

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:

PROPOSED AMENDMENTS TO
GROUNDWATER QUALITY
(35 ILL. ADM. CODE 620)

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R 2022-018
(Rulemaking - Public Water Supply)

NOTICE OF FILING

To: ALL PARTIES ON THE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that I have today electronically filed with the Office of the Clerk of the Illinois Pollution Control Board the attached **Pre-filed Responses of Dr. Melinda Hahn**, and a **Certificate of Service**, copies of which are hereby served upon you.

/s/ Sarah L. Lode

Sarah L. Lode

Dated: November 23, 2022

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NOW COME Dynegy Midwest Generation, LLC; Electric Energy, Inc.; Illinois Power Generating Company; Illinois Power Resources Generating, LLC; and Kincaid Generation, LLC, (collectively, "Dynegy"), by their attorneys, ArentFox Schiff LLP, in response to the Illinois Pollution Control Board's October 27, 2022, prefiled questions and the Illinois Environmental Protection Agency's October 27, 2022, prefiled questions, and pursuant to the Hearing Officer's September, 19, 2022, Order, submit the following.

Dr. Melinda Hahn Responses to Illinois Environmental Protection Agency October 27, 2022 Questions

- 1) Does Part 620 exempt naturally occurring concentrations of a contaminant from compliance with the prevent response and the numerical standards?

Answer: Dynegy objects to this question to the extent it seeks a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows.

Yes, it does. Section 620.410 states, in part, "Except due to natural causes or as provided in Section 620.450, concentrations of the following chemical constituents shall not be exceeded in Class I groundwater[.]" However, Part 620 puts the burden on stakeholders to determine naturally occurring background levels. The process of determining background levels and obtaining Illinois Environmental Protection Agency ("IEPA") concurrence or doing so in response to a potential violation of the numerical standards in Part 620 can be a time consuming and expensive process. This burden should not be placed on the property owner as IEPA is in possession of data from the USGS database that indicate that the proposed standards for cobalt and vanadium are often less than Illinois background concentrations.

- 2) Does Part 620 set soil quality standards or soil remedial objectives?

Answer: Dynegy objects to this question to the extent it seeks a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows.

No. I raised the Illinois soil remedial objectives in my testimony because the Illinois Pollution Control Board's (the "Board's") decision to avoid promulgating Tier 1 Soil Remediation Objectives below known background levels for arsenic in Part 742 is directly analogous to the current situation. Class I and II groundwater standards are used as remediation objectives and, as noted in the testimony of Lynn Dunaway, "outside the remediation programs, violations have been

brought for exceedance of Part 620 standards”¹ and, accordingly, should similarly not be set below known background concentrations.

- 3) If a person is buying property, should the buyer be aware of environmental hazards whether natural or anthropogenic?

Answer: Background concentrations, such as naturally occurring cobalt and vanadium in groundwater, are not typically considered an environmental hazard. IEPA, through its proposed rulemaking, is creating an environmental hazard for naturally occurring metals. The level of buyer awareness is a situation- and fact-specific issue. In general, a seller should disclose any potential contamination.

A potential buyer of a property may evaluate a property's environmental conditions and assess potential liability for any contamination (known as “All Appropriate Inquires” or “AAI” for non-residential commercial transactions). Setting groundwater standards below natural background levels will result in increased cost of property transactions due to the added burden of sampling and demonstration of consistency with background for cobalt and vanadium.

- 4) Please provide a citation in Part 620 that requires property owners to take legal action if their groundwater is contaminated by someone else.

Answer: Dynegy objects to this question to the extent it seeks a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. Part 620 does not require that property owners take legal action if their groundwater is contaminated by someone else. However, a property owner may incur economic losses associated with proving to IEPA or third parties that groundwater contamination above Part 620 standards and associated remedial activities are the responsibility of the entity who caused the contamination.

- 5) Please provide a citation in Part 620 that requires property owners to: a) install monitoring wells? b) collect groundwater samples? c) report the results?

Answer: Dynegy objects to this question to the extent it calls for a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. Part 620 does not specifically require property owners to install monitoring wells, collect groundwater samples, or report the results. It does, however, potentially increase requirements on owners or operators that are required to conduct groundwater quality monitoring pursuant to state or federal law or regulation or pursuant to a State or Federal judicial or administrative order.

- 6) Does Section 8 of the Illinois Groundwater Protection Act require the Illinois EPA, to adopt groundwater standards for contaminants that are found in groundwaters of the State?

Answer: Dynegy objects to this question to the extent it calls for a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. Section 8 of the Illinois Groundwater Protection Act speaks for itself. It provides, in part, the following:

The Agency, after consultation with the Committee and the Council, shall propose regulations establishing comprehensive water quality standards which are specifically for the protection of groundwater. In preparing such regulations, the Agency shall address, to the extent feasible, those contaminants which have been found in the groundwaters of the State and which are known to cause, or are

¹ Hearing Transcript at 125:20–22 (March 14, 2022), R2022-018, *In the Matter of: Proposed Amendments to Groundwater Quality 35 Ill. Adm. Code 620*.

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suspected of causing, cancer, birth defects, or any other adverse effect on human health according to nationally accepted guidelines.

Section 8 further states that an economic impact study and whether existing methods are capable of detecting and quantifying contaminants with reasonable analytical certainty should also be considered in the establishment of groundwater standards.

- 7) Does Section 8 of the Illinois Groundwater Protection Act require that the groundwater standards include contaminants that cause or are suspected of causing cancer, birth defects and any others that adversely affect human health?

Answer: See response to question 6, above.

- 8) Does Section 8 of the Illinois Groundwater Protection Act make any statements regarding limiting groundwater standards only to contaminants that cause human health effects?

Answer: See response to question 6, above.

- 9) When assessing risk to human health and the environment is it appropriate to use total metals analysis?

Answer: The use of total metals in a groundwater sample could overestimate the risk to human health and the environment. The potential risks associated with metals in groundwater depend on physical and chemical factors, such as the location of the monitoring well relative to the point of compliance or the receptor, the bioavailability of the metals and the forms of the metals in the natural media, and including, but not limited to, the following factors—dissolved, speciation/complexation, precipitation, presence of colloids, redox state, salinity, pH, and/or the presence of natural organic matter.²

- 10) Please provide a citation in Part 620 that requires the use of total metals analysis for compliance.

Answer: Dynegy objects to this question the extent it calls for a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. The proposed Part 620 rules state that groundwater samples must be collected in accordance with procedures incorporated by reference, which for inorganics in potentially turbid groundwater would include the United State Environmental Protection Agency's ("US EPA's") standard procedure for low stress or low flow sampling.³ This procedure document says that filtered samples should also be collected (in addition to "total" samples) if the sample turbidity is greater than 10 nephelometric turbidity units ("NTUs"). Part 620 does not say that the paired, filtered sample can be used to determine compliance. In fact, in my experience, it is IEPA's longstanding practice to only accept the use of total metals data to determine compliance with standards.

- 11) Can monitoring wells be constructed to yield water with a turbidity low enough that matrix interference is not an issue?

Answer: Depending on the geologic formation, it may not be possible to construct a monitoring well that will yield water with a turbidity low enough that matrix interference is not an issue.

² <https://www.epa.gov/sites/production/files/2013-09/documents/metals-risk-assessment-final.pdf>.

³ US EPA, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, EPA Publication EQASOP-GW4, Region 1, Low-Stress (low flow) SOP Revision No. 4, July 30, 1996: Revised September 19, 2017.

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Replacing monitoring wells in an attempt to solve a turbidity issue would increase the cost of site investigation and AAI, without guarantee of success.

- 12) Can a sampler or a laboratory allow samples to settle then decant non-turbid water from the container for analysis?

Answer: I am not aware of any sampling or analysis procedure that includes this practice. Laboratory methods require that an aliquot of a well-mixed sample be used for analysis.

- 13) Is low flow sampling a common sampling technique?

Answer: Yes. Various US EPA and state guidance documents recommend the use of low-flow sampling techniques to collect representative groundwater samples. See for example the following:

https://www.epa.gov/sites/default/files/2015-06/documents/gw_sampling_guide.pdf

<https://www.epa.gov/sites/default/files/2017-10/documents/eqasop-gw4.pdf>

<https://www.epa.gov/sites/default/files/2015-06/documents/lwflw2a.pdf>

<https://www.state.nj.us/dep/srp/guidance/lowflow/lowflowguide.pdf>

- 14) Does low flow sampling reduce the turbidity of collected groundwater samples?

Answer: Low flow sampling results in less disturbance of sediments that accumulate in the wells, resulting in less turbidity in the collected groundwater samples.

- 15) If a groundwater sample has a turbidity of more than 1 NTUs, can the sample be digested for analysis?

Answer: Yes. However, digesting and analyzing an unfiltered groundwater sample (an aggressive acid extraction designed to capture all metals in dissolved and suspended phases in the sample) with high turbidity runs the risk of overestimating the mobile concentration of metals in groundwater.⁴ Some suspended solids and colloids in a groundwater sample can be naturally occurring, but they can also be artifacts of sampling. Ideally, an unfiltered sample from a properly installed, developed, and purged well using low flow techniques would result in a representative sample of dissolved and naturally occurring mobile solid phases, but this is not always the case. The US EPA's Science Advisory Board recommended to filter groundwater samples with turbidity greater than 5 NTUs even when collected with the low flow method.⁵

- 16) Are the acceptance criteria for a digested and non-digested sample the same?

Answer: Assuming acceptance criteria means internal laboratory data quality review, I believe the quality assurance/quality control ("QA/QC") procedures established for groundwater sampling and analyses will be the same for digested and non-digested samples.

- 17) Do laboratory methods address common sources of interference and how to address that interference for sample analysis?

Answer: Certain analytical methods, including SW-846 Method 6010 for metals, include discussion of "Interferences" and ways to correct for interferences. For physical interferences, such as high dissolved solids, the method suggests that these interferences must be reduced

⁴ US EPA Science Advisory Board Administrator, Letter to EPA Administrator re: To Filter, or Not to Filter: That is the Question, September 5, 1997.

⁵ *Ibid.*

through means including "sample dilution". The use of sample dilution results in elevated detection limits and potentially biased results.

- 18) Is a higher groundwater water quality standard justified by the fact that laboratory methods may require a heavily contaminated sample to have a reporting limit above the health or environmentally based standard, when uncontaminated samples can achieve the lower health or environmentally based standard, reporting limit?

Answer: Matrix interference, which drives up effective laboratory reporting limits for inorganics in groundwater, is typically driven by non-target analytes or chemical/physical conditions of the groundwater. For example, the cobalt reporting limit could be elevated due to colloids or dissolved solids that do not contain cobalt, or by dissolved constituents such as chloride or sulfate. Elevated laboratory reporting limits are not necessarily caused by "contamination".

- 19) Was the purpose of the USGS data to comply with health or environmentally protective values?

Answer: The USGS, a globally recognized leader in natural sciences, implemented the National Water-Quality Assessment ("NAWQA") Program in 1991 to support national, regional, state, and local information needs and decisions related to water-quality management and policy. The NAWQA Program was designed to answer the following question: What is the quality of our Nation's streams and groundwater?⁶

Data show the actual concentrations of metals in groundwater. The resulting data may be less than or greater than health or environmentally protective values. USGS did not bias the data to try to "comply" with health or environmentally protective values.

- 20) Were the reporting limits for 84% and 92% of Cobalt and Vanadium, respectively, actually set at 0.005 mg/L or were analytical results simply below that concentration?

Answer: The majority of the reporting limits for the unfiltered samples were actually 0.005 mg/L. A small number of the reporting limits were higher. The majority of the results were non-detect at those reporting levels.

- 21) Does the fact that a certain percentage of analytical results were below a given reporting limit (e.g., 0.005 mg/L) mean that lower reporting limits can't be achieved?

Answer: No, however, a high percentage of laboratory reporting limits above the proposed groundwater quality standards means that the feasibility of achieving those standards has not been established for Illinois groundwaters.

- 22) Do you agree the proposed updated Class I potable resource standards for cobalt and vanadium were calculated using the prescribed methods in Part 620 as proposed?

Answer: My understanding is that IEPA's proposed Class I standards for cobalt and vanadium are based on IEPA's calculation of the Human Health Threshold Toxicant Advisory Concentration ("HTTAC") based on the formula in their proposed Appendix A to Part 620.

- 23) Do the updated toxicity data for cobalt and vanadium calculate a potable resource standard protective of humans from adverse effects when ingesting groundwater?

Answer: That question is beyond the scope of my testimony. My testimony does not discuss or opine on whether toxicity data for cobalt and vanadium used by IEPA to calculate its proposed

⁶ USGS, Trace Elements and Radon in Groundwater Across the United States, 1992-2003, 2011, p. iii.

potable resource standards for those constituents is protective of human health. While my testimony speaks for itself, I further note here that the focus of that testimony is that it is impractical to promulgate groundwater standards below background concentrations because these values are used as remediation objectives, and remediation is not required below background levels. Further, laboratories must be able to reliably quantify cobalt and vanadium in real world, unfiltered groundwater samples at concentrations below the proposed standards. Based on available data, it is not clear that is possible for Illinois groundwaters. Similar to the Board's approach to Part 742, for calculated health-based soil remediation objectives below background, I suggest the Board adopt background threshold values for cobalt and vanadium as the groundwater standards.

- 24) Is the current cobalt standard of 1.0 mg/L, based on beneficial use for livestock, protective of humans from adverse effects when ingesting groundwater?

Answer: Risk assessment is beyond the scope of my testimony. Please see my answer to question 23, above.

- 25) Is the current vanadium potable resource standard considered protective of human health, based on the updated toxicity assessment?

Answer: See my response to question 23, above.

- 26) Where in Part 620 is background discussed or considered a factor when developing and proposing numerical groundwater quality standards?

Answer: Dynegy objects to this question to the extent that it calls for a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. Background is a factor when determining technical feasibility and economic reasonableness of proposed standards.

- 27) Does Part 742 also contain provisions for determining area background in groundwater and excluding a contaminant using area background concentrations?

Answer: Dynegy objects to this question to the extent that it calls for a legal opinion or conclusion. Subject to and notwithstanding this objection, Dr. Hahn responds as follows. My understanding is that 35 Ill. Adm. Code Section 742.410 allows for determining area background. Section 742.415 allows for the use of area background concentrations, with the exception of when IEPA determines that the area background level poses an acute threat to human health or the environment when considering the post-remedial action land use. As stated above, the burden of demonstrating that background is above the groundwater standards should be the responsibility of the regulating authority, given that it is in possession of readily available/accepted data which demonstrate that background concentrations are higher than the proposed standards.

- 28) Can contamination at background levels cause adverse health effects if ingested in groundwater?

Answer: Risk assessment is beyond the scope of my testimony. However, I do understand that CERCLA and other site cleanup programs, meant to protect against adverse health effects, do not require remediation below background concentrations.

- 29) In Section 1.2 you discuss, "Trace Elements and Radon in Groundwater Across the United States, 1992-2003," by USGS. Can a complete copy of the Report be provided as part of Testimony?

Answer: Yes, the report can be downloaded from the following website:

https://pubs.usgs.gov/sir/2011/5059/pdf/sir2011-5059_report-covers_508.pdf.

(Website accessed on November 11, 2022.)

- 30) What analytical method(s) did USGS use when conducting the studies?

Answer: Per the USGS report (p. 5):

Trace elements were analyzed at the USGS National Water Quality Laboratory in Denver, Colo., by using inductively coupled plasma atomic-emission spectrometry (ICP–AES), inductively coupled plasma mass spectrometry (ICP–MS), graphite-furnace atomic-absorption spectrometry (AA), or hydride generation atomic-absorption spectrometry (Fishman and Friedman, 1989; Faires, 1993; McLain, 1993; Ivahnenko and others, 1996; Garbarino, 1999; Ivahnenko and others, 2001).

- 31) Section 1.3, states, “Further, IEPA appears to be unconcerned regarding the technical feasibility or the potential increased cost of compliance, stating that “the Agency recognizes that not all commercial labs may be able to achieve the appropriate levels of quantitation at this time. Nonetheless, to remain viable, commercial labs should expect to keep up with analytical techniques and new methodologies”. In fact, laboratories currently operating in Illinois and laboratories certified by IEPA to analyze samples collected in Illinois may be unable to achieve reporting limits needed to show compliance with the very low proposed standards for cobalt and vanadium in unfiltered groundwater samples²²” The Footnote 22 states, “Communications with commercial laboratory staff confirm that labs would have difficulty achieving reporting limits below the Class I standards proposed by IEPA for cobalt and vanadium.” Please provide a list of labs contacted regarding this issue and what specific questions Dr. Hahn asked when discussing a lab’s capability of achieving reporting limits needed to show compliance with the health-based standards?

Answer: I consulted with Pace Analytical and Teklab, Inc. Both laboratories were asked if they could achieve reporting limits below the proposed Class I standards for cobalt and vanadium for typical Illinois groundwater samples seen in their practice. Teklab reported that they expect difficulty in meeting the proposed vanadium standard and noted that when the groundwater standard approaches the reporting limit, the statistical confidence in the compliance determination decreases. Pace indicated that their labs are currently unable to achieve reporting limits below the proposed standards for both cobalt and vanadium based on their experience with Illinois groundwater samples.

- 32) What analytical method was used by the USGS National Water Information System for the samples?

Answer: A variety of analytical methods were used by USGS as described in the answer to question 30, above, including AA, ICP-MS and ICP-AES.

Dr. Melinda Hahn Responses to Illinois Pollution Control Board October 27, 2022 Questions

1. The groundwater quality standards under 35 Ill Adm Code 620.410 and 420 recognize the possibility of constituents being present at concentrations above the Class I or Class II standards. For example, Section 620.410 provides, “Except due to natural causes or as provided in Section 620.450, concentrations of the following chemical constituents must not be exceeded”. See 35

Ill Adm Code 410(a). In addition, many of the Board's remediation regulations like Underground Storage Tank (UST), Site Remediation Program (SRP), and CCR Surface Impoundment include alternative source demonstration provisions to address background related issues when it comes to remediation. Please comment on why the Board must revise the proposed *health-based* Class I standards to reflect state-specific background concentrations.

Answer: Again, similar to the soil remediation objectives in Part 742, there are data that show that a significant portion of Illinois groundwaters would exceed the proposed standards. Failing to consider this at the point of this rulemaking puts the entire burden on the regulated community to make costly site-specific demonstrations of background. Based on the language quoted above, the Board clearly intended to exempt naturally occurring conditions, so it does not make sense to adopt standards we know will cause some Illinois groundwaters to be incorrectly considered contaminated.

2. On page 2, referring to USGS report of NWQAP data, you note that "a map of spatial distribution of cobalt concentration in groundwater (reproduced below) shows that approximately one-third of the Illinois samples exceed 0.001 mg/L".
 - a. Does this mean two-third of the samples were below 0.001 mg/L?
 - b. If so, considering the non-degradation provisions under Part 620, comment on whether health-based Class I groundwater quality standards for cobalt must be set based on background concentration, which may allow contamination up to the background level in groundwater where cobalt concentrations are below the proposed standard.
 - c. Would such a standard be protective of human health?
 - d. Please address vanadium in the same context.

Answer: Yes, in the case of cobalt in this study, approximately one third of groundwater samples exceeded 0.001 mg/L and two thirds did not. In the case of vanadium, more than half of the samples exceeded 0.00027 mg/L and less than half did not. As in soil, there is likely considerable natural variation of metals concentrations by area, local geology, or aquifer. The Board is encouraged to take into consideration the character of the area to be regulated and the existing water quality in a rulemaking by the Illinois Environmental Protection Act

"In promulgating regulations under this Act, the Board shall take into account the existing physical conditions, the character of the area involved, including the character of surrounding land uses, zoning classifications, the nature of the existing air quality, or receiving body of water, as the case may be, and the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution."

In the case of metals in soil, IEPA studied the background variation in concentrations across the state, and concluded that different background levels are present in metropolitan versus non-metropolitan areas. Part 742 soil remediation objectives adopted by the Board reflect this. My suggestion, if the IEPA proceeds in proposing groundwater standards known to be below background for a significant portion of Illinois groundwater, is that the IEPA conduct a similar review for groundwater to determine whether background concentrations vary in the state (e.g., by area, geology, or aquifer) and propose standards above background threshold values accordingly. This would avoid potential degradation in one area based on a higher background in another area, and is consistent with past practices for rulemaking for soil. As stated above, while human health risk assessment is outside the scope of my testimony, programs intended to protect human health, such as CERCLA, do not require remediation below background levels.

3. On page 5, you note, "In fact, laboratories currently operating in Illinois and laboratories

certified by IEPA to analyze samples collected in Illinois may be unable to achieve reporting limits needed to show compliance with the very low proposed standards for cobalt and vanadium in unfiltered groundwater samples". Please comment on whether your statement is based on a survey of all currently operating laboratories in Illinois, including those certified by IEPA. If not, how many laboratories in Illinois were contacted to draw your conclusion?

Answer: Please see the answer to IEPA Question 31, above.

4. For chemical constituents like cobalt and vanadium, please comment on whether compliance with the health-based groundwater standards be based on filtered samples rather than unfiltered samples.

Answer: Groundwater samples are collected for a number of different reasons. One investigator may want to determine whether groundwater has been impacted by anthropogenic activities. This is usually the case for property transactions and RCRA/CERCLA sites. Another investigator may want to know whether water from a certain well is safe to drink. In that case, an unfiltered sample makes sense. In its 2011 investigation report of regional groundwater quality, the USGS used only filtered samples.

As described above in the answer to IEPA Question 15, unfiltered samples may overestimate the mobile concentration of inorganics in a groundwater sample. This could negatively impact sites seeking regulatory closure where groundwater is not used for drinking water. Requiring all groundwater samples to be unfiltered for compliance is overly conservative, particularly in cases where the groundwater is not being used for drinking water in the immediate vicinity of the sampled well.

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 23rd day of November, 2022, I have electronically served the attached **Pre-filed Responses of Dr. Melinda Hahn** upon the individuals on the attached service list. I further certify that my email address is Sarah.Lode@afslaw.com; the number of pages in the email transmission is 13; and the email transmission took place before 5:00 p.m.

/s/ Sarah L. Lode

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