -- well, these two wells right
18 here.

19 They showed concentrations -- or it shows
20 concentrations of boron which are typically below
21 the state ground water standard of 2, but above
22 background. And sulfate, that is below the state
23 standard, but above background.

24 I'm going to skip to 14, which is just, in

1 my opinion, up-gradient from 10, but very near it,
2 and it behaves a lot like 10.

3 In other words, it has about the same
4 concentrations, less than 2, and, you know, less
5 than 400, but above background. So those two wells
6 are monitoring about the same in that area.

7 Then the next one would be well 11, which
8 is well north here in this area. ELUC well 11,
9 which has, again, concentrations of boron typically
10 above 2, but apparently in the last few quarters has
11 been decreasing sulfate, which is below the 400
12 milligrams per liter state standard, and except for
13 one value, which may be an outlier, is above the
14 background.

15 These wells, I have data from the phase 2
16 environmental assessment report by ENSR that show
17 these wells are completed. These ELUC wells are
18 completed in ash. They weren't designed.

19 MS. NIJMAN: Objection, misstates testimony.

20 THE WITNESS: You got the logs. I think they
21 are ash. I'm sorry, you are right.

22 HEARING OFFICER HALLORAN: Sustained.

23 THE WITNESS: The wells, themselves, didn't
24 show ash but borings right next to the wells showed

1 ash.

2 MS. NIJMAN: Same objection.

3 THE WITNESS: Okay.

4 HEARING OFFICER HALLORAN: Sustained.

5 THE WITNESS: Moving on to well 12 right here
6 on the north side of the site, or the north side of
7 the old boiler site, again, it has fairly high
8 concentrations of boron, higher than the background.

9 Sulfate is higher than background, and at
10 times boron higher than the state standard, as well
11 as sulfate generally less than the state standard.

12 And then the final well is No. 15, which
13 is located down here at the southeast corner of the
14 former ash slag storage area, excuse me, and it has
15 concentrations of boron typically higher than 2.
16 Sulfate, that is typically lower than 400, but above
17 background, for both boron and sulfate.

18 BY MR. RUSS:

19 Q. I just have one more question, maybe two
20 or three real quick.

21 Are you familiar with any nearby sources
22 of ground water contamination off the Waukegan
23 property?

24 A. Well, we have data that is from the ELUC

1 well that shows there's ground water contamination
2 on the Griess-Pfleger site.

3 Q. The tannery site?

4 A. Yes. And I also have information that's
5 not in my report, for the general boiler site, TDS
6 primarily, and information by URS. You're referring
7 to URS data?

8 Q. I'm not referring to anything. I'm just
9 asking.

10 A. Yes, there is contamination on site,
11 ground water contamination.

12 Q. What is your conclusion relating to the
13 off-site sources you just described in elevated
14 boron on south bay on the site you mentioned?

15 A. I did a plot of the off-site wells for
16 boron, the data I had for boron. It is lower
17 concentrations than what we see in the vicinity of
18 the former ash slag storage area, and also at the
19 downstream wells 1, 2, 3, 4, downgrading to wells 1,
20 2, 3, 4.

21 MR. RUSS: Do you want to stop for today?

22 HEARING OFFICER HALLORAN: Sure. We're off the
23 record.

24 (Discussion off the record.)

1 HEARING OFFICER HALLORAN: We're finished for
2 today. We'll continue on the record tomorrow,
3 Friday, October 27th. Thank you and have a great
4 night.

5 (THE FOLLOWING PROCEEDINGS WERE ADJOURNED.)

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