ILLINOIS POLLUTION CONTROL BOARD
July 26, 2018

IN THE MATTER OF:	)	
	)	
PROPOSED SITE-SPECIFIC RULE FOR	)	R14-24
SANITARY DISTRICT OF DECATUR	)	(Site-Specific Rule - Water)
FROM 35 ILL. ADM. CODE 302.208(e)	)	

Proposed Rule. First Notice.

OPINION AND ORDER OF THE BOARD (by C.M. Santos):

The Sanitary District of Decatur (District) treats wastewater for the City of Decatur and other municipalities, as well as for industrial and commercial users. The District's discharge to the Sangamon River exceeds the Board's chronic water quality standard for dissolved nickel, and the District attributes this chiefly to Archer Daniels Midland Company (ADM). According to the District no technically feasible and economically reasonable treatment method would allow it to meet the standard. The District proposes that the Board adopt a new Section 303.410 of the water pollution regulations, establishing a site-specific standard based on bioavailability of nickel to aquatic life in the Sangamon River near its discharge.

For the reasons below, the Board submits the proposed site-specific rule to first-notice publication in the *Illinois Register*. Publication begins a period of at least 45 days during which interested persons may file a public comment on the Board's proposal.

GUIDE TO THE BOARD'S OPINION

The Board first provides an abbreviated procedural history of this rulemaking (pages 1-3), after which the Board summarizes the background on the District, its operations, and the Sangamon River (pages 3-11). This is followed by information on the generally-applicable nickel standards (pages 11-12) and the proposed site-specific standard (pages 12-14). The Board then discusses issues concerning nickel treatment, the derivation of the District's proposed standard, and federal law (pages 14-24). Next, the Board addresses the technical feasibility and economic reasonableness of the District's proposal (pages 24-25). After requesting public comment (pages 25-26), the Board proceeds to first-notice publication of the site-specific rule (pages 26-29).

ABBREVIATED PROCEDURAL HISTORY

On June 30, 2014, the District filed its original petition for a site-specific rule. On July 24, 2014, the Board accepted the petition for hearing.

At the Board's direction, the District filed regular status reports beginning August 29, 2014. The status reports generally requested that the Board postpone scheduling a hearing. *E.g.*, Proposed Site Specific Rule for Sanitary District of Decatur from 35 Ill. Adm. Code 302.208(e), R 14-24, (May 1, 2015). On January 19, 2017, the Board noted the District's request to extend a variance to achieve similar relief. *See* Sanitary District of Decatur v. IEPA, PCB 14-111. The Board postponed action in both matters and directed the District to file a status report by June 30, 2017. On April 12, 2017, the Board advanced the June 30, 2017 deadline to May 12, 2017, and requested that the District address time-limited water quality standards (TLWQS) under Section 38.5 of the Environmental Protection Act (Act). *See* Public Act 99-937 (eff. Feb. 24, 2017). In response to the District's May 12, 2017 status report, the Board on July 26, 2017, granted the District's request to postpone action. The Board directed the District to file all support for its petition by November 30, 2017.

On November 30, 2017, the District filed an amended petition (Pet.). Forty-four exhibits accompanied the amended petition (Exhs 1-44). The District also filed a motion to waive the Board's requirement to submit 200 signatures (35 Ill. Adm. Code 102.202(g)) and a motion to supplement its amended petition "with additional information, as may be necessary, to support the District's petition." On December 21, 2017, the Board accepted the petition, granted the motion to waive the signature requirement, and denied the motion to supplement.

In a letter dated January 11, 2018, the Board requested that DCEO conduct an economic impact study of the District's amended proposal by February 26, 2018. The Board did not receive a response.

On February 28, 2018, the hearing officer scheduled a hearing on May 16, 2018, and set a deadline of April 25, 2018, to pre-file testimony. The Board published notice of the hearing in the Decatur *Herald & Review* on March 2, 2018.

On April 2, 2018, the District filed a motion requesting that the Board accept (Mot. File) the following exhibits: a revised Exhibit 14 (Rev. Exh. 14); a revised Exhibit 28 (Rev. Exh. 28); and Exhibits 45 and 46 (Exh. 45, 46). The District's motion also requested that the Board accept a revised Exhibit List and a revised proposal for 35 Ill. Adm. Code 303.410. On April 26, 2018, the Board granted the District's motion and accepted the documents without comment on their substance.

On April 25, 2018, the District pre-filed testimony by the following witnesses: Kent D. Newton, Executive Director and Chief Financial Officer of the District (Newton Test.); Timothy R. Kluge, former Technical Director of the District (Kluge Test.); Allison S. Cardwell of the Aquatic Toxicology Laboratory in the Department of Environmental and Molecular Toxicology at Oregon State University (Cardwell Test.); Robert C. Santore of Windward Environmental LLC (Windward) (Santore Test.); Paul D. Bloom, Ph.D., Vice-President for Process and Chemical Research at ADM (Bloom Test.); and Robert E. Colombo II, Ph.D., Associate Professor of Biology at Eastern Illinois University (EIU) (Colombo Test.).

The hearing took place as scheduled on May 16, 2018, and the Board received the transcript (Tr.) on May 23, 2018. The hearing officer admitted seven exhibits into the record. Exhibits 1-6 are the pre-filed testimony of the District's six witnesses. Exhibit 7 lists 43 questions prepared by the Board for the District's witnesses. Tr. at 23-27. During the hearing, the Board received a single public comment from Mr. Ryan McCrady, President of the Economic Development Corporation of Decatur-Macon County. Tr. at 9-10.

On May 23, 2018, the Illinois Environmental Protection Agency (IEPA) filed its post-hearing comments (IEPA Cmts.). On May 31, 2018, the District filed additional responses to questions posed by the Board at hearing (Dist. Resp.). On June 5, 2018, the Board requested a clarification from the District, and the District responded (Dist. Resp. 2) on June 19, 2018.

On June 25, 2018, the District filed a motion to correct the transcript. The Board has reviewed the motion, agrees with the District's corrections, and grants the unopposed motion. *See* 35 Ill. Adm. Code 101.500(d).

BACKGROUND

District's Facility and Operations

The District treats wastewater for the City of Decatur; the Villages of Forsyth, Mt. Zion, Oreana, and Argenta; and industrial and commercial entities in the Decatur area. Pet. at 3; Newton Test. at 2. The District has approximately 32,000 active billing accounts, which include 25 significant industrial users (SIUs) and 2400 other industrial and commercial users. *Id*. The District employs approximately 55 full-time employees. *Id*.

The District's Main Plant is located at 501 Dipper Lane in Decatur. Pet. at 3; Newton Test. at 2. It has a design average flow of 41.0 million gallons per day (MGD) and design maximum flow of 125.0 MGD. Pet. at 3-4; Newton Test. at 3. It processes average flow of approximately 28 MGD. Pet. at 3; Newton Test. at 3. Treatment includes "screening, grit removal, primary clarification, activated sludge, secondary clarification, disinfection, dechlorination, discharge to surface water, anaerobic digestion, sludge thickening, and land application of sludge on area farmland." Pet. at 4; Newton Test. at 3.

"The District has an approved pretreatment program with 13 noncategorical SIUs and 11 categorical SIUs." Pet. at 4; Newton Test. at 3. ADM and Tate & Lyle Ingredients Americas, Inc. (Tate & Lyle) discharge approximately 10 MGD and 5 MGD, respectively, to the Main Plant. *Id*. This comprises approximately 45 percent of flow, which increases to as much as 56 percent during extended dry weather. *Id*. Both ADM and Tate & Lyle process grain to produce a range of products. *Id*.

Sangamon River

The District discharges to the Sangamon River, and its main discharge is through Outfall 001. Pet. at 4, 38; Newton Test. at 3. At that point, "the Sangamon River is designated as a General Use water under Section 303.201 of the Board's rules." *Id*., citing 35 Ill. Adm. Code 303.201 (General Use Waters).

"The only impoundment on the main stem of the Sangamon River is Lake Decatur, formed by a dam in the southern portion of the City of Decatur. . . . Lake Decatur is the primary water source for the City of Decatur, and the lake is managed to maintain a continuous water supply." Pet. at 37. Flow downstream from the dam "is highly variable." *Id*. In dry weather, "little or no water is released from the lake," and there is little flow between the dam and the District's discharge. *Id*. Discharge from the District's Main Plant to the river is approximately three miles below the dam. *Id*.; Kluge Test. at 5.

The Illinois State Water Survey has mapped the seven-day, 10-year low flow (7Q10) for the Sangamon River. Pet. at 39; Kluge Test. at 6, citing Exh. 31. Between the Lake Decatur dam and the District's discharge, the Illinois State Water Survey (ISWS) map shows a 7Q10 flow of zero. *Id*. "[O]n average, over a period of ten years, the stream will have no flow for at least one period of at least seven consecutive days." *Id*.

During times of little or no flow below the dam, "the District's discharge constitutes the primary flow in the Sangamon River between Decatur and Springfield." Pet. at 37-38. ISWS reports that flow for the District's discharge is 34.7 cubic feet per second (cfs) or 22.4 MGD. *Id*. at 39. Between the District's discharge and the river's confluence with the South Fork, the 7Q10 flow varies from 36.0 to 40.9 cfs. *Id*. "A number of small tributaries enter this stretch of the Sangamon River, and all but one of those tributaries are shown with zero low flow in either their entire length or in all but their extreme lower reaches." *Id*.

The District's sampling and observations indicate that, from the District's discharge to the confluence with the South Fork and Sugar Creek, the Sangamon River "is similar to the Main Plant's discharge in volume and chemical characteristics." Pet. at 40. At the confluence, the District argues that the river's "volume and water chemistry noticeably change." *Id*. Sugar Creek carries discharge from a Springfield wastewater treatment plant. *Id*. Based on these factors, the District proposes the confluence as the end of the river segment in which its proposed standard would apply. *Id*.

Water Quality in the Sangamon River

Since 2007, the District has monitored the nickel concentration in its treated discharge and in the Sangamon River upstream and downstream from that discharge. Pet. at 38, citing Exh. 30. Mr. Santore testified that he examined monitoring data for the Sangamon River and looked for both seasonal trends and trends over time. Tr. at 43. He indicated that "there is a relatively slight seasonal pattern to the water quality." Mr. Santore added that monitoring data show that "the composition of the river appears to be pretty stable." Tr. at 43.

The Sangamon River segment receiving the District's discharge "is listed on Illinois' 303(d) List of impaired waters for 2016." Pet. at 38 (citation omitted). Fish consumption and primary contact recreation are the impaired uses for the segment, and potential causes for the impairment are polychlorinated biphenyls and fecal coliform. *Id*. at 38-39.

Aquatic Data

Since 1998, EIU has studied the impact of the District's discharge and issued annual reports. Pet. at 40; *see* Exhs. 32-40. Dr. Colombo testified that these studies regularly conclude that downstream nickel concentrations "do not appear to be affecting fish or macroinvertebrate communities." Colombo Test. at 2; *see* Pet. at 40.

EIU used electrofishing to sample fish and determine whether water quality upstream and downstream from the District's discharge affected fish communities. Colombo Test. at 4; Pet. at 42, citing Exh. 32 at 10. Catch-per-unit-effort (CPUE) measures the relative density of fish. CPUE in 2016 was higher upstream, but "previous years of studies have regularly determined that there was no significant difference in the number of fish caught per hour between reaches upstream and downstream of the District's main outfall." Colombo Test. at 4; Pet. at 42; *see* Exh. 33 at 14-15. Based on Simpson's Diversity Index, EIU found no difference in the diversity of the fish community between reaches upstream and downstream of the District's discharge. Colombo Test. at 4; Pet. at 42. EIU concluded that "fish communities are not different between reaches and did not appear to be affected by soluble nickel within the study area." Pet. at 42, citing Exh. 33.

EIU reports that diversity of fish species in the Sangamon River is comparable to other Midwestern streams. Colombo Test. at 4; Pet. at 41, citing Exh. 33 at 17. Dr. Colombo testified that there is a high degree of similarity between the fish community in the Sangamon River and most other tributaries of the Illinois, Wabash, and Mississippi Rivers. Tr. at 75-76. He added the Sangamon River has "one of the more robust fish community assemblages" among the tributaries of the Illinois River. *Id*.

In 2014 and 2015, EIU sampled macroinvertebrates in upstream and downstream reaches. In neither year did EIU find a significant difference between the two reaches "for estimated relative abundance, total taxa richness and EPT [Ephemeroptera, Pleucoptera, and Trichoptera] richness." Pet. at 43; *see* Colombo Test. at 3; Exh. 33 at 13-14. EIU concluded that there are few differences between the communities in the two reaches, that differences indicate higher quality communities downstream, and that macroinvertebrates in the study area are affected more by habitat than by water quality and concentrations of soluble nickel. Colombo Test. at 3; Pet. at 43; *see* Exh. 33 at 16. The District asserts that studies show water quality downstream that is similar to or better than upstream. Colombo Test. at 2; Pet. at 40.

In 2016, EIU used a modified Ohio Quality Habitat Evaluation Index (QHEI) to assess physical parameters including substrate type and depth, percent of each instream cover type, channel morphology, riparian zone and bank erosion, pool and riffle quality, and gradient. Pet. at 41; Colombo Test. at 2; *see* Exh. 32 at 5-6. EIU concluded that "[h]igher QHEI scores were typical of sites downstream of the District's discharge." Colombo Test. at 2; Pet. at 41, citing Exh. 32 at 9. EIU suggested that consistent flow downstream from the discharge "may help maintain physical habitat quality while the upstream reach becomes disconnected pools." Exh. 32 at 12; *see* Colombo Test at 2; Pet. at 41-42.

Threatened and Endangered Species and Natural Areas

The District performed Ecological Compliance Assessment Tool (EcoCAT) searches of the Illinois Natural Heritage Database. Pet. at 45. The search "found no records of State-listed threatened or endangered species, Illinois Natural Area Inventory sites, dedicated Illinois Nature

Preserves, or registered Land and Water Reserves" near the Main Plant. *Id*.; Kluge Test. at 6, citing Exh. 41 (EcoCAT report). The Illinois Department of Natural Resources lists three endangered species in Macon County and 17 endangered or threatened species in Sangamon County. Pet. at 45-46 (citation omitted).

Other Dischargers on the Sangamon River

The ISWS map shows six municipal wastewater effluent discharges to tributaries of the Sangamon River segment to which the District's proposal would apply. Pet. at 46. The District reports that all "are lagoon-type treatment systems that may discharge little or no flow during dry weather." *Id*. "The only discharge of more than 0.09 cfs shown in the ISWS map in this reach of the Sangamon River is Borden Chemical Company near Illiopolis." *Id*. After a 2004 explosion, Formosa Plastics Corporation (Formosa) purchased the facility, which no longer discharges. *Id*. IEPA terminated Formosa's National Pollutant Discharge Elimination System (NPDES) permit in 2015. *Id*. The District indicates that it reviewed NPDES permits for each of these dischargers, and none includes nickel limits. *Id*. Although Formosa's NPDES permit required sampling for parameters including total nickel, it did not include a nickel limit. *Id*. n.6.

Similar Dischargers in Illinois

The District reports that only two active NPDES permits issued by IEPA include limits and a compliance schedule for nickel, one for the American Nickeloid Company's facility in Peru, and one for Aqua Illinois Inc.'s University Park wastewater treatment facility. Pet. at 58-59. While IEPA provided public notice of a draft permit including limits and a compliance schedule for nickel for the Lake County Department of Public Works' New Century Town sewage treatment plant, the final permit did not include them. *Id*. at 59. The District reports that it did not identify "any other Illinois site specific rules or adjusted standards that establish alternative water quality standards for nickel.: *Id*. at 58.

NPDES Permit for Facility

IEPA issued the District an NPDES permit on April 20, 2007, and it became effective on July 1, 2007. Pet. at 4; Kluge Test. at 2. As issued, the permit included a nickel effluent limit of 0.011 mg/L. *Id*., citing 35 Ill. Adm. Code 302.208(e). The permit stated the limit as a monthly average with no daily maximum concentration. Pet. at 4; Kluge Test. at 2. IEPA based its calculation on hardness data collected in the Sangamon River "with a critical hardness value of 242 mg/L as $CaCO_3$." Exh. 2 at 1; *see* Pet. at 5. The permit included as Special Condition 18 a two-year schedule to achieve compliance with the permitted nickel effluent limit. Pet. at 5.

Under Special Condition 17 of the original permit, "the District performed a Translator Study to determine the acute and chronic metals translators for nickel" in the Main Plant's discharge. Pet. at 5; *see* Exh. 3; Kluge Test. at 2. Based on the study, IEPA advised the District that "the nickel permit limit could be adjusted to 0.015 mg/L (monthly average)." Pet. at 6, citing Exh. 4; Kluge Test. at 2-3.

On July 1, 2009, IEPA modified the District's permit. Pet. at 6, citing Exh. 1 (Permit No. IL0028321); Kluge Test. at 3. The modified permit changed the permitted nickel limit to 0.015 mg/L monthly average based on the metals translator. *Id*. It also extended the compliance schedule for nickel to three years to require compliance by July 1, 2010. Pet. at 6-7; Exh. 1 (Special Condition 17).

The modified permit has an expiration date of June 30, 2012. Exh. 1; *see* Pet. at 4. On December 21, 2011, the District submitted a timely application to renew the permit. The District states that the modified permit continued in effect under 35 Ill. Adm. Code 309.104(a). Pet. at 4.

<u>Sources of Nickel in Wastewater Received by District</u>

When IEPA issued an NPDES permit in 2007, the District began to investigate sources of nickel in the wastewater it received. Kluge Test. at 3. The District sampled larger pumping stations collecting primarily from residential areas. *Id*. After analyzing 24 samples collected over ten months in 2007 and 2008, the District "found an average nickel concentration from domestic sources below the detection limit." *Id*.

Mr. Kluge testified that the District had analyzed metals in discharges from large industrial users before IEPA issued the permit in 2007. Kluge Test. at 3. Data from 2003 to 2008 showed ADM's discharge contained "an average of 0.0556 mg/L of nickel and Tate & Lyle's discharge an average nickel concentration below the detection limit." *Id*. Based on these results, "the District determined that the most significant source of nickel in the District's wastewater was ADM's pretreated industrial flow." *Id*.; *see* Bloom Test. at 2; Pet. at 25.

ADM's Decatur complex includes numerous separate processing plants: Corn Plant (Wet Corn Mill, Alcohol Plant, and Sorbitol Plant), BioProducts Plant, Cogeneration Plant, East Soybean Processing Plant, West Plant, Glycols Plant, and Polyols Plant. Bloom Test. at 2; Pet. at 25. Each produces multiple products and creates unique wastewater streams. *Id*. ADM generally reuses wastewater multiple times before discharging it to an on-site wastewater treatment plant (WWTP). *Id*. "The WWTP treats approximately 11 MGD through an anaerobic treatment system followed by aerobic treatment prior to discharge to the District." *Id*.

ADM tested its raw materials and process water streams to identify streams with the highest nickel concentrations. Bloom Test. at 3; Pet. at 25. ADM identified three primary sources of nickel: incoming soybeans (approximately 4.1 mg/kg) and corn (approximately 0.53 mg/kg); nickel solubilized from nickel catalysts used in hydrogenation; and nickel solubilized from metallurgy during processing at the Polyols Plant. Bloom Test. at 3; Pet. at 25-26; *see* Exh. 20. Dr. Bloom testified that ADM's nickel balance study identified incoming soybeans as a source of approximately 49.2 pound per day and incoming corn as a source of up 19.1 pounds per day. Tr. at 67. Dr. Bloom explained that incoming nickel in soybeans and corn cannot be controlled, so ADM addressed major sources of nickel discharging to its WWTP. Bloom Test. at 3; *see* Pet. at 26. ADM performed nickel material balances of its Decatur complex and traced the majority of nickel entering the WWTP to the East Soybean Processing Plant, Corn Plant, and Polyols Plant. Based on 2010 data, ADM found that total loading of nickel to the WWTP averaged 7.94 pounds per day. Exh. 20. In 2015, ADM permanently shut down the Polyols

Plant, which had accounted for average daily loading of 1.87 pounds per day.. Bloom Test. at 3; Tr. at 67; Pet. at 26; Exh. 20. As discussed below, ion exchange technology at the Sorbitol Plant largely mitigated nickel from catalysts by removing up to 1.3 pounds per day. Tr. at 68. Also, Dr. Bloom explained that removing the soy molasses stream from the East Soybean Processing Plant accounted for 2.4 pounds per day, which were assumed to come from incoming grain. Tr. at 67-68; Pet. at 27.

Nickel Mitigation Efforts to Date

District. The District states that, since IEPA issued an NPDES permit in 2007, it has "diligently pursued compliance" with the permitted nickel limit. Pet. at 20-21. The District investigated alternatives including reduced industrial contributions, adjusted permit limits, and improved removal with treatment technology. *Id.* at 21; *see* Kluge Test. at 4.

Translator Study. Under its 2007 NPDES permit, "the District performed a Translator Study to determine the acute and chronic metals translators for nickel" in the District's discharge. Pet. at 5; *see id*. at 21. Mr. Kluge's testimony explained that "[t]he Board's water quality standard for nickel is given in terms of dissolved nickel, and the District's NPDES permit limit is in terms of total nickel." Tr. at 31. A translator study obtains "site specific data on what portion of the nickel in the District's discharge is dissolved versus associated with suspended material." *Id.* IEPA reviews the District's sampling data to establish a translator value. *Id.*

The District submitted its translator study to IEPA with its December 20, 2007 interim report. Exh. 3; *see* Dist. Resp. at 2. IEPA noted that the District had calculated a metals translator of 0.961 for the effluent and 0.972 for the receiving stream. While IEPA relied on the District's results, it excluded data "when both the dissolved and the total were below the detection level." Exh. 7. This resulted in a nickel translator value of 0.966. *Id*.; *see* Exh. 4; Exh. 46; Tr. at 31-32; Dist. Resp. at 2. While the translator study was underway, "the District determined that it would provide very little relief" (Pet. at 21).

Sampling. Soon after the effective date of its NPDES permit, the District compiled data including industrial samples, District effluent samples, and stream samples. Pet. at 21. Data showed that ADM's pretreated industrial flow was the most significant source of nickel in the District's wastewater. *Id*. After meeting with SIUs including ADM, the District met with IEPA and provided it a summary of sampling data. *Id*., citing Exh. 6. After discussing options to reduce nickel loadings with ADM, "the District calculated new local pretreatment limits that would allow it to meet the upcoming effluent limit for nickel." *Id*. at 22.

Revised Permit Limit. The District submitted its first Interim Report to IEPA on December 20, 2007. Exh. 3. Based on data collected by the District, IEPA calculated critical hardness using "the tenth percentile hardness for the low flow period August 2, 2007 through November 1, 2007." Exh. 7; *see* Tr. at 32-33. This calculated a critical hardness value of 359 mg/L. *Id*. Mr. Santore characterized this as "hard water or even very hard water." Tr. at 38. Hardness is a mineral component of the water contributed by the geology of the area, and he stated "in this area it is not unusual to see high hardness waters." *Id*. at 39. Because hardness is tied to geology, Mr. Santore does not expect it to change. *Id*. at 42.

The report also included results of the Translator Study, which resulted in a nickel translator of 0.966. Exh. 7; *see* Exh. 3; Pet. at 5, 21. With these data, IEPA advised the District on April 24, 2009 that "the nickel permit limit could be adjusted to 0.015 mg/L (monthly average)." Pet. at 6, citing Exh. 4; *see* Pet. at 22, citing Exh. 7; Exh. 4; Tr. at 33. IEPA's July 1, 2009 permit modification revised the nickel effluent based on the metals translators. Pet. at 6, citing Exh. 1.

Developing Site-Specific Rule. The District reports that it has since 2007 reviewed information that could support a site-specific standard for nickel. Pet. at 22, citing Exh. 3. As suggested by the United States Environmental Protection Agency (USEPA) and IEPA, the District reviewed guidance on determining a Water Effect Ratio (WER) and whether it could apply to the District. Pet. at 22-23, citing Exh. 3. The District also considered the biotic ligand model (BLM). Pet. at 23, citing Exh. 3. After retaining an environmental scientist to consider these options, the District provided IEPA with a preliminary report. Pet. at 23, citing Exh. 10. The District performed additional river sampling and also prepared information on WER and BLM for discussion with USEPA and IEPA. Pet. at 24, citing Exhs. 11-13; Rev. Exh. 14.

<u>ADM.</u> To identify and implement methods to meet the nickel standard, ADM invested approximately $1.02 million in employee costs and $0.45 million in equipment rental and pilot trial costs from 2009 to 2011. Pet. at 57. Based on evaluation of its wastewater streams, ADM invested approximately $4.35 million to install systems and change processes as described below to reduce nickel in discharges from its processing facilities. Pet. at 26, 57, 59-60; Bloom Test. at 5; *see* Exhs. 15-19 (District interim reports). Since 2010, the nickel concentration in ADM's effluent to the District has declined from approximately 0.120 mg/L to approximately 0.060 mg/L. Pet. at 28, citing Exh. 21; *see* Tr. at 72-73. ADM intends to continue implementing these process changes regardless of flow in the Sangamon River. Pet. at 28; Bloom Test. at 7. In the following subsections, the Board summarizes ADM's process changes.

West Soybean Plant. ADM collects and manages spent and spilled nickel catalyst to keep it out of the wastewater system. Pet. at 26, 57; Bloom Test. at 4, 5.

Sorbitol Plant. ADM installed an ion exchange resin system to capture soluble nickel from the wastewater. Pet. at 26-27; Bloom Test. at 5-6. Dr. Bloom testified that ADM spent $450,000 to install the system. Bloom Test. at 4; Pet. at 57. Filters capture and recover particulate catalyst, which is then recycled or disposed of as solid waste according to applicable regulations. Pet. at 26, 27; Bloom Test. at 5, 6. Dr. Bloom testified that this process removes 1.3 pounds of nickel per day. Tr. at 68.

East Soybean Processing Plant. ADM installed a system that removes the soy molasses stream. Pet. at 27; Bloom Test. at 6. Dr. Bloom testified that ADM spent $2.7 million to install this system, which removed 2.4 pounds of nickel per day. Bloom Test. at 4; *see* Tr. at 68; Pet. at 27, 57. This represented approximately 35 percent of the soluble nickel from ADM's Decatur complex. Pet. at 27.

Polyols Plant. ADM determined that it could precipitate nickel from this process through pH adjustment and a precipitation and filtration system. Pet. at 56. Dr. Bloom testified that ADM spent approximately $750,000 to install the system, which reduced nickel by 1.9 pounds per day. Bloom Test. at 4, 6; Pet. at 27, 57; Tr. at 68. Although the plant permanently shut down in 2015, it had accounted for approximately 11% of the soluble nickel from ADM's Decatur Complex. Pet. at 27; Bloom Test. at 6. Before the plant shut down, ADM also considered alternate metallurgy as a way to reduce nickel discharges. Tr. at 70.

Sludge. ADM reported that in 2015 "elevated nickel in the effluent occurred as a result of solids carry-over from the high-salt slow rate anaerobic digestion reactors." Pet. at 27; Bloom Test. at 6. ADM developed a plan to manage and remove sludge from the anaerobic wastewater system. *Id.* The plan includes "removal and dewatering of solids from the system, short-term management of the solids in newly constructed storage basins, and land application of the sludge. . . ." *Id*. Dr. Bloom testified that ADM spent $450,000 to install facilities to remove excess sludge. Bloom Test. at 4.

ADM's land application permit authorizes it to apply "approximately 6,000 dry tons per year of anaerobically digested industrial biosolids to agricultural land at rates not to exceed the agronomic nitrogen demand of the crop grown." Pet. at 28 n.4, citing Exh. 22. ADM removed approximately 10.08 million pounds of sludge from the system in 2016 and approximately 11.44 million pounds in 2017. Pet. at 27; Bloom Test. at 6. Dr. Bloom suggested that it was difficult to estimate a percentage reduction in the discharge of nickel to the District's wastewater treatment, but he indicated that sludge removal "will only help" reduce that discharge. Tr. at 71-72.

Regulatory Relief

PCB 09-125. On June 15, 2009, the District petitioned the Board for a variance from the general use water quality standard for nickel "and the rule establishing the methodology for developing water quality based effluent limits" applicable to nickel. Pet. at 7, citing 35 Ill. Adm. Code 302.208(e), 304.105; Sanitary District of Decatur v. IEPA, PCB 09-125. The Board granted the District's requested variance, subject to conditions. Pet. at 7-12, citing Sanitary District of Decatur v. IEPA, PCB 09-125 (Jan. 7, 2010). Condition (k) established a schedule to achieve compliance with the permitted nickel effluent standard by July 1, 2014. Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 32-33 (Jan. 7, 2010).

The District states that IEPA provided public notice of a permit modification including the revised compliance schedule in the Board's order granting the District's variance. Pet. at 12. The District reports that, as of the date it filed its amended petition, IEPA had not taken final action on the modification. *Id*.

PCB 14-111. On February 21, 2014, the District petitioned the Board to extend the variance by one year. Pet. at 12, citing Sanitary District of Decatur v. IEPA, PCB 14-111. IEPA recommended that the Board deny the requested extension. Sanitary District of Decatur v. IEPA, PCB 14-111, slip op. at 15-16 (Apr. 7, 2014); Exh. 5. The District then requested a stay to investigate a proposal for a site-specific water quality standard. Sanitary District of Decatur v. IEPA, PCB 14-111, slip op. at 3 (Apr. 21, 2014). The Board stayed the proceeding to October 1, 2014. At the Board's direction, the District filed a series of reports on the status of its investigations, and the Board granted requests extending the stay. On January 19, 2017, the Board extended the stay to June 30, 2017. *See* Pet. at 13-16.

Time-Limited Water Quality Standard. On February 24, 2017, Public Act 99-937 became effective, enacting Section 38.5 of the Act and providing the Board authority to adopt a TLWQS. Section 38.5(c) converted the District's pending petition in PCB 14-111 by operation of law to a petition for a TLWQS. Pet. at 16-17, citing 415 ILCS 5/38.5.

After the Board twice extended the District's deadline to file an amended petition complying with Section 38.5, the District requested that the Board extend the deadline to December 31, 2018. Sanitary District of Decatur v. IEPA, PCB 14-111 (Sept. 29, 2017); *see* Pet. at 17-19. The District explained that it requested the extension to pursue this site-specific rule. Pet. at 19-20. The District wishes to maintain the TLWQS proceeding as an alternative form of relief if the Board declines to adopt its proposed site-specific rule. *Id*. at 20. The Board granted the District's motion and extended the deadline to file an amended petition for a TLWQS to December 31, 2018. Sanitary District of Decatur v. IEPA, PCB 14-111 (Oct. 5, 2017); *see* Pet. at 20.

District's Communications with IEPA and USEPA

The District states that it worked with IEPA and USEPA to prepare its proposed site-specific rule so that IEPA will support it, USEPA will approve it, and it will be consistent with federal law. Pet. at 29; Newton Test. at 3. Since 2007, the District has regularly communicated with USEPA and IEPA. The District reports that it has responded to the agencies' questions and comments and provided them with requested data. Newton Test. at 3-4; *see* Pet. at 29-37, citing Exhs. 24-27, 29.

GENERALLY-APPLICABLE NICKEL STANDARD

Water quality criteria are based on scientific assessment of health and ecological effects of pollutants and are developed based on USEPA guidance. Pet. at 46-47 (citation omitted). Criteria "are based on the 5th percentile of a distribution of toxicity data from a large number of organisms that include species of suitable diversity to meet the minimum numbers of biological families specified in the guidelines." Pet. at 47. Criteria consider factors affecting bioavailability such as pH, salinity, and hardness. *Id*. Hardness is one water quality characteristic affecting bioavailability and toxicity of nickel. *Id*. It refers to the mineral content of water and is mostly associated with the combined concentration of calcium and magnesium ions. *Id*.

Section 302.208(e)

At the discharge from the District's Main Plant, the Sangamon River is designated a General Use Water. Pet. at 38, citing 35 Ill. Adm. Code 303.201. The general use acute and chronic water quality standards for nickel are defined by calculations for dissolved nickel based on stream hardness. Pet. at 38, citing 35 Ill. Adm. Code 302.208(e); Pet. at 47.

The Board adopted the acute and chronic dissolved nickel water quality standards in 2002. Water Quality Triennial Review: Amendments to 35 Ill. Adm. Code 302.105, 302.208(e)-(g), 302.504(a), 302.575(d), 309.141(h)l and Proposed 35 Ill. Adm, Code 301.267, 301.313, 301.413, 304.120, and 309.157, R02-11, slip op. at 23 (Dec. 19. 2002) (effective Dec. 20, 2002); 27 Ill. Reg. 166, 182 (Jan. 3, 2003); *see* Triennial Review of Sulfate and Total Dissolved Solids Water Quality Standards: Proposed Amendments to 35 Ill. Adm. Code 302.102(b)(6), 302.102(b)(8), 302.102(b)(10), 302.208(g), 309.103(c)(3), 405.109(b)(2)(A), 405.109(b)(2)(B), 406.100(d); Repealer of 35 Ill. Adm. Code 406.203, 406.209, and Part 407; and Proposed New 35 Ill. Adm. Code 302.208(h), R07-9, slip op. at 14 (Sept. 4, 2008) (revising effective Sept. 8, 2008); 32 Ill. Reg. 14978, 14991 (Sept. 19, 2008); *see also* Tr. at 80-81.

Acute Standard. The acute standard for dissolved nickel is calculated as $e^{A+B\ ln(H)}$ x 0.998, where A = 0.5173 and B = 0.8460. 35 Ill. Adm. Code 302.208(e). In this calculation, e^x equals the "base of natural logarithms raised to the *x*- power," and ln(*H*) equals the "natural logarithm for Hardness." *Id*. For the acute standard, 0.998 equals the "conversion factor multiplier for dissolved metals." *Id*. The acute standard must not be exceeded at any time, except for those waters for which IEPA has approved a zone of initial dilution (ZID). 35 Ill. Adm. Code 302.208(a). The District does not propose to change the acute standard for dissolved nickel. Pet. at 2.

Chronic Standard. The chronic standard for dissolved nickel is calculated as $e^{A+B\ ln(H)}$x 0.997, where A = 0.4456 and B = 0.8473. 35 Ill. Adm. Code 302.208(e). For the chronic standard, 0.997 equals the "conversion factor multiplier for dissolved metals." *Id*. The chronic standard must not be exceeded "by the arithmetic average of at least four consecutive samples collected over any period of at least four days," except for waters for which IEPA has approved a mixing zone or in which mixing is allowed under 35 Ill. Adm. Code 302.102. 35 Ill. Adm. Code 302.208(b). In the District's modified NPDES permit issued July 1, 2009, the chronic nickel limit in terms of total nickel rather than dissolved was revised from 0.011 mg/L to 0.015 mg/L. Kluge Test. at 2-3; *see* Pet. at 6; Exh. 1.

PROPOSED SITE-SPECIFIC RULE

Proposed Section 303.410

The District proposed a new Section 303.410 entitled "Chronic Nickel Water Quality Standard for Segment of the Sangamon River." Pet. at 2, 70. In its amended petition, the District proposed that

> [t]he general use chronic water quality standard for dissolved nickel contained in Section 302.208(e) shall not apply to the Sangamon River, which receives discharges from the Sanitary District of Decatur's Main STP, from that facility's Outfall 001 located at 39° 49' 56" North Latitude, 89° 0' 7" West Longitude, to the point of the confluence of the Sangamon River with the South Fork of the Sangamon River near Riverton. Instead, nickel levels in such waters shall meet a chronic water quality standard for dissolved nickel as follows:

Chronic Dissolved Nickel Standard = exp[A+Bln(H)] x 0.997* x WER

where A = -2.286, B = 0.846, ln(H)=natural logarithm of Hardness, and WER=2.33
*conversion factor multiplier for dissolved metals. *Id.*

Revised Proposal

In its April 20, 2018 motion, the District submitted a revised equation to calculate the proposed site-specific standard:

Chronic Dissolved Nickel Standard = exp[A+Bln(H)] x 0.997* x WER

where A = -2.286, B = 0.846, ln(H)=natural logarithm of Hardness, and WER=2.50
*conversion factor multiplier for dissolved metals. Mot. File at 6.

The Board suggested the following changes to the District's proposal, which the District accepted. Tr. at 84.

> The general use chronic water quality standard for dissolved nickel contained in Section 302.208(e) shall not apply to the segment of the Sangamon River, which receives discharges from the Sanitary District of Decatur's Main Sewage Treatment Plant~~STP~~, from that facility's Outfall 001 located at 39° 49' 56" North Latitude, 89° 0' 7" West Longitude, to the point of the confluence of the Sangamon River with the South Fork of the Sangamon River near Riverton. Instead, ~~nickel levels in such~~ waters in this segment of the Sangamon River must~~shall~~ meet a chronic water quality standard for dissolved nickel as follows:
>
> Chronic Dissolved Nickel Standard = exp[A+Bln(H)] x 0.997* x WER
>
> where A = -2.286, B = 0.846, ln(H)=natural logarithm of Hardness, and WER=2.50
> *conversion factor multiplier for dissolved metals.

In its June 5, 2018 request for clarification, the Board added the unit of measurement, a significant digit, and the term "Water Effect Ratio" to the District's proposed language:

> [t]he general use chronic water quality standard for dissolved nickel contained in Section 302.208(e) shall not apply to the segment of the Sangamon River, which receives discharges from the Sanitary District of Decatur's Main Sewage Treatment Plant, from that facility's Outfall 001 located at 39° 49' 56" North Latitude, 89° 0' 7" West Longitude, to the point of the confluence of the Sangamon River with the South Fork of the Sangamon River near Riverton. Instead, waters in this segment of the Sangamon River must meet a chronic water quality standard for dissolved nickel as follows:

Chronic Dissolved Nickel Standard (µg/L) = exp[A+Bln(H)] x 0.997* x WER

where A = -2.286, B = 0.8460, ln(H)=natural logarithm of Hardness, and WER (Water Effect Ratio) = 2.50
*conversion factor multiplier for dissolved metals.

The Board requested that the District respond and indicate whether the proposed language reflected the District's intent. The District confirmed that the Board's language did so. Dist. Resp. 2.

Demonstrating Attainment

Under 35 Ill. Adm. Code 302.208(b),

> [t]he samples used to demonstrate attainment or lack of attainment with a CS [chronic standard] must be collected in a manner that assures an average representative of the sampling period. For the chemical constituents that have water quality based standards dependent upon hardness, the chronic water quality standard will be calculated according to subsection (e) using the hardness of the water body at the time the sample was collected. To calculate attainment status of chronic standards, the concentration of the chemical constituent in each sample is divided by the calculated water quality standard for the sample to determine a quotient. The water quality standard is attained if the mean of the sample quotients is less than or equal to one for the duration of the averaging period. 35 Ill. Adm. Code 302.208(b).

The Board asked the District to clarify whether these sample collection protocols for demonstrating compliance with the chronic standard would apply to its proposed site-specific standard. Tr. at 83. Mr. Kluge testified that the District proposed no change in how it would demonstrate compliance. Tr. at 83-84.

NPDES Permit

The District requests that the Board direct IEPA to revise the District's NPDES permit so that it will be required to meet the proposed site-specific standard using a critical hardness value of 359 mg/L in the equation. Pet. at 2, 70, 71.

DISCUSSION

In the following sections of the opinion, the Board discusses nickel treatment options investigated by the District and ADM, the derivation of the District's proposed site-specific rule, federal law, and the technical feasibility and economic reasonableness of the District's proposal.

Review of Treatments

The District and ADM have investigated nickel treatment options at the District and pretreatment options at ADM to determine whether they are both technically feasible and economically reasonable and can meet the total nickel effluent limit in the District's current NPDES permit. Kluge Test. at 4; Pet. at 52; *see* Bloom Test. at 7; Exhs. 42, 43. The Board summarizes these investigations in the following subsections.

District

In its 2009 variance petition, the District stressed that any treatment process must be capable of handling the Main Plant's design average flow of 41 MGD and possibly its design maximum flow of 125 MGD. Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 14 (June 15, 2009); Pet. at 52. The District stated that, "[w]hile treatment technologies for removing relatively high concentrations of metals from such streams as electroplating wastewater are well-established, their applicability is limited by the very low concentrations in the District's wastewater stream." *Id*.

Precipitation. The District cited precipitation of nickel hydroxide as one technology to remove nickel from a solution. The District stated that solubility of nickel hydroxide at the required pH of 10-11 is approximately 0.12 mg/L, "nearly an order of magnitude higher than the expected effluent limit." Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 15 (June 15, 2009); Pet. at 52. The District concluded that, "[e]ven under ideal conditions, [hydroxide] precipitation could not achieve the limit." Pet. at 52.

Filtration. Incidental removal of metals from municipal wastewater varies depending on "whether the metal species is particulate or dissolved (either as a metal ion or a metal complexed with another material)." Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 15 (June 15, 2009); Pet. at 52-53. Filtration may improve removal of particulates or dissolved metals adsorbed onto particulates. *Id*. Because most of the nickel in the District's effluent is in the dissolved form, the District argues that filtration would not remove it. *Id*.

Chemical Treatment. Chemical treatment technologies such as ion exchange and reverse osmosis remove metals from the effluent flow "and concentrate them into a smaller volume, high concentration stream that require further management." Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 15 (June 15, 2009); Pet. at 53. The District reports that these technologies "require significant operating costs for energy, labor, and membranes (reverse osmosis) or resin (ion exchange)." *Id*.

For reverse osmosis, the District received a preliminary estimate of capital costs of $4 per gallon per day capacity, which does not include operating costs or costs for brine disposal. Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 15-16 (June 15, 2009); Pet. at 53. Treating 25 MGD of the District's flow to meet the permit limit would require minimum capital costs of $100 million. *Id*. The District estimates that additional costs for brine disposal could double that estimate. *Id*. Since it filed its variance petition, the District obtained an estimate that the cost to construct a reverse osmosis treatment system, "including necessary pretreatment and brine disposal using a 'zero liquid discharge' process, was approximately $9.4 million per MGD of design flow, meaning the District's treatment of 25 MGD would require capital costs of approximately $235 million." Pet. at 54. The District argues that these estimates exceed "the construction costs of the District's entire plant" and would remove approximately six pounds or less of nickel per day. *Id*. at 53-54.

While the District expects that the capital costs of an ion exchange system may be half that of a reverse osmosis system, a substantial amount of research is needed "to find an ion exchange resin suitable for removing nickel that is likely to be in a complexed form in the District's effluent. Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 16 (June 15, 2009); Pet. at 53. Sizing the system depends on the attainable removal efficiency, but the District argues that the size would need to be at least 25 MGD and possibly much larger. *Id*/

Summary. The District concluded that it "could not identify any technically feasible and economically reasonable technologies for removing nickel from its entire plant flow due to the very low concentrations of nickel in the District's wastewater stream and the very large flow to be treated." Pet. at 54.

ADM

As described above under "Nickel Mitigation Efforts," ADM implemented process changes to reduce nickel loads to the District. *Supra* at 8-10; *see* Pet at 26-27. When the Board granted the District a variance in 2010, it included a condition that "[t]he District must require, through an authorization to discharge issued by the District under its pretreatment ordinance," that ADM determine the technical and economic feasibility of 10 control technologies. Sanitary District of Decatur v. IEPA, PCB 09-125, slip op. at 17-19, 30-31 (Jan. 7, 2010) (condition (h)); *see* Bloom Test. at 3-4; Pet. at 9-10. ADM considered these technologies to determine whether any of them alone or in combination could control nickel to the extent of allowing the District to meet its permitted nickel level. Pet. at 54; Bloom Test. at 7; *see* Exhs. 42, 43.

ADM considered technical feasibility to mean "ADM's confirmation that the specific technology evaluated will consistently meet: (a) the nickel limit in the District's current NPDES permit; and/or (b) the proposed nickel limit that would apply to ADM based upon the District's current NPDES permit." Exh. 42 at 1 n.2. ADM considered economically reasonable to mean that "the capital and operating costs associated with implementing a specific technology are objectively reasonable." *Id*. n.3. If ADM concluded that a specific technology was not technically feasible, it did not determine whether it was economically reasonable. *Id*.

Nickel Proprietary Precipitation Process. ADM investigated this category using six different materials including modified clays for "selective adsorption of nickel from the wastewater." Pet. at 55; *see* Exh. 42 at 1; Dist. Resp., Att. A. ADM states that most materials either required high dosages or were "bench-scale proprietary technologies that the technology-supplying companies were unable to scale up." *Id*. Using acidic clay to treat the District's discharge would require 400-1200 tons of dry clay each day and landfill disposal of the nickel-bound clay. Pet. at 55; *see* Dist. Resp., Att. A. ADM concluded that this category of technologies "is not technically feasible because of the large volume of material handling required." *Id*.; *see* Exh. 42 at 1; Dist. Resp., Att. A.

<u>Nickel Chemical Precipitation Process Using Carbamates or Organic Sulfides.</u> ADM investigated this category by "scaling nickel precipitation using polymeric dimethyl dithiocarbamate chemistry." Pet. at 55; *see* Exh. 42 at 1-2; Dist. Resp., Att. A. ADM did not scale each of these technologies "because of low levels of nickel removal, associated aquatic toxicity of the chemical and lack of commercial manufacturing capabilities by the vendors." *Id*. The technologies that ADM scaled "did not result in a consistent reduction in total nickel to below 0.037 mg/L due to variability in results from bench scale testing." Pet. at 55. ADM concluded that "technologies evaluated in this category are not technically feasible." Pet. at 55; *see* Dist. Resp., Att. A.

<u>Commercial Resins.</u> ADM investigated this category using nonfunctionalized styrene divinyl benzene resins. Pet. at 55; *see* Exh. 42 at 5; Dist. Resp., Att. A. With Vivenano resins, tests showed "no effective nickel reduction as the resin was competing for all the ions in the matrix as opposed to being selective for nickel. Pet. at 55. With Dow and Purolite resins, tests showed ability to adsorb nickel from the wastewater stream but required "extremely large" use of resin. *Id*. at 56. Also, "regeneration of the resin required the use of a pH 10 ethanol solution at an elevated temperature." *Id*. ADM concluded that "this process would be extremely difficult to scale up" and that "technologies in this category are not technically feasible." *Id*.; *see* Exh. 42 at 5; Dist. Resp., Att. A.

<u>Filtration.</u> ADM investigated technologies including combinations of reverse osmosis, sand filtration, and microfiltration. Pet. at 56; *see* Exh. 42 at 3; Dist. Resp., Att. A. The best recoveries with reverse osmosis, an important element of filtration, were under 30%. Pet. at 56. ADM stated that "[t]he remaining 70% wastewater would need to be evaporated and the recovered solids would have to be landfilled. This would require the evaporation of about 7.7 MGD of water." *Id*. ADM adds that its wastewater stream "contain materials which significantly foul membranes." *Id*. ADM concluded that this category of technologies is not technically feasible. *Id*.; *see* Exh. 42 at 3; Dist. Resp., Att. A.

<u>Noncommercial, Experimental Technologies.</u> ADM investigated experimental techniques including electrocoagulation, captive deionization, and advanced oxidation. Pet. at 56; *see* Exh. 42 at 4; Dist. Resp., Att. A. ADM reports that "there are currently no commercial manufacturers of electrocoagulation equipment." Pet. at 56. ADM adds that captive deionization "captures more than just nickel in the effluent stream and is easily fouled." *Id*. ADM reports that no consistent reduction of nickel resulted from advanced oxidation such as ozone and chlorine dioxide. *Id*. ADM could not perform a large-scale trial on chlorine dioxide because of its permitted chlorine limit. *Id*. ADM concluded that this category of technologies is not technically feasible. *Id*.; *see* Exh. 42 at 4; Dist. Resp., Att. A.

<u>Summary.</u> Dr. Bloom testified that ADM has completed the technology review required by the District's 2010 variance. Bloom Test. at 4-5; *see* <u>Sanitary District of Decatur v. IEPA</u>, PCB 09-125, slip op. at 30-31 (Jan. 7, 2010). He argues that this review did not identify an alternative "that could consistently meet the required nickel limit and also be both technically feasible and economically reasonable." Bloom Test. at 5; *see id*. at 7. Based on its current wastewater streams, ADM believes that "nickel reduction below 0.040 mg/L – 0.050 mg/L soluble nickel is not feasible within the limits of any technologies that have been evaluated." Pet. at 57.

Dr. Bloom testified that, even if experimental technologies were commercially available and scalable, ADM estimated in 2009 that "it would have to spend about $32.5 million in the first year to install a mix of technologies and chemicals." Bloom Test. at 5. He estimated that this would remove three to seven pounds of nickel per day from a 11 MGD stream. *Id*. He equated this to a cost of $7,500-18,000 per pound of nickel removed and added that the mix of technology and chemicals "would likely generate about 15-20 tons per day of landfill waste." *Id*.

Derivation of Proposal

Chronic Toxicity Testing

The District states that, although factors such as pH and natural organic matter (NOM) affect nickel bioavailability and toxicity, they have not been incorporated into equations used to calculate metals standards. Pet. at 47-48 (citation omitted); *see* Santore Test. at 4; Rev. Exh. 28 at 4. Because the standards do not consider these factors, the District argues that they "are often overprotective." Pet. at 48. USEPA published guidance to establish a Water Effect Ratio (WER) for developing a site-specific standard that accounts for local toxicity factors affecting bioavailability of metals. *Id*. (citation omitted); *see* Santore Test. at 4; Rev. Exh. 28 at 4.

Establishing a WER requires biological testing of the receiving waters. Pet. at 48. OSU sought to determine the toxicity of nickel to *Ceriodaphnia dubia* when exposed in a laboratory-reconstituted water designed to simulate the District's effluent. Cardwell Test. at 2. *C. dubia*, an aquatic invertebrate, served as the test species because "it is the most sensitive species in the Illinois water quality criteria for nickel." *Id*. at 3; Tr. at 35; *see id*., Exh. D at 13 (Ambient Water Quality Criteria for Nickel). Ms. Cardwell stated that *C. dubia* is "a standard toxicity test organism." Tr. at 35. She testified that "using a sensitive species for the toxicity testing provides protection for many other aquatic species." Cardwell Test. at 3. She clarified that less sensitive species would also be protected. Tr. at 35.

Simulating the District's effluent requires high hardness and high pH. OSU acclimated test organisms to the simulated water for over a year so that exposure conditions matched the high ionic composition of the Sangamon River. Cardwell Test. at 2; Santore Test. at 4; Pet. at 48. Ms. Cardwell elaborated that acclimating the *Ceriodaphnia dubia* began with standard laboratory water having hardness of 100 mg/L and then increased hardness over the course of generations. Tr. at 36. The process monitored health and reproduction of the test organisms and continued until the simulated water reached the hardness of the Sangamon River. *Id*. Ms. Cardwell testified that, when hardness reached that level, "the organisms were reproducing and were of great health." *Id*.

Ms. Cardwell testified that the process did not acclimate test organisms to high NOM, which is measured as dissolved organic carbon (DOC). She indicated that the standard laboratory water used to simulate the District's effluent was approximately 1 mg/L DOC. Tr. at 37

Ms. Cardwell testified that NOM typically "is made up from different organisms, such as algae and also decomposing vegetation," which account for DOC in the water column. Tr. at 37. Mr. Santore explained that DOC is a chemical measurement used to quantify the presence of NOM. "[W]e know from the molecular structure of NOM that carbon represents about 50 percent of the NOM." Tr. at 40. He added that DOC concentrations in the Sangamon River typically range from 6 to 12-14 mg/L. *Id*. at 39-40. "We've seen natural waters that go well into the 20s and 30s, for example, milligrams per liter, so these concentrations are not unusual." *Id*. at 40; *see id*. at 42. To measure effects of DOC on nickel toxicity, OSU performed tests in water with and without added DOC. Cardwell Test. at 2.

Testing exposed *c. dubia* to a series of nickel concentrations in the simulated effluent. The concentrations sought to elicit a biological response quantified as 20% effect concentrations (EC_{20}). Cardwell Test. at 3. Ni EC_{20} corresponds to "a nickel concentration where 20% of the organisms exhibited reduced survival and reproduction." *Id*. Ms. Cardwell testified that "the 20 percent effect concentration is a standard end point for USEPA water quality criteria for chronic testing." Tr. at 41. OSU compared Ni EC_{20} values for each test to determine differences between water with and without DOC. Cardwell Test. at 3. Ms. Cardwell testified that testing results showed "that the addition of DOC to the simulated effluent had a protective effect on chronic nickel toxicity." *Id*. at 3-4; *see* Santore Test. at 4. She added that the protective effect of DOC and hardness has also been reported in the literature for other species. Cardwell Test. at 4.

Based on OSU data and additional toxicity data in the literature, Windward developed an overall DOC equation for the relationship between DOC concentrations and Ni EC_{20} values in the Sangamon River. This DOC equation is used to calculate Ni EC_{20} values that are later used to derive the WER. Rev. Exh. 28 at 5-7.

$$\log_{10} Ni\ EC_{20} = 0.3260 \times \log_{10} DOC + 0.9215$$

Using a DOC concentration of 0.5 mg/L in the reference water, the Ni EC_{20} was calculated as 6.663 µg/L. Tr. at 51; Exh. 46. Using the DOC average concentration of 8.83 mg/L measured in the Sangamon River, the average Ni EC_{20} was calculated as 16.662 µg/L. As described below, Mr. Santore used these two values to derive the WER for the Sangamon River. Tr. at 51; Rev. Exh. 28 at 8-10; Exh. 45 at 2; Exh. 46.

Water Effect Ratio

Mr. Santore testified that, although the generally-applicable nickel standard accounts for the hardness of the Sangamon River, it "does not consider ameliorative effects of NOM on nickel." Santore Test. at 4; Rev. Exh. 14. Mr. Santore testified that the "effects of NOM are one of the primary reasons why a site-specific adjustment to the nickel standard is justified." Santore Test. at 4; Rev. Exh. 28. USEPA developed the WER to develop site-specific standards accounting "for toxicity modifying factors that affect the bioavailability of metals that are not otherwise addressed by the statewide standard." *Id*.; *see* Rev. Exh. 28.

WER compares the toxicity of nickel to one or more sensitive organisms in a receiving water to a reference water. Rev. Exh. 14 at 3; *see* Pet. at 48. A reference water represents conditions similar to those used to develop the generally applicable water quality standard. A receiving water is the actual water in the local body of water. Rev. Exh. 14 at 3. Comparing observed toxicity in the receiving and reference waters "can be used to document the presence of local factors affecting toxicity and to quantify the magnitude of their effect." *Id*. "The WER is simply the ratio of the measured toxic endpoint in the receiving water to that in the reference water." *Id*. In this case, the toxic endpoint is expressed as Ni EC_{20}. The DOC equation calculated the reference water Ni EC_{20} as 6.663 µg/L and the receiving water Ni EC_{20} as 16.662 µg/L. Rev. Exh. 28 at 5; Tr. at 51; Exh. 46.

The WER is derived as the ration of the Ni EC_{20} for the average DOC concentration in the Sangamon River receiving water to the Ni EC_{20} for the DOC concentration in the reference water:

$$\text{Ni WER} = \frac{\text{Ni effect in site water}}{\text{Ni effect in reference water}}$$

$$\text{Ni WER} = \frac{10^{[0.3260 \times \log_{10}(8.33) + 0.9215}}{10^{[0.3260 \times \log_{10}(0.5) + 0.9215}} = 2.50$$

The ratio of 2.50 between these two figures "tell us how the bioavailability of nickel in the Sangamon is altered by DOC." Tr. at 51-52; Rev. Exh. 28; Dist. Resp. at 2-3; Dist Resp. 2.

Based on communications with IEPA and USEPA, Mr. Santore is not aware that either of those agencies has any objection to the WER calculation of 2.50. Tr. at 64-65; *see* Exh. 45; Dist. Resp. at 5. Mr. Koch, who works in the Water Quality Standards Section of IEPA's Bureau of Water, testified that in his opinion the WER of 2.50 "would be protective of the Sangamon River. I believe it's a good representation of the actual toxicity of nickel in that environment." Tr. at 79.

<u>Biotic Ligand Model</u>

To provide an independent line of evidence to support its proposed WER of 2.50, the District used a Biotic Ligand Model (BLM). Pet. at 48, 49; *see* Rev. Exh. 28. While the WER depends on biological testing of the receiving waters, the "BLM is a computational approach that can simulate the effects of water chemistry on metal toxicity and on aquatic organisms' physiological responses to metals." *Id*. at 48 (citations omitted); *see* Rev. Exh. 14; Santore Test. at 3. The District argues that the BLM for nickel "has been shown to be able to predict bioavailability effects on nickel toxicity to freshwater organisms." Pet. at 49, citing Exh. 29. The national water quality criterion for copper also used a BLM to evaluate the impact of the metal on aquatic organisms. Kluge Test. at 4. The Water Environmental Research Foudnation has developed a BLM for nickel. *Id*.

The nickel BLM predicts a DOC effect based on chemical interactions between DOC and dissolved nickel. Rev. Exh. 28. NOM "is a complex assemblage of molecules that include reactive functional groups capable of binding Ni." *Id*. The BLM considers these interactions and predicts how NOM affects the chemical speciation of nickel. *Id*. At low levels of DOC, dissolved nickel mostly takes the form of inorganic complexes and free nickel ion. *Id*. (Figure 2: Nickel speciation predicted by the BLM over a range of DOC concentrations). "As DOC increases, the amount of Ni bound to DOC also increases. At DOC concentrations representative of the Sangamon River, as much as 70% of the dissolved Ni is expected to be bound to DOC. . . ." *Id*. Since the free nickel ion is the most bioavailable form, this decrease from approximately 78% to 25% free nickel suggests that "bioavailability has been reduced by about a factor of 3." *Id*. (Figure 2).

Mr. Santore testified that water quality data for the BLM are based on two separate sampling events at two locations. Santore Test. at 5. Both locations are downstream from the District's discharge within the segment of the Sangamon River that would be subject to the proposed site-specific rule. *Id*,; Tr. at 44-45. Analysis of site water and reference water calculated a WER of 2.63. *Id*., citing Rev. Exh. 14; *see* Rev. Exh. 28. Mr. Santore argued that the calculation "demonstrates that the DOC relationship-based WER of 2.50 is reasonable for the Sangamon River and protective for sensitive aquatic life." Santore Test. at 5; *see* Rev. Exh. 28. Sensitivity analysis concluded that the calculated WER "is not expected to significantly change as a result of variability in water quality within ranges" comparable to existing data. Rev. Exh. 14 at 15.

Equation for Site-Specific Rule

After determining a WER, an equation for the site-specific standard can be derived by using the WER as a multiplier of the generally-applicable standard. Pet. at 48. The District proposed the following equation:

> Chronic Dissolved Nickel Standard (µg/L) = exp[A+Bln(H)] x 0.997* x WER,
>
> where A = - 2.286, B = 0.8460, ln(H) = natural logarithm of Hardness, and WER (Water Effect Ratio) = 2.50
> * conversion factor multiplier for dissolved metals.

Mot. File at 6.

Calculation of NPDES Permit Effluent Limit

To calculate an effluent limit for the District's NPDES permit based on the equation in the proposed site-specific standard, the District first applied the critical hardness value for the Sangamon River of 359 mg/L to the equation for the generally-applicable Illinois water quality standard. Tr. at 46-47, 50; Exh. 46; Dist. Resp. at 2. With the conversion factor multiplier for dissolved metals of 0.997, this step of the calculation results in a dissolved nickel concentration of 0.01471 mg/L. Exh. 46. Mr. Santore testified that USEPA has long used the hardness equation to develop water quality standards for metals. "[W]e used the same form because we weren't trying to change anything about how the hardness component was done." Tr. at 49-50.

The District next considered the effects of DOC by applying the WER. The calculation accounts for the effect of DOC by multiplying the generally-applicable water quality standard by the WER. Tr. at 50; Rev. Exh. 28. Multiplying the state standard by the WER of 2.50 and applying the conversion factor multiplier for dissolved metals of 0.997 results in a site-specific chronic water quality standard for dissolved nickel of 0.03679 mg/L. Tr. at 52, 60; Exh. 46; *see* Dist. Resp. at 3.

Mr. Santore testified that the water quality standard is based on protection of aquatic life. USEPA has determined that, for metals such as nickel, the concentration of dissolved metal is the most important factor in determining toxicity and bioavailability. Tr. at 58. A permit limit, on the other hand, is based on the amount discharged, which is more accurately characterized as total metal. *Id* at 58-59. A translator converts the dissolved metal concentration to a total metal concentration to set a permit effluent limit expressed as total metal. *Id*. at 59. Dividing the dissolved nickel concentration of 0.0369 mg/L by the translator of 0.966 from the 2007 translator study, the District calculated an anticipated permit limit for total nickel of 0.0382 mg/L. Exhs. 4, 46; Tr. 52-53, 57, 60. Applying the conversion factor multiplier for dissolved metals of 0.997, the anticipated NPDES permit effluent limit would be 0.03806 mg/L total nickel. *See* Dist. Resp. 2 at 2.

$$(\mu g/L) = \left[e^{[-2.286 + 0.8460\, ln\,(359)]} \times 0.997 \right] \times \left[\frac{10^{[0.3260 \times \log_{10}(8.33) + 0.9215]}}{10^{[0.3260 \times \log_{10}(0.5) + 0.9215]}} \right] / 0.966 = 38.06\ \mu g/L$$

Mr. Santore testified that this permit limit "does not factor in any dilution" and does not consider upstream flow. Tr. at 61. Mr. Kluge clarified that the 7Q10 flow upstream from the District's discharge is zero. *Id*. at 61-62. He added that, in determining the permit limits for the District, "there is no allowance for upstream dilution." *Id*. at 62.

<u>Comparison with Other Nickel Standards</u>

Mr. Santore asserted that, although the District's anticipated NPDES permit limit would be higher than its current limit, it is lower than the limit calculated by USEPA or other states. Santore Test. at 5-8; Exh. 46. Mr. Santore testified that USEPA has its own nationally recommended water quality standards. Santore Test. at 5 (citation omitted). At the hardness value for the Sangamon River of 359 mg/L, USEPA's calculation for nickel would result in a recommended chronic standard of 0.154 mg/L. *Id*. at 7; *see* Exh. 46. Mr. Santore also compared standards in adjoining states. At hardness of 359 mg/L, Iowa's chronic water quality standard for nickel would also result in a value of 0.154 mg/L. Santore Test. at 7; *see* Exh. 46, citing IOWA ADMIN. CODE r. 567-61.3(3). At the same hardness, Indiana's chronic water quality standard for nickel would result in a value of 0.465 mg/L. Santore Test. at 7; *see* Exh. 46, citing IND. ADMIN. CODE tit. 327, r.2-1-16. Mr. Santore adds that these standards "would still be converted to a total nickel basis using the appropriate translator to determine permit limits." Santore Test. at 7-8.

Mr. Santore accounted for the differences between these standards and Illinois' standard by explaining that they "are based on published toxicity data." Tr. at 55. As new data become available, states can review it and revise their standards. *Id*. He testified that Illinois' standard reflects a 1993 paper including a chronic toxicity test to *C. Dubia* as the most sensitive species, but USEPA has not cited that data in its water quality documents. *Id*. at 56. Mr. Koch elaborated that, when USEPA adopted its national criterion in 1995, it reviewed literature published until December 1992. *Id*. at 80-81.

Federal Law

The District states that the Act provides the Board's rulemaking authority and lists water quality standards and effluent limitations as regulations the Board may adopt. Pet. at 64, citing 415 ILCS 5/5(c), 13(a) (2016). The District argues that the Board can adopt standards that do not adversely affect the designated uses of a water body. Pet. at 65 (citations omitted). The District concludes that the Board has authority to determine whether its proposed site-specific rule establishes the appropriate standard and protects uses in the specified segment of the Sangamon River. *Id*. at 66.

The District states that regulations require USEPA to review and approve or disapprove water quality standards, including site-specific standards, adopted by the states. Pet. at 66, citing 40 C.F.R. § 131.21. Section 131.6 of USEPA's regulations lists the elements that a state must include with water quality standards submitted for review, including "[w]ater quality criteria sufficient to protect the designated uses." Pet. at 68, citing 40 C.F.R. § 131.6. Section 131.5 lists eight factors USEPA must review when determining whether to approve or disapprove standards adopted by a state, including "[w]hether the State has adopted criteria that protect the designated water uses based on sound scientific rationale. . . ." Pet. at 66-67, citing 40 C.F.R. § 131.5.

The District argues that its petition includes information that supports adoption of the proposed rule and that meets the requirements of 40 C.F.R. § 131.6. Pet. at 68. If the Board adopts the proposal, the District asserts that its petition includes the information needed for USEPA to review and approve it under 40 C.F.R. § 131.5. *Id*.

The District reports that USEPA recently revised 40 C.F.R. § 131.10. 80 Fed. Reg. 51020 (Aug. 21, 2015). USEPA generally requires that states revising or removing designated uses must justify how consideration of the use of the water supports the state's action. Pet. at 69, citing 40 C.F.R. § 131.10. The District states that its proposed site-specific rule continues the designated uses of the Sangamon River and will protect general use waters. Pet. at 69. The District argues that the proposal considers site-specific conditions. *Id*.

The Board asked whether IEPA reviews site-specific water quality standards during its triennial review process and, if not, what might prompt a review. Tr. at 44, 87. IEPA responded that it "*may* review site-specific water quality standards during its triennial review process. . . ." IEPA Cmt. at 1 (emphasis added), citing 33 U.S.C. § 1313(c)(1) (Clean Water Act); 40 C.F.R. § 131.20. The Board understands "may review" to mean that IEPA has authority to perform this review. IEPA's response does not indicate whether it reviews or will review site-specific water quality standards during triennial review. Further, if site-specific water quality standards were not part of the triennial review process, the Board asked IEPA what would prompt a review, and IEPA did not respond to this alternative. IEPA Cmt. at 1. Below under "Filing Public

Comments," the Board requests that IEPA clarify its response during the first-notice comment period.

Technical Feasibility and Economic Reasonableness

Although the District acknowledges that it is technically feasible for reverse osmosis to meet the nickel limit, it argues that the projected capital cost of $235 million is not economically reasonable. Pet. at 59; *see id*. at 52. The District proposes a site-specific rule because no alternative that is both technically feasible and economically reasonable would allow it to comply with the generally-applicable rule. *Id*. at 59.

ADM evaluated methods for reducing nickel in its wastewater stream to the District. However, ADM determined that no technology or combination of technologies - that is technically feasible and economically reasonable - would control nickel at its Decatur Complex and allow the District to meet its nickel limit. Pet. at 54, 59.

In a letter dated January 11, 2018, the Board requested that DCEO conduct an economic impact study of the District's amended proposal (*see* 415 ILCS 5/27(b) (2016)), and the Board requested that DCEO respond by February 26, 2018. The Board did not receive a response. No one at hearing testified or commented on the Board's request or the absence of a response. Tr. at 85-86.

The District argues that, although reverse osmosis treatment might meet the District's nickel permit limit, its projected capital costs are approximately $235 million. Pet. at 53, 59; *see supra* at 15-16. The District also argues that it has shut down the Polyols Plant at which it had installed the nickel capture process. Pet. at 56; *see* Bloom Test. at 4-5. Based on its current discharge to the District, ADM concludes that, with the technology it has evaluated, it is not feasible to reduce nickel concentrations below 0.040 – 0.050 mg/L. Pet. at 57; Bloom Test. at 7. ADM argues that requiring further reductions would be "economically cost prohibitive." Bloom Test. at 8. If required to meet the generally-applicable standard, ADM projects that it "would be prevented from running at its full operating capacity or legally permitted levels." *Id*. at 7.

To comply with the requested site-specific rule, ADM projects $4.35 million in capital costs and $4.25 million in annual operating costs for pretreatment. Pet. at 57, 59-60. ADM's capital costs include $450,000 to install a resin capture system at the Sorbitol Plant, $2.7 million to install a soy molasses stream removal system, and $450,000 to install excess sludge removal facilities at the wastewater treatment plant. ADM attributes $750,000 to a high pH precipitation and filtration process at the shutdown Polyols Plant. Pet. at 57, 59. The District's original petition itemized $1.2 million in operating costs, but the amended petition did not itemize the higher projected costs. *See* Pet. at 59-60. Below under "Filing Public Comments," the Board requests that the District and ADM clarify these projected annual operating costs.

The District asserts that its proposal does not impose significant compliance costs on its customers and industrial users other than ADM. The District argues that there will be substantial costs for the District and its customers if the proposal is not adopted. Pet. at 60. The District concludes that the proposed rule is more economically reasonable than the alternatives without having a detrimental effect on the environment. *Id*.

Based on the record, the Board finds that no process or treatment is both technically feasible and economically reasonable to make the District's discharge meet the generally-applicable standard.

However, the Board finds that, in this segment of the Sangamon River, the District's proposed site-specific standard appropriately considers the ameliorative effect of both hardness and natural organic matter on the bioavailability and toxicity of nickel. The record supports the calculation of a Water Effect Ratio, which the Biotic Ligand Model for nickel generally corroborates. The Board concludes that the proposed standard is calculated to protect aquatic life and the uses of this Sangamon River segment.

The Board recognizes that ADM expects capital costs of $4.35 million and annual operating costs of $4.25 million to comply with the District's proposed site-specific standard. However, the Board finds that the proposal limits the discharge of nickel and avoids an adverse impact on the environment in a manner that is both technically reasonable and economically feasible. Below, for first-notice publication, the Board proposes the District's site-specific rule text.

Filing Public Comments

First-notice publication of the Board's proposal starts a period of at least 45 days during which any person may file a public comment with the Board, regardless of whether the person has already filed a public comment. *See* 5 ILCS 100/5-40(b) (2016) (Illinois Administrative Procedure Act).

The Board encourages persons to file public comments on these proposed amendments. In its order above, the Board specifically requested comment on the following two matters:

1) IEPA stated that it "*may* review site-specific water quality standards during its triennial review process . . . ." IEPA Cmts. at 1 (emphasis added). The Board understands "may review" to mean that IEPA has authority to do so. The Board requests that IEPA clarify whether it reviews or will review site-specific water quality standards during triennial review.

2) The District reports that ADM estimate $4.25 million in annual operating costs to implement the proposed site-specific rule. The Board requests that the District and ADM itemize these projected annual operating costs.

Public comments must be filed electronically through the Clerk's Office On-Line (COOL) at pcb.illinois.gov. The Board requests that comments indicate this rulemaking's docket number, R14-24. Questions about electronic filing should be directed to the Board's Clerk at 312-814-3461.

CONCLUSION

For a segment of the Sangamon River, the Board proceeds to first-notice publication of a site-specific rule in the *Illinois Register*. Specifically, in a new Section 303.410 of its water pollution regulations, the Board proposes a site-specific numeric standard that is based on hardness in the water and bioavailability of nickel to aquatic life. In its order below, the Board directs the Clerk to publish the proposal, which begins a period of at least 45 days during which any interested person may file a public comment with the Board.

ORDER

The Board directs the Clerk to cause first-notice publication in the *Illinois Register* of the following amendments to the Board's regulations.

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 303
WATER USE DESIGNATIONS AND SITE-SPECIFIC WATER QUALITY STANDARDS

SUBPART A: GENERAL PROVISIONS

Section
303.100 Scope and Applicability
303.101 Multiple Designations
303.102 Rulemaking Required (Repealed)

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section
303.200 Scope and Applicability
303.201 General Use Waters
303.202 Public and Food Processing Water Supplies
303.203 Underground Waters
303.204 Chicago Area Waterway System and Lower Des Plaines River
303.205 Outstanding Resource Waters
303.206 List of Outstanding Resource Waters
303.220 Primary Contact Recreation Waters
303.225 Incidental Contact Recreation Waters
303.227 Non-Contact Recreation Waters and Non-Recreational Waters
303.230 Upper Dresden Island Pool Aquatic Life Use Waters
303.235 Chicago Area Waterway System Aquatic Life Use A Waters
303.240 Chicago Area Waterway System and Brandon Pool Aquatic Life Use B Waters

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE
SPECIFIC WATER QUALITY STANDARDS

Section
303.300 Scope and Applicability
303.301 Organization
303.311 Ohio River Temperature
303.312 Waters Receiving Fluorspar Mine Drainage (Repealed)
303.321 Wabash River Temperature
303.322 Unnamed Tributary of the Vermilion River
303.323 Sugar Creek and Its Unnamed Tributary
303.326 Unnamed Tributary of Salt Creek, Salt Creek, and Little Wabash River
303.331 Mississippi River North Temperature
303.341 Mississippi River North Central Temperature
303.351 Mississippi River South Central Temperature
303.352 Unnamed Tributary of Wood River Creek
303.353 Schoenberger Creek; Unnamed Tributary of Cahokia Canal
303.361 Mississippi River South Temperature
303.400 Bankline Disposal Along the Illinois Waterway/River
303.410 Chronic Nickel Water Quality Standard for Segment of the Sangamon River
303.430 Unnamed Tributary to Dutch Creek
303.431 Long Point Slough and Its Unnamed Tributary
303.441 Secondary Contact Waters (Repealed)
303.442 Waters Not Designated for Public Water Supply
303.443 Lake Michigan Basin
303.444 Salt Creek, Higgins Creek, West Branch of the DuPage River, Des Plaines River
303.445 Total Dissolved Solids Water Quality Standard for the Lower Des Plaines River
303.446 Boron Water Quality Standard for Segments of the Sangamon River and the Illinois River
303.447 Unnamed Tributary of the South Branch Edwards River and South Branch Edwards River
303.448 Mud Run Creek
303.449 Chicago Sanitary and Ship Canal

SUBPART D: THERMAL DISCHARGES

Section
303.500 Scope and Applicability
303.502 Lake Sangchris Thermal Discharges

303.APPENDIX A References to Previous Rules
303.APPENDIX B Sources of Codified Sections

AUTHORITY: Implementing Section 13 and authorized by Sections 11(b), 27, and 28 of the Environmental Protection Act [415 ILCS 5/11(b), 13, 27, and 28].

SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 27, p. 221, effective July 5, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 5 Ill.

Reg. 11592, effective October 19, 1981; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended in R87-27 at 12 Ill. Reg. 9917, effective May 27, 1988; amended in R87-2 at 13 Ill. Reg. 15649, effective September 22, 1989; amended in R87-36 at 14 Ill. Reg. 9460, effective May 31, 1990; amended in R86-14 at 14 Ill. Reg. 20724, effective December 18, 1990; amended in R89-14(C) at 16 Ill. Reg. 14684, effective September 10, 1992; amended in R92-17 at 18 Ill. Reg. 2981, effective February 14, 1994; amended in R91-23 at 18 Ill. Reg. 13457, effective August 19, 1994; amended in R93-13 at 19 Ill. Reg. 1310, effective January 30, 1995; amended in R95-14 at 20 Ill. Reg. 3534, effective February 8, 1996; amended in R97-25 at 22 Ill. Reg. 1403, effective December 24, 1997; amended in R01-13 at 26 Ill. Reg. 3517, effective February 22, 2002; amended in R03-11 at 28 Ill. Reg. 3071, effective February 4, 2004; amended in R06-24 at 31 Ill. Reg. 4440, effective February 27, 2007; amended in R09-8 at 33 Ill. Reg. 7903, effective May 29, 2009; amended in R09-11 at 33 Ill. Reg. 12258, effective August 11, 2009; amended in R08-9(A) at 35 Ill. Reg. 15078, effective August 23, 2011; amended in R11-18 at 36 Ill. Reg. 18898, effective December 12, 2012; amended in R08-9(C) at 38 Ill. Reg. 5517, effective February 13, 2014; amended at in R08-09(D) at 39 Ill. Reg. 9423, effective July 1, 2015; amended in R14-24 at 42 Ill. Reg.________, effective________.

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

Section 303.410 Chronic Nickel Water Quality Standard for Segment of the Sangamon River

The general use chronic water quality standard for dissolved nickel contained in Section 302.208(e) shall not apply to the segment of the Sangamon River, which receives discharges from the Sanitary District of Decatur's Main Sewage Treatment Plant, from that facility's Outfall 001 located at 39° 49' 56" North Latitude, 89° 0' 7" West Longitude, to the point of the confluence of the Sangamon River with the South Fork of the Sangamon River near Riverton. Instead, waters in this segment of the Sangamon River must meet a chronic water quality standard for dissolved nickel as follows:

Chronic Dissolved Nickel Standard (µg/L) = exp[A+Bln(H)] x 0.997* x WER,

where A = -2.286, B = 0.8460, ln(H) = natural logarithm of Hardness, and WER (Water Effect Ratio) = 2.50
* conversion factor multiplier for dissolved metals.

(Source: Added at 42 Ill. Reg.________, effective________)

IT IS SO ORDERED.

I, Don A. Brown, Clerk of the Illinois Pollution Control Board, certify that the Board adopted the above opinion and order on July 26, 2018, by a vote of 5-0.

Don A. Brown, Clerk
Illinois Pollution Control Board