ILLINOIS POLLUTION CONTROL BOARD
April 16, 2015

IN THE MATTER OF:	)	
	)	
PETITION OF EMERALD PERFORMANCE	)	AS 13-2
MATERIALS LLC FOR AN ADJUSTED	)	(Adjusted Standard)
STANDARD FROM 35 ILL. ADM. CODE	)	
304.122(b)	)	

OPINION AND ORDER OF THE BOARD (by J.D. O'Leary):

On September 28, 2012, Emerald Performance Materials, LLC (Emerald) filed a petition requesting that the Board renew an adjusted standard previously granted to its chemical manufacturing facility located at 1550 County Road 1450 N. in Henry, Marshall County (facility). *See* Petition of Noveon, Inc. for an Adjusted Standard from 35 Ill. Adm. Code 304.122, AS 02-5 (Nov. 4, 2004) (Noveon). Emerald seeks an adjustment from the total ammonia nitrogen as nitrogen standard at Section 304.122(b) of the Board's effluent standards for the discharge from the facility's wastewater treatment plant. *See* 35 Ill. Adm. Code 304.122(b).

On January 14, 2013, the Illinois Environmental Protection Agency (Agency or Illinois EPA or IEPA) recommended that the Board deny the petition. *See* 415 ILCS 5/28.1 (2012); 35 Ill. Adm. Code 104.416. On June 17, 2014, Emerald and the Agency filed agreed recommended conditions to be included in any relief granted by the Board, although the Agency continued to recommend that the Board not grant the requested adjusted standard.

Based on the record before it, the Board finds that Emerald has provided sufficient justification for each of the factors at Section 28.1 of the Environmental Protection Act (Act) (415 ILCS 5/28.1 (2012)). The Board grants Emerald's petition for an adjusted standard from the Board's ammonia effluent limitation subject to conditions listed in its order below.

In this opinion, the Board first provides the procedural background before addressing preliminary matters and the legal framework for an adjusted standard. The Board then summarizes the factual background, previous Board proceedings regarding the facility, and the current applicable standard. After providing Emerald's originally proposed standard, the Board reviews compliance alternatives considered by Emerald. The Board then summarizes the Agency's recommendation to deny the petition. Next, the Board reviews the agreed recommended conditions submitted by Emerald and the Agency. The Board then discusses the issues presented and statutory factors before reaching its conclusion and issuing its order.

PROCEDURAL BACKGROUND

On September 28, 2012, Emerald filed a petition for an adjusted standard (Pet.) accompanied by fourteen exhibits:

Petition of Noveon, Inc. for an Adjusted Standard from 35 Ill. Adm. Code 304.111, AS02-5 (Nov. 4, 2004) (Exh. 1);

Reissued NPDES [National Pollutant Discharge Elimination System] Permit No. IL0001392 issued February 9, 2007, to Emerald Performance Materials (Exh. 2);

Modified NPDES Permit No. IL0001392 issued to Emerald Performance Materials February 9, 2007, and modified April 27, 2010 (Exh. 3);

Diffuser Performance Evaluation prepared for Noveon, Inc. by AquAeTer (Dec. 2005) (Exh. 4);

Quarterly Mixing Zone Sampling Guidance Manual to Meet NPDES Permit No. IL0001392 Special Condition 18 prepared for Emerald Performance Materials by AquAeTer (April 2007) (Exh. 5);

NPDES Annual Summary Report – NPDES Permit No. IL0001392 submitted by Emerald Performance Materials to Agency and dated December 18, 2006; December 24, 2007; December 22, 2009; January 14, 2010; May 20, 2010; and December 20, 2011 (Exh. 6);

Agency Violation Notice W-2008-00092 to Emerald Performance Materials dated February 29, 2008, and related documents (Exh. 7);

Agency Violation Notice W-2008-00364 to Emerald Performance Materials dated November 20, 2008, and related documents (Exh. 8);

Agency Violation Notice W-2011-30116 to Emerald Performance Materials dated March 31, 2011, and related documents (Exh. 9);

Discharge reports (Exh. 10);

Block flow diagram of wastewater treatment system (Exh. 11);

AquAeTer memorandum regarding "New Ammonia Standards" dated May 10, 2012 (Exh. 12);

Brown and Caldwell letter regarding "Ammonia-Nitrogen Treatment Alternatives for Emerald Performance Materials, LLC – Henry, IL Plant" dated August 27, 2012 (Exh. 13); and

Affidavit of Jarrod Kocin, facility Interim Plant Manager (Exh. 14).

On October 10, 2012, Emerald published notice of filing the petition in the *Henry News Republican*. On October 12, 2012, Emerald filed the certificate of publication of notice. On November 1, 2012, the Board accepted Emerald's petition for hearing.

On November 8, 2012, the Agency filed a motion for a 60-day extension of the deadline to file a recommendation. In an order dated November 13, 2012, the hearing officer granted the motion and extended the deadline to January 14, 2013.

Through a hearing officer order dated December 17, 2012, the Board submitted questions to Emerald regarding the petition and requested a written response as soon as practicable.

On January 14, 2013, the Agency filed its recommendation (Rec.) that the Board deny Emerald's petition for an adjusted standard.

On April 12, 2013, Emerald filed its responses to the questions in the December 17, 2012 hearing officer order (April Resp.), accompanied by five attachments:

> Water Quality Assessment and Waste Assimilative Analysis of the LaGrange Pool, Illinois River (State Water Survey Division, Illinois Department of Energy and Natural Resources June 1981);
> The Effects of Lake Michigan Discretionary Diversion Strategies on Illinois Waterway Dissolved Oxygen Resources (State Water Survey Division, Illinois Department of Energy and Natural Resources July 1983);
> The Impact of Greater Peoria Sanitary District Ammonia Discharges on Illinois River Water Quality (State Water Survey Division, Illinois Department of Energy and Natural Resources November 1984); and
> The Impact of Greater Peoria Sanitary District Ammonia Discharges on Illinois River Water Quality, Part 2 (State Water Survey Division, Illinois Department of Energy and Natural Resources November 1986) (Att. 1);
>
> Appendix B-2 from 303(d) list: Specific Assessment Information for Streams, 2012 (Att. 2);
>
> Ammonia Nitrogen Sampling Results from Illinois River at Diffuser from Annual Summary Reports (Att. 3);
>
> Toxicity test reports (Att. 4); and
>
> Appendices to Diffuser Verification Evaluation (Att. 5).

Through a hearing officer order dated August 1, 2013, the Board submitted to Emerald and the Agency questions regarding the petition, the Agency's recommendation, and Emerald's response to the hearing officer's questions. The order directed Emerald and the Agency to respond by October 8, 2013. On October 8, 2013, the Board received Emerald's response (Oct. Resp.), and on October 9, 2013, the Board received the Agency's response (Agency Resp.).

On June 17, 2014, Emerald and the Agency jointly filed agreed recommended conditions (Joint Rec. Conds.). The parties attached two exhibits to the motion: the text of the Agency's original recommended conditions filed January 14, 2012; and the text of the parties' joint

recommended conditions. The filing also included a request "that the docket from AS 2002-005 be incorporated by reference pursuant to 35 Ill. Adm. Code 101.306" (Mot. Incorp.). Also on June 17, 2014, Emerald and the Agency filed an agreed motion to modify or rescind the Board order issued on November 1, 2012, which noted Emerald's request to hold a hearing and authorized the hearing officer to schedule a hearing (Mot. Modify). In the joint motion, Emerald withdrew its request to hold a hearing.

On June 20, 2014, Emerald filed a motion to file *instanter* (Mot. File). Accompanying the motion were two exhibits. The first, a letter dated July 8, 2013, regarding ammonia-nitrogen treatment alternatives, was intended to replace the material originally submitted with Emerald's petition as Exhibit 13 (Appendix A). The second exhibit provided results of Whole Effluent Toxicity Testing dated November 22, 2013 (Appendix B).

On November 25, 2014, a hearing officer order directed Emerald to address the issue whether PolyOne should become a party to this proceeding. Emerald filed its response on December 2, 2014 (Emerald Resp.).

PRELIMINARY MATTERS

Hearing Officer Order (November 25, 2014)

In an order on November 25, 2014, the hearing officer noted that the Agency had modified Emerald's NPDES permit by designating PolyOne as a co-permittee. Pet. at 6-7; *see id*., Exh. 3. The order also noted that the Agency's recommendation asserts that "the Board lacks authority to grant the requested relief because the co-permittee, PolyOne, is not a party to this action." Rec. at 22.

Emerald's petition states that, "[b]ased upon discussions with the Agency concerning this petition it was determined that PolyOne should be included as a named recipient of any relief granted by the Board so as to allow the Agency to reissue the Henry Plant NPDES Permit with such relief. . . ." Pet. at 7, n.2. The petition further states that naming PolyOne as a recipient would allow the Agency to "reissue the current NPDES Permit with any relief ultimately granted." *Id*. The petition adds that "PolyOne has agreed to this and if necessary become a Party to this proceeding." *Id*. The hearing officer order directed Emerald within 14 days to submit any motion or other filing it deemed appropriate to address this issue.

In its response filed December 2, 2014, Emerald states that it has filed a timely application for renewal of its modified NPDES permit. Emerald Resp. at 1. Emerald reports that the Agency intends to wait for the Board's decision in this matter before renewing that permit. *Id*.

Emerald states that PolyOne has sold its Henry facility to Mexichem, Inc., which now operates the facility as Mexichem Specialty Resins, Inc. (Mexichem). Emerald Resp. at 1. Emerald states that, since the Agency filed its recommendation, Mexichem sent the Agency a letter requesting "to be removed from the Emerald NDPES permit IL0001392-1 as a co-permittee based on several reasons. . . ." *Id*., *see* Attachment (letter to IEPA from Mexichem).

The letter reports that these reasons include "1) Mexichem has no operational control, 2) Mexichem has not been involved with current or historical permit applications/renewals, 3) language stated in Special Condition 4 of the current permit regarding PolyOne (Mexichem) streams, and 4) the process descriptions titled A01 and B01 and supporting plot plans and SWPP [stormwater pollution prevention] flows that include the entire site (both companies)." *Id*.; *see* Pet., Exh. 3 (addressing discharges and monitoring samples from outfalls A01 and B01 in Special Condition 4).

Emerald indicates that its counsel has discussed this case with the Agency, which reports that it "cannot take any action to modify the expired Emerald NPDES Permit in response to the Mexichem letter and will address the Mexichem request when the Emerald NPDES Permit is proposed for issuance following the Pollution Control Board decision in this case." Emerald Resp. at 1. Emerald states that it "does not believe that any modification to the requested relief is necessary; and the issue concerning the IEPA comment regarding the need to have the additional party added to this proceeding is moot given the pending request by Mexichem to be dropped as a co-permittee." *Id*.

The Board has reviewed Emerald's response to the hearing officer order of November 25, 2014, and the attached letter from Mexichem to the Agency. In the absence of a pending motion, the Board takes no action to add a party to this matter and proceeds to consider the petition as a request only by Emerald.

Incorporation of Record in AS 02-5

Summary of Motion

As noted above under "Procedural Background," the agreed recommended conditions also includes a request "that the docket from AS 2002-005 be incorporated by reference pursuant to 35 Ill. Adm. Code 101.306." Joint Rec. Conds. at 4. The request states that "Emerald's petition presents the same technical treatment alternatives presented in the petition for adjusted standard filed by Emerald in AS 2002-005, on which the Board held a hearing in 2004 and granted relief to Emerald." *Id*. Emerald and the Agency request that "the docket in AS 2002-05 be incorporated by reference in lieu of a hearing on this matter." *Id*. at 5.

Board Discussion

Section 101.306(a) of the Board's procedural rules[1] provides in pertinent part that,

> [u]pon the separate written request of any person or on its own initiative, the Board or hearing officer may incorporate materials from the record of another Board docket into any proceeding. The person seeking incorporation must file with the Board 4 copies of the material to be incorporated. The Board or hearing

[1] Since the filing of Emerald's petition, the Board has amended Section 101.306(a) only to the extent of cross-referencing provisions for electronic filing of documents. *See* Procedural Rule to Implement Electronic Filing and Allow for Public Remarks at Board Meetings, R 14-21, slip op. at 33 (Jan. 22, 2015).

> officer may approve a reduced number of copies for documents incorporated in other Board dockets. The person seeking incorporation must demonstrate to the Board or the hearing officer that the material to be incorporated is authentic, credible, and relevant to the proceeding. Notice of the request must be given to all identified participants or parties by the person seeking incorporation. 35 Ill. Adm. Code 101.306.

Emerald and the Agency have submitted a written request that the Board incorporate the record of AS 02-5, Petition of Noveon, Inc. for an Adjusted Standard from 35 Ill. Adm. Code 304.122, into the record of this proceeding. The Board notes that, while Section 101.306 of its procedural rules requires the filing of four copies of the material sought to be incorporated, the request did not include copies of the record in AS 02-5. However, Section 101.306 allows the Board to approve a reduced number of copies for documents incorporated in other Board dockets such as AS 02-5. The Board notes that the record in AS 02-5 is on file with the Board's Clerk and is largely available to the participants and the public through the Clerk's Office On-Line (COOL).

The Board also notes the joint request's claim that the Board relied on the record in AS 02-5 to evaluate many of the same technical treatment alternatives and to conduct a hearing and grant the petition. The Board construes this as a claim that the record is "authentic, credible, and relevant to the proceeding." 35 Ill. Adm. Code 101.306(a). In addition, the Board notes that this request is filed jointly by Emerald and the Agency and that the accompanying certificate of service reflects service on persons appearing on the Service List in this proceeding. *See id*.

Having reviewed the request by Emerald and the Agency to incorporate the record in AS 02-5 into the record of this proceeding, and in the absence of any opposition, the Board grants the request. In doing so, the Board under the circumstances of this case allows the incorporation without submitting additional copies of the record in AS 02-5 that is on file with the Board's Clerk. Having granted the joint motion, the Board directs the Clerk to place a copy of the record of the proceeding in AS 02-05 into the record of AS 13-2. *See* Citgo Petroleum Corp. and PDV Midwest Refining, L.L.C. v. IEPA, PCB 08-33, slip op. at 1 (Feb. 21, 2008).

The Board notes that Section 101.306(b) of its procedural rules provides that

> "[t]he Board will give the incorporated matter the appropriate weight in light of the following factors: the standard of evidence under which the material was previously presented to the Board; the present purpose for incorporating the material; and the past and current opportunity of cross-examination of the matters asserted within the incorporated material." 35 Ill. Adm. Code 101.306(b).

Agreed Motion to Modify or Rescind

Summary of Motion

As noted above under "Procedural Background," on June 17, 2014, Emerald and the Agency filed an agreed motion to modify or rescind Board order. The agreed motion notes that

the Board's November 1, 2012 order accepted Emerald's petition and authorized a hearing in this matter. Mot. Modify at 1 (¶2). The agreed motion states that "Emerald and the Illinois EPA have held extensive discussions regarding the requested relief and have provided information in response to Hearing Officer Orders. As a result the Parties believe that the Board can and should rule on the requested relief based upon the information presented in the pleadings, the responses to the Hearing Officer Orders and the previous record in AS 2005-05 and have reached an agreement to that effect" as presented in agreed recommended conditions. *Id*. (¶3). The agreed motion states that, "[b]ased upon this agreement Emerald withdraws its request that a hearing be held." *Id*. (¶4). Emerald and the Agency request that the Board modify its November 1, 2012 order, decide this matter without a hearing and, in the event that the Board determines to grant the requested adjusted standard, impose the parties' agreed recommended conditions. *Id*. at 1.

Board Discussion

The Board's procedural rules provide that the Board will hold a public hearing on a petition for an adjusted standard if

1) The petitioner requests a hearing be held; or

2) The Board receives a hearing request by any person pursuant to Section 104.420 of this Part, not later than 21 days after the date of the publication of the petition notice in accordance with Section 104.408 of this Part; or

3) The Board *in its discretion determines that a hearing would be advisable*. . . . 35 Ill. Adm. Code 104.422(a).

Emerald's petition requested that the Board hold a hearing in this matter. Pet. at 36. The Board did not receive within 21 days of publication of notice any request to hold a hearing. *See* 35 Ill. Adm. Code 104.422(a)(2). The Board has received no public comment on this case while it has been pending. In its recommendation, the Agency stated that it "does not believe a hearing is necessary. . . ." Rec. at 21.

In Emerald's and the Agency's subsequent agreed motion, Emerald withdraws its request that the Board hold a hearing. Mot. Modify at 1. Section 104.420(b) of the Board's procedural rules provides in its entirety that, "[w]here all parties and participants who have requested a hearing pursuant to this Subpart [D: Adjusted Standards] have withdrawn their requests for a hearing, the hearing will not be held unless the Board in its discretion deems it advisable." 35 Ill. Adm. Code 104.420(b). Emerald has withdrawn the only request to hold a hearing in this matter. Under Section 104.420(b), no hearing will be held, and the Board denies the agreed motion to modify or rescind as unnecessary.

Motion to File *Instanter*

Summary of Motion

As noted above under "Procedural Background," on June 20, 2014, Emerald filed a motion to file *instanter*, accompanied by two exhibits.

The motion first notes that Emerald's petition included an Exhibit 13, a letter dated August 27, 2012, regarding Ammonia-Nitrogen treatment alternatives. Mot. File at 1; *see* Pet., Exh. 13. Attached to the motion as Appendix A is "a revised letter dated July 8, 2013, . . . to replace that which was originally submitted as Exhibit 13." Mot. File at 1.

The motion next notes that, in its October 8, 2013 response to Board questions, "Emerald stated that it would provide the results of additional Whole Effluent Toxicity Testing to the Board and to the Agency." Mot. File at 1. Attached to the motion as Appendix B is "a copy of Whole Effluent Toxicity Testing dated November 22, 2013." *Id*.

The motion states that each of the two documents had previously been provided to the Agency. Mot. File at 1. The motion further states that counsel for Emerald "has been authorized to state that the Agency does not have any objection to this request . . . ." *Id*. Emerald requests that the Board grant the motion "and accept the two attached documents into the record of this proceeding for consideration in ruling on the requested relief." *Id*. at 2.

Board Discussion

The Board's procedural rules provide that, "[w]ithin 14 days after service of a motion, a party may file a response to the motion. If no response is filed, the party will be deemed to have waived objection to the granting of the motion, but the waiver of objection does not bind the Board . . . in its disposition of the motion. 35 Ill. Adm. Code 101.500(d). The Board notes Emerald's statement that the Agency does not object to including these two appendices in the record.

Having reviewed the motion and attached exhibits, and in the absence of any objection, the Board grants the unopposed motion for leave to file *instanter* and accepts the two attached appendices into the record of this proceeding.

LEGAL FRAMEWORK FOR ADJUSTED STANDARD

Petition and Notice of Filing

The Act and the Board's procedural rules provide that a petitioner may request, and the Board may grant, an environmental standard that is different from the generally applicable standard that would otherwise apply to the petitioner. This is called an adjusted standard. The general procedures that govern an adjusted standard proceeding are found at Section 28.1 of the Act and Section 104.Subpart D of the Board's procedural rules. 415 ILCS 5/28.1 (2012); 35 Ill. Adm. Code 104.400 *et seq*.

The Board's procedural rules specify the required contents of a petition for an adjusted standard. *See* 35 Ill. Adm. Code 104.406, 104.416. Once a petition for an adjusted standard is filed, the Agency must file its recommendation with the Board. *See* 415 ILCS 5/28.1(d)(3)

(2012); 35 Ill. Adm. Code 104.416. The adjusted standard proceeding is adjudicatory in nature and therefore is not subject to the rulemaking provisions of the Act or the Illinois Administrative Procedure Act (5 ILCS 100/1-1 *et seq*. (2012)). *See* 415 ILCS 5/28.1(a) (2012); 35 Ill. Adm. Code 101.202 (defining "adjudicatory proceeding").

Section 28.1(d)(1) of the Act (415 ILCS 5/28.1(d)(1) (2012)) and Section 104.408(a) of the Board's procedural rules (35 Ill. Adm. Code 104.408(a) (quoting the Act)) require the adjusted standard petitioner to publish notice of filing the petition by advertisement in a newspaper of general circulation in the area likely to be affected by the proposed adjusted standard. Under those provisions, publication must take place within 14 days after the petition is filed. The newspaper notice must indicate that any person may cause a public hearing to be held on the proposed adjusted standard by filing a hearing request with the Board within 21 days after publication. *See* 415 ILCS 5/28.1(d)(1) (2012); 35 Ill. Adm. Code 104.408(b).

Standard of Review and Burden of Proof

Emerald seeks an adjusted standard from the rules of general applicability at 35 Ill. Adm. Code 304.122(b), which does not specify the level of justification that must be met by a petitioner for an adjusted standard. Pet. at 12. Therefore, in determining whether to grant the requested adjusted standard, the Board must consider, and Emerald has the burden to prove, the factors at Section 28.1(c) of the Act:

1) factors relating to that petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to the petitioner;

2) the existence of those factors justifies an adjusted standard;

3) the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and

4) the adjusted standard is consistent with any applicable federal law. 415 ILCS 5/28.1(c) (2012); *see* Pet. at 32-33; Rec. at 16.

The burden of proof in an adjusted standard proceeding is on the petitioner. *See* 415 ILCS 5/28.1(b), (c) (2012); 35 Ill. Adm. Code 104.426. Once granted, the adjusted standard, instead of the rule of general applicability, applies to the petitioner. *See* 415 ILCS 5/28.1(a) (2012); 35 Ill. Adm. Code 101.202, 104.400(a). In granting adjusted standards, the Board may impose conditions as may be necessary to accomplish the purposes of the Act. *See* 415 ILCS 5/28.1(a) (2012); 35 Ill. Adm. Code 104.428(a).

In both a general rulemaking and a site-specific rulemaking, "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." 415 ILCS 5/27(a) (2012). Section 28.1 of the Act requires that the petitioner justify an adjusted standard consistent with Section 27(a) of the Act (415 ILCS 5/27(a), 28.1 (2012)).

FACTUAL BACKGROUND

Ownership of Facility

Emerald reports that "[t]he facility was solely owned and operated by the B.F. Goodrich Company from its initial construction in 1958 until 1993." Pet. at 13; *see id*. at 1.

Emerald states that the B.F. Goodrich Company divested the Geon Vinyl Division from the company in 1993 and formed The Geon Company, a separate, publicly-held company. Pet. at 1-2, 13. The Geon Company operated the polyvinyl chloride (PVC) resin operations at the facility until August 31, 2000, when it consolidated with the M.A. Hanna Company to form PolyOne. *Id*. at 2, 13. Emerald states that PolyOne "continues to own and operate the PVC resin production plant." *Id*. at 2, 13.

Emerald states that the B.F. Goodrich Company sold all assets of its chemical business, including the facility, to Noveon in February 2001. Pet. at 2, 13. Emerald adds that, in June of 2004, Noveon completed the sale of a portion of its operations including the facility to The Lubrizol Company. *Id*. Emerald has owned the facility since May 1, 2006. *Id*. The new owner formed Emerald Performance Materials, LLC to own and operate plants including the facility. *Id*.

Emerald states that "[b]oth the PVC resin and specialty chemicals portion of the original B.F. Goodrich plant have remained largely unchanged, despite the history of corporate ownership with only limited curtailment and replacement of individual products." Pet. at 2.

The petition states that PolyOne and Emerald continue to operate the facility "in basically the same manner as was presented in AS 02-5." Pet. at 13; *see* Noveon. "The wastewater treatment system is owned and operated by Emerald and the system continues to treat the wastewater" from Emerald's and PolyOne's operations at the facility under a service agreement. Pet. at 13. The petition notes that the Agency has modified the facility's NPDES permit to include PolyOne as a co-permittee. *Id*.; *see id*., Exh. 3. The petition indicates that Emerald and the Agency have "determined that PolyOne should be included as a named recipient of any relief granted by the Board . . . so that the Agency can reissue the current NPDES permit with any relief ultimately granted. PolyOne has agreed to this and if necessary become a Party to this proceeding." *Id*. at 7, n.2.

Facility Production

Emerald states that the facility produces two broad categories of products, accelerators and anti-oxidants. Pet. at 14.

Emerald states that accelerators are used in rubber products such as tires to accelerate the curing process. Pet. at 14. Accelerators have historically been the large majority of the facility's production, and they accounted for 75% of the 2012 output. *Id*. Emerald states that accelerator production at the facility relies almost entirely on mercaptobenzothiazole (MBT) as the key intermediate. *Id*. Emerald adds that MBT-based accelerators are the most common type and are both relatively inexpensive and very efficient. *Id*. Emerald asserts that, "[g]iven the low cost and high value MBT-based accelerators provide customers, it is highly unlikely they will be replaced in the foreseeable future." *Id*. Emerald stresses that it "is the sole remaining manufacturer of MBT in the United States." *Id*. It adds that it is also the sole U.S. producer of the accelerator chemicals Curite 18, OBTS, and MBDS. *Id*. at 14-15. Emerald states that accelerator production involves raw materials including "sulfur, aniline, carbon disulfide, and amines." *Id*. at 15. The multi-step manufacturing process includes "the manufacture of an intermediate (sodium mercaptobenzothiazole). This intermediate is then reacted with an amine and other raw materials to form an accelerator product. The product is then isolated through filtration and drying." *Id*.

Emerald states that anti-oxidants are used to inhibit oxidation in such materials as rubber, jet fuel, greases, oils, and polypropylene. Pet. at 14. The facility manufactures various anti-oxidants, which use "either diphenylamine or one of several phenols as a starting material. The processes consist of both batch and continuous reactors, filtration operations and solidification." *Id*. at 15. Emerald adds that it continues to produce most of the same products that Noveon described to the Board in the proceedings in AS 02-5. *Id*.

PolyOne produces PVC resins, which are sold to customers including those "in the construction, household furnishings, consumer goods, electrical, packaging, and transportation industries." Pet. at 15. "PolyOne uses a small amount of ammonia as an ingredient to produce an emulsifier for use in one of the PVC processes." *Id*. at 16.

Emerald states that "ammonia is not a major raw material in any of the processes" at the facility. Pet. at 16. Because it is not a primary ingredient in any process or product, "the source of ammonia nitrogen in the effluent is not directly related to the level of ammonia in the raw waste water discharged to the treatment plant." *Id*. Amines used in many of the products produced at the facility serve as precursors to formation of ammonia nitrogen. *Id*. at 21-22. Emerald states that "the amines in the wastewater are converted to ammonia nitrogen in the wastewater treatment process and, because nitrification does not occur as a result of inhibition, the ammonia nitrogen is subsequently discharged from the wastewater treatment plant." *Id*. at 16. Brown and Caldwell noted that "most of the effluent ammonia discharge originates as influent organic nitrogen that is bio-hydrolized to ammonia during the treatment provided in the onsite wastewater treatment facility." Appendix B at 1. Brown and Caldwell explained that inhibition of nitrification in the wastewater treatment facility is attributable largely to MBT in the wastewater. Pet. at 29; Appendix A at 4-5.

Wastewater Treatment System

Capacity

Emerald states that it owns and operates the facility's wastewater treatment system, which treats wastewater from both PolyOne's and Emerald's processes under a service agreement. Pet. at 13. The system treats approximately 380,000 gallons per day of effluent from the PolyOne operations. *Id*. "Emerald operations contribute approximately 150,000 gallons per day." *Id*. at 13-14. The system also treats approximately 270,000 gallons per day of "combined PolyOne and Emerald utility waters and potential contact stormwater." *Id*. at 14. Total daily discharge of process and non-process water from the facility's wastewater treatment facility is approximately 800,000 gallons. *Id*.

In a hearing officer order, the Board noted Brown and Caldwell's report that effluent NH_3-N loads had decreased by 48 percent since 2002 due to shutdowns, lower production, and improved recovery. Pet., Exh. 13 at 2; *see* Appendix A at 2, 3 (Table 2). The Board asked whether the reported total discharge is still 800,000 gallons/day. Emerald responded by referring to wasteloads it used to consider compliance alternatives. April Resp. at 3. Emerald stated that the volume of discharged wastewater changed only from an average of 560 gallons per minute (gpm) or 806,000 gallons per day (gpd) in 2002 to 538 gpm or 775,000 gpd for the period of March 2010 to February 2011. *Id*. Emerald added that, for the full year of 2011, "the peak was 738 gpm and the average was 549 gpm. In 2012, the peak was 884 gpm and the average was 596 gpm." *Id*.

Processes

Before transfer to the primary treatment system, "[a]ll process wastewater is collected in equalization tanks." Pet. at 17; *see id*., Exh. 11 (Process Flow Block Diagram). Wastewater from production of accelerators and antioxidants discharges either to the polymer chemical (PC) equalization tank or the Cure-Rite 18® equalization tank. *Id*. at 17. "Waste activated sludge and solids from the PolyOne 213 wastewater pretreatment system that are not captured by the solids filter press discharge to the PVC equalization tank." *Id*. The PVC equalization tank at times "may also receive recycle streams from various wastewater treatment processes." *Id*.

"Non-process wastewater, including non-contact cooling water, potential contact stormwater, water from the boilerhouse demineralizer and water treatment works, is discharged to two holding ponds." Pet. at 18. From those ponds, the wastewater is pumped into the primary treatment system. *Id*.

"In the primary treatment system, wastewaters are mixed, pH is adjusted, coagulant and flocculent are added, then wastewater is sent to the primary clarifier where suspended solids are separated. The solids are dewatered and sent to a landfill as a non-hazardous special waste." Pet. at 17; *see id*., Exh. 11.

From the primary clarifier, "wastewater is sent to activated sludge treatment consisting of up to four 'biotreators.'" Pet. at 17. Biotreators are tanks as large as one million gallons that

"contain biomass to degrade the organic matter in the wastewater." *Id*. Addition of air "ensures that the biomass has sufficient oxygen to complete the degradation of organic materials and also ensures through agitation that the biomass comes into adequate contact with the organic matter contained in the wastewater." *Id*.

After this biological treatment, "wastewater flows into the secondary clarifier where more coagulant and flocculent are added." Pet. at 17. During secondary clarification, solids removed "are primarily biomass and are returned to the biotreators." *Id*.

From the secondary clarifier, wastewater is "sent to a traveling bridge sand filter." Pet. at 18. A sand bed removes additional solids, "and the effluent flows into a concrete sump leading to the outfall. Backwash from the sand filter is recycled back into the primary treatment system." *Id*.

Emerald notes that the City of Henry operates a municipal wastewater treatment system adjacent to the facility. Pet. at 18. The City's treated discharge combines with the facility's treated effluent and is then discharged through the facility's outfall into the Illinois River. *Id*. Compliance sampling of the two waste streams is performed before they are combined. *Id*.

Emerald states that the system has historically provided greater than 95% reduction of biochemical oxygen demand while discharging ammonia nitrogen in concentrations ranging from 23-150 mg/L with the exception of two three-day periods of upsets. Pet. at 16, citing Exh. 10. Brown and Caldwell explained that, although the wastewater treatment plant operates under conditions that would prompt biological nitrification, there is a lack of nitrification resulting from the bio-inhibition of nitrifying bacteria presumably caused by MBT in the wastewater. Pet. at 29; Appendix A at 4-5.

Discharge from Treatment Facility

The treatment facility's effluent originally discharged through an 18-inch single-port submerged diffuser to the main channel of the Illinois River. Pet. at 19. Emerald states that, because the facility "sits 40 to 50 feet above the Illinois River, the effluent enters the river with great velocity." *Id*. The original diffuser was replaced in October 2005 with a high-rate multi-port diffuser. *Id*. at 7, 19.

Based on analysis of the facility's discharge, AquAeTer, a firm providing environmental engineering services, determined that "the dispersion required to meet the acute [ammonia] standard is 11.5:1 and to meet the chronic [ammonia] standard is 68.1:1." Pet. at 19, citing Exh. 12. AquAeTer's previous analysis "showed that the multi-port diffuser achieves a dispersion of 39.7:1 in the zone of initial dilution and a dispersion of 239.2:1 at a distance of 553 feet." Pet. at 19; *see* Exh. 12 at 2. Emerald reports that, between January 1, 2007, and January 31, 2012, the facility's effluent "has had an ammonia concentration ranging from 23 to 150 mg/L with the exception of two three-day periods when the concentration exceeded 155 and reached as high as 180 mg/L of ammonia." Pet. at 19, citing Exh. 10. However, based on its analysis, "AquAeTer has determined that these discharges of total ammonia nitrogen as N can be discharged from the

multi-port diffuser during summer and winter conditions, respectively, and still achieve the applicable acute and chronic total ammonia nitrogen as N water quality standards." *Id*. at 19-20.

In a hearing officer order, the Board asked Emerald to provide ammonia discharge data in terms of pounds per day and to indicate the average. Emerald responded that NH_3-N averaged 473 lbs/day from March 2010 to February 2011. April Resp. at 3. "Data from the full year of 2011 indicates that the peak for ammonia was 1449 lbs/day and the average was 579 lbs/day. Data from 2012 indicates that the peak for ammonia was 872 lbs/day and the average was 468 lbs/day." *Id*.

In addition, the Board noted that the petition in AS 02-5 reported average effluent ammonia of 909 lbs/day and that the NPDES permit establishes a daily maximum load of 1848.6 lbs/day for ammonia (as N). *See* Pet., Exhs. 1, 2. The Board asked whether, in light of decreased effluent loads reported by Brown and Caldwell, the permitted daily maximum load is still necessary. Emerald responded that the maximum daily load for NH_3-N "can be reduced to 1,500 lbs/day to reflect the progress made by Emerald in reducing effluent ammonia. This accommodates the highest daily load experienced during 2011 of 1449 lbs/day." April Resp. at 3.

Area Affected by Discharge

After treatment, wastewater is discharged to the Illinois River through a high rate multi-port diffuser at Outfall 001 under the terms of NPDES Permit No. IL0001392. Pet. at 18; *see* Exh. 2 (permit). The facility is situated on the west bank of the Illinois River between river miles 198 and 199. Pet. at 18. At the facility, the Illinois River is approximately 875 feet wide with an approximate maximum depth of 18 feet. *Id*. at 19. "The average depth of the river is 11 feet, and it has a drainage area of approximately 13,543 square miles at Henry, Illinois." *Id*. A gauging station operated at Henry since 1981 shows that the Illinois River at that location "has a mean average flow of 15,340 cubic feet per second (cfs)." *Id*. According to the Illinois State Water Survey, the Illinois River at Henry has an annual 7-day, 10-year low flow of 3,400 cfs. *Id*.

Agency Permitting of Facility

On December 27, 2006, the Agency provided public notice of reissuance of Permit No, IL0001392. Pet. at 6. On February 9, 2007, the Agency issued a revised permit effective from May 1, 2007, to April 30, 2012. *Id*.; *see id*., Exh. 2. On April 27, 2010, the Agency issued a permit modification designating PolyOne as a co-permittee. Pet. at 6-7; *see id*., Exh. 3. The petition indicates that Emerald and the Agency have "determined that PolyOne should be included as a named recipient of any relief granted by the Board . . . so that the Agency can reissue the current NPDES permit with any relief ultimately granted." *Id*. at 7, n.2. The petition adds that "[a] timely renewal of the modified NPDES permit was submitted on November 1, 2011" and remains pending before the Agency." *Id*. at 7.

SUMMARY OF PREVIOUS BOARD PROCEEDINGS REGARDING FACILITY

PCB 91-17

Emerald states that, on January 24, 1991, B.F. Goodrich appealed renewed NPDES Permit No. IL0001392 addressing wastewater discharge from the facility. Pet. at 2; *see* Noveon, Inc. f/k/a BF Goodrich Corporation (Henry Facility) v. IEPA, PCB 91-17. The permit issued by the Agency included an ammonia effluent limitation of 3.0 mg/L based on 35 Ill. Adm. Code 304.122(b) that previous permits had not included. Pet. at 2. Emerald reports that, after two days of hearing in that proceeding, "it was agreed that the appropriate course of action would be for B.F. Goodrich to file a variance petition with the Board." *Id*. at 3. Emerald reports that the parties agreed to stay PCB 91-17 through a series of waivers of the decision deadline with status reports to the Board. *Id*.

After a hearing on February 17, 2004, the Board upheld the Agency's determination to include an ammonia effluent limit in the NPDES permit for the facility. The Board found that Noveon's level of treatment did not constitute Best Degree of Treatment (BDT) and that dilution was not therefore allowed. Pet. at 4; *see* Noveon, Inc. f/k/a BF Goodrich Corporation (Henry Facility) v. IEPA, PCB 91-17 (Sept. 16, 2004).

PCB 92-167

Emerald states that "[a] variance petition was filed on October 30, 1992 by Noveon which by then had purchased the Henry Plant from B.F. Goodrich. Pet. at 3; *see* Noveon, Inc., f/k/a BF Goodrich Company (Henry Facility) v. IEPA, PCB 92-167; *but see* Pet. at 13 (stating that facility "solely owned and operated by B.F. Goodrich Company" until 1993). Emerald reports that the parties also agreed to stay PCB 92-167. Pet. at 3.

Emerald states that, while these proceedings were pending, there were reviews of ammonia reduction and treatment technologies, studies of facility processes, and meetings with the Agency to review the findings. Pet. at 3. Emerald adds that, based on these efforts, "it was concluded in 1998 that none of the available treatment technologies were both economically reasonable and technically feasible to implement in order to significantly reduce the ammonia in the wastewater from the Henry Plant to a level that would achieve compliance with Section 304.122(b)." *Id*. at 3-4. Because a variance requires eventual compliance with the standard from which relief is sought, "it was agreed that pursuing an adjusted standard from the Board was appropriate. . . ." *Id*. at 4. On June 20, 2002, the Board granted a motion to withdraw the petition for a variance. *Id*.; *see* Noveon, Inc., f/k/a BF Goodrich Company (Henry Facility) v. IEPA, PCB 92-167 (June 20, 2002).

AS 02-5

On May 22, 2002, Noveon filed a petition for an adjusted standard. Pet. at 4; *see* Noveon (May 22, 2002). Emerald reports that, while the parties continued to discuss resolution of Agency issues, the parties reported to the Board in January 2003 that neither the pending permit

appeal nor the variance would reach a settlement agreement. Pet. at 4. The Agency filed a recommendation opposing the requested adjusted standard. *Id*.; *see* Noveon (June 18, 2003).

The Board granted Noveon an adjusted standard from the ammonia effluent limitation in Section 304.122(b). Noveon, slip op. at 21-22 (Nov. 4, 2004); Pet., Exh. 1. The Board provided that the ammonia nitrogen discharge from the facility could not exceed 155 mg/L. Pet. Exh. 1 at 22. Although the Board found that Noveon provided BDT and qualified for a mixing zone and zone of initial dilution (ZID), it directed the Agency designate them "in accordance with Board mixing zone regulations, through the NPDES permitting process." Pet. at 5; *see* Noveon, slip op. at 19-21 (Nov. 4, 2004); Exh. 1.

Conditions on Grant of Adjusted Standard

In granting an adjusted standard, the Board imposed a number of conditions. Noveon, slip op. at 22-23 (Nov. 4, 2004); Exh. 1; *see* Pet. at 6.

Sunset. First, the Board provided that "[t]his adjusted standard will expire on November 4, 2011." Noveon, slip op. at 22 (Nov. 4, 2004). The Board stated that "[t]his period of time will allow Noveon to complete the installation of the multi-port diffuser and perform water quality monitoring and reporting obligations required by this adjusted standard." *Id*. at 21. The Board added that, after seven years, "more economically reasonable technology may become available and revisiting the ammonia nitrogen issue at that time will be beneficial." *Id*.

Ammonia Limit. The Board provided that "Noveon must not discharge calculated total ammonia nitrogen at concentrations greater than 155 mg/L from its Henry, Illinois plant into the Illinois River." Noveon, slip op. at 22 (Nov. 4, 2004). The Board did not agree that, "simply because the Agency calculated a theoretical level that is higher than what Noveon actually discharges, Noveon should be permitted to discharge up to that amount." *Id*. at 21; *see id*. at 9.

Diffuser. The Board also adopted a condition providing that "[d]ischarge into the Illinois River shall occur through a high-rate, multi-port diffuser designed to achieve an effluent dispersion necessary to meet the applicable ammonia nitrogen water quality standards at the edge of the mixing zone and zone of initial dilution (ZID). Noveon must install the multi-port diffuser within one year of issuance of its revised NPDES permit." Noveon, slip op. at 21, 22 (Nov. 4, 2004).

Quarterly Monitoring. The Board also added monitoring requirements establishing that "Noveon must monitor ammonia nitrogen in the Illinois River on a quarterly basis to demonstrate compliance with the applicable ammonia water quality standards in accordance with 35 Ill. Adm. Code 302.212. The monitoring must commence within 30 days of the installation of the multi-port diffuser and continue until termination of the adjusted standard." Noveon, slip op. at 22 (Nov. 4, 2004). The Board also required Noveon to submit monitoring results to the Agency in an annual report. *Id*.

Investigation of Production Methods and Treatment Technologies. The Board also adopted a condition requiring Noveon to "continue to investigate production methods and

technologies that generate less ammonia in Noveon's discharge into the Illinois River. When practicable, Noveon must substitute current methods or technologies with new ones so long as the substitution generates less ammonia in Noveon's discharge." Noveon, slip op. at 22 (Nov. 4, 2004). The condition also provided that "Noveon must perform any reasonable test of new technologically or economically reasonable production methods or materials applicable to the specialty chemicals manufacturing process, which may reduce ammonia concentrations in the discharge from Noveon's facility" which the Agency specifically requests in writing that it perform. *Id*. In response to a Board question, Emerald reported that the Agency has not made any request for such a test. April Resp. at 7. The Board also required that "Noveon must prepare and submit each year an annual report summarizing the activities and results of these investigatory efforts." Pet. at 22-23.

Compliance. The Board also adopted a condition requiring that "Noveon must operate in full compliance with the Clean Water Act, its National Pollutant Discharge Elimination System program, the Board's water pollution regulations, and any other applicable regulation." Noveon, slip op. at 23 (Nov. 4, 2004).

Attempts to Achieve Compliance with Conditions

Diffuser. Emerald states that, on October 4, 2005, it completed installation of the multi-port diffuser at a cost of more than $1.3 million. Pet. at 7, 12. Emerald notes that the Board had required installation within one year after issuance of a revised NPDES permit, or by February 9, 2008. *Id*. Emerald states that AquAeTer completed a dispersion study of the diffuser on October 25, 2005, and submitted a report to the Agency on December 21, 2005. Pet. at 7, 12; *see id*., Exh. 4 ("Diffuser Performance Evaluation"). "The results showed that the ammonia discharge was fully mixed at the edge of the ZID with a dispersion of 47.9:1 (2% effluent) and a dispersion of 299.9:1 (0.3%) at the edge of the mixing zone." *Id*. at 7, 12. Emerald asserts that the results demonstrate that "the acute total ammonia nitrogen as N water quality standard would be met within the ZID and that the chronic total ammonia nitrogen as N water quality standard would also be met within the total mixing zone." *Id*. at 7. Emerald states that the Agency granted a ZID and mixing zone reflected in the 2007 reissued NPDES permit. *Id*. at 7, 12; *see id*., Exh. 2.

Quarterly Monitoring. Emerald reports that AquAeTer and the Agency agreed to a program for monitoring ammonia concentrations as required by the Board's Order in AS02-5. Pet. at 7-8; *see* Noveon, slip op. at 22 (Nov. 4, 2004). AquAeTer subsequently prepared a monitoring plan that has been used by Emerald "to monitor the Illinois River ammonia nitrogen levels on a quarterly basis to demonstrate that its discharge does not result in an exceedance of the water quality standard." Pet. at 8; *see id*., Exh. 5.

Discharge Monitoring Report (DMR). Emerald states that it has compiled monitoring results for ammonia nitrogen as N, biological oxygen demand (BOD), total suspended solids (TSS), flow, pH, and temperature. Pet. at 9-10; *see id*., Exh. 10. Emerald reports that it has submitted these results to the Agency monthly from January 1, 2001 through January 31, 2012. *Id*. Emerald states that these data show that, "with the exception of a three-day period in August of 2011 when the concentration was reported to be 180 mg/L ammonia and a three-day period from August 30 to September 1, 2011 with concentrations of 170, 170 and 160 mg/L ammonia

all other discharges have been in compliance with the 155 mg/L total ammonia nitrogen limit." Pet. at 10. Emerald further states that, "[e]ven with these higher concentration numbers, the NPDES permit daily maximum ammonia load limit of 1,848.6 pounds per day was not exceeded." *Id*.

Effluent Toxicity Testing. Emerald states that it has conducted effluent toxicity testing and reported results to the Agency as required by its permit. Pet. at 10. Emerald states that, "[a]t the edge of the ZID, which was set at 20 feet downstream from the diffuser discharge in the approved mixing zone study, a dispersion of 39.8:1 was achieved which gives an LC_{50} of 2.51 percent by volume." *Id*. Emerald asserts that, "[b]ecause all of the acute toxicity testing results to date have been [] above this value, Emerald is meeting their toxicity limit for LC_{50} of greater than or equal to 2.51 percent by volume." *Id*.

In a hearing officer order, the Board noted that Emerald had provided its procedure for conducting toxicity testing but had not submitted results with its petition. *See* Pet. at 10; Pet., Exh. 2 at 7. In response, Emerald submitted reports of toxicity testing performed in 2006. A 96-hour acute test, which is performed on *Pimephales promelas* (fathead minnow), showed an estimated LC_{50} value of 7.4% effluent with 95% confidence limit of 5.9 – 9.2%. A 48-hour acute test, which is performed on *Ceriodaphnia dubia* (water flea), showed an estimated LC_{50} value of 16.0% effluent. April Resp. at 15, citing Att. 4. Emerald concurred that the corresponding dilution ratio is 6.25:1. Oct. Resp. at 4.

Emerald also submitted results of toxicity testing performed in 2011 and 2012. Emerald stated that the biomonitoring required by Special Condition 14 of its NPDES permit was performed on effluent from the facility and not on the combined discharge with the City Of Henry's publicly-owned treatment works (POTW). Oct. Resp. at 3; *see* Pet., Exh. 2 at 7. On June 13, 2011, a 96-hour acute test showed an estimated LC_{50} value of 8.5% effluent, and a 48-hour acute test showed an estimated LC_{50} value of 11.27% effluent. April Resp. at 15, citing Att. 4. Emerald concurred that the corresponding dilution ratio is 11.8:1. Oct. Resp. at 4. Emerald reported that, because of a problem with the sample collected July 25, 2011, the laboratory was able to perform only a 48-hour test on the *Pimephales promelas*, which showed an estimated LC_{50} value of 8.68% effluent. The 48-hour acute test on *Ceriodaphnia dubia* showed an estimated LC_{50} value of 12.5% effluent. April Resp. at 15, citing Att. 4. Emerald concurred that the corresponding dilution ratio is 11.5:1. Oct. Resp. at 4. On October 12, 2011, the 96-hour test showed an estimated LC_{50} value of 22.75% effluent, and a 48-hour acute test showed an estimated LC_{50} value of 31.8% effluent. April Resp. at 15, citing Att. 4. Emerald concurred that the corresponding dilution ratio is 4.4:1. Oct. Resp. at 4. Emerald reported that, because of a failure to deliver renewal effluent, a sample collected on January 23, 2012, allowed only a 48-hour test on *Pimephales promelas*, which showed an estimated LC_{50} value of <6.25% effluent. The 48-hour acute test on *Ceriodaphnia dubia* showed an estimated LC_{50} value of 9.42% effluent. April Resp. at 15, citing Att. 4; *see* Oct. Resp. at 1. Emerald concurred that the corresponding dilution ratio is >16.0:1. Oct. Resp. at 4. Emerald stated that each of these dilution ratios is less than the dilution achieved at the edge of the ZID, which is 39.8:1 at 20 feet and 47.9:1 at 92 feet. Oct. Resp. at 4. Emerald added that the dispersion ratio required to meet the acute ammonia standard is also met at the edge of the ZID. *Id*. at 4-5.

Emerald responded to a Board question regarding the January 23, 2012 sample showing an LC_{50} value of <6.25% and the assertion by the Agency that "LC_{50} values this toxic are not found at any other Illinois facility." Rec. at 19. Emerald explained that a failure in sampling and analysis results in a "less than" designation and that it had submitted the results of new Whole Effluent Toxicity Testing performed on samples collected in November 2013. A 96-hour acute test on *Pimephales promelas* showed an estimated LC_{50} value of 16.79% effluent, and a 48-hour acute test on *Ceriodaphnia dubia* showed an estimated LC_{50} value of 16.49% effluent. Appendix B at 1, 6, 7, 16, 19.

In a hearing officer order, the Board noted that dispersion required to meet the ammonia standards was calculated based on a combined discharge with concentration of 126 mg/L but the WET testing produced LC_{50} results based only on the Emerald/PolyOne effluent. The Board asked Emerald to explain the practical effect of comparing these results. Specifically, the Board asked whether the river would see "effluent with the LC_{50} values reported for Emerald/PolyOne or rather would it likely see relatively higher LC_{50} values if the combined effluent underwent WET testing?" Emerald stated that "the dilution ratios from the LC_{50} effluent results are potentially greater than the LC_{50} percent effluent results would be" from the combined effluent. Oct. Resp. at 5. Emerald explained that "the dilution ratios presented in the WET testing results are the maximum expected values for the end of pipe discharge if the Henry dilutional flow was not being discharged. The river actually receives a less toxic (LC_{50} would be larger/dilution ratio would be smaller) combined effluent from the Emerald/PolyOne plus City of Henry POTW that flows through the diffuser to the River." *Id*.

The Board also noted that the NPDES permit for the facility provides that, "[s]hould the results of the biomonitoring program identify toxicity, the IEPA may require that the Permittee prepare a plan for toxicity reduction evaluation and identification." Pet., Exh. 2 at 7 (Special Condition 14(4)). Emerald reports that the Agency "has not requested a plan for toxicity reduction evaluation and identification and test results to date indicate that Emerald has been in compliance with the Permit requirement of no toxicity at or less than 2.51%." April Resp. at 15. The Board requested that Emerald explain the basis for this toxicity limit. Emerald stated that "[t]he dispersion achieved in the ZID is 39.8:1. This means 1 part effluent to 38.8 parts background river water at the edge of the ZID. The effluent is 1/39.8 percent of the water at the edge of the ZID, which is 2.51%. Therefore, an effluent with an LC_{50} of greater than 2.51% should not be toxic at the edge of the ZID." April Resp. at 15; *see* Oct. Resp. at 3-4.

Environmental Projects

The opinion granting an adjusted standard in AS 02-5 stated that, "[t]hroughout the duration of this adjusted standard, the Board encourages Noveon to research and propose means, beyond the wastewater treatment plant and multi-port diffuser, of providing environmentally beneficial improvements to the Illinois River in Marshall County." Noveon, slip op. at 19 (Nov. 4, 2004). The Board elaborated that "[a]ny project that Noveon researches and proposes must improve, restore or protect the Illinois River in Marshall County and reduce risks to public health and the environment beyond what is ordered by this adjusted standard." *Id*. The Board noted that it had incorporated projects of this nature into adjusted standards. *Id*. (citations omitted). Although the Board did not make research into such improvements an element of its order, it

stated that "the Board will consider proposals by Noveon should Noveon choose to renew this adjusted standard at a future date." *Id*.

In a hearing officer order, the Board noted that Emerald had sought renewal of the adjusted standard and requested information on any projects Emerald had identified or planned to propose. Emerald responded that it "has not yet completed any projects specifically targeted to provide environmentally beneficial improvements to the Illinois River." April Resp. at 8. Emerald added that it does not now plan any specific projects of this nature. *Id*. at 9. Emerald reported that funds for such projects have been limited by repayment of debt stemming from its purchase of the facility and the cost of installing a sodium hydrosulfide (NaSH) unit. *Id*. at 8-9. Emerald also cited the effect of a seven-month lockout of the hourly workforce and the impact of the recent recession. *Id*. at 9. Emerald stated that is "has not had available capital to spend on additional projects that do not allow some return on investment or at least offset some operating expenses." *Id*.

The Board also asked Emerald if it "would consider cost-share incentives to implement or install best management practices (BMP) for an environmental project, such as applying to the Agency for funds through Section 319(h) of the Clean Water Act nonpoint source management grants" as described on the Agency's website. Oct. Resp. at 11. Emerald responded that it was not likely to consider such options "due to the effort and resources needed to manage such a project, [and] the lack of identified BMPs for the reduction of non-point sources of nitrogen." *Id*. Emerald asserts that "identifying new treatment technologies and/or production methods would be a more effective use of monies." *Id*. Emerald added that it "had not yet "identified any BMPs that would be economically feasible or result in a quantifiable environmental benefit." *Id*.

Annual Reports

Emerald states that it has prepared and submitted to the Agency required annual reports of ammonia nitrogen monitoring. Pet. at 8; *see id*., Exh. 6; *see also* Noveon, slip op. at 22-23 (Nov. 4, 2004).

Emerald adds that these reports also include "a description of Emerald's work on projects that have the potential to reduce ammonia levels in the waste water discharge as well as other environmental activities." Pet. at 8; *see id*., Exh. 6. Below under "Discussion," the Board separately reviews Emerald's reports on these projects.

2006. On December 18, 2006, Emerald submitted its 2006 annual report. Exh. 6 at 1; *see* Rec. at 5-6. Emerald reported that it had installed a multi-port diffuser, performed a dispersion study, and issued a report on its efficacy. *Id*. Emerald also reported that it had submitted monthly DMRs to the Agency with results of ammonia monitoring conducted five times per week. *Id*.

2007. On December 24, 2007, Emerald submitted its 2007 annual report. Exh. 6 at 2-3. Emerald reported two results of quarterly monitoring for ammonia nitrogen: sampling on March 28, 2007, showed a concentration of 0.23 mg/L and on September 28, 2007, showed a

concentration of 0.20 mg/L. *Id*. at 2. Emerald again reported that it had submitted monthly DMRs to the Agency with results of ammonia monitoring conducted five times per week. *Id*.

2008. On March 20, 2010, Emerald submitted its 2008 annual report. Exh. 6 at 4. Emerald reported four results of quarterly monitoring for ammonia nitrogen: sampling on March 14, 2008, showed a concentration of 0.27 mg/L; on June 19, 2008, showed a concentration of <0.10 mg/L; on September 28, 2008, showed a concentration of <0.20 mg/L; and on December 13, 2008, showed a concentration of <0.20 mg/L. *Id*. Emerald again reported that it had submitted monthly DMRs to the Agency with results of ammonia monitoring conducted five times per week. *Id*.

2009. On December 22, 2009, Emerald submitted its 2009 annual report. Exh. 6 at 5-6; *see* Rec. at 7. Emerald reported four results of quarterly monitoring for ammonia nitrogen: sampling on March 26, 2009, showed a concentration of <0.20 mg/L; on June 18, 2009, showed a concentration of <0.20 mg/L; on September 28, 2009, showed a concentration of <0.10 mg/L; and on November 20, 2009, showed a concentration of <0.20 mg/L. *Id*. at 5. Emerald again reported that it had submitted monthly DMRs to the Agency with results of ammonia monitoring conducted five times per week. *Id*.

2010. On January 14, 2011, Emerald submitted its 2010 annual report. Exh. 6 at 7-8; *see* Rec. at 7-8. Emerald reported three results of quarterly monitoring for ammonia nitrogen: sampling on March 31, 2010, showed a concentration of <0.20 mg/L; on June 30, 2010, showed a concentration of <0.20 mg/L; and on September 23, 2010, showed a concentration of <0.20 mg/L. Exh. 6 at 7. Emerald again reported that it had submitted monthly DMRs to the Agency with results of ammonia monitoring conducted five times per week. *Id*.

2011. On December 20, 2011, Emerald submitted its 2011 annual report. Exh. 6 at 9. Emerald reported four results of quarterly monitoring for ammonia nitrogen, each of which showed a concentration of <0.10 mg/L. *Id*.

Violation Notices

Emerald states that, while it "has operated the wastewater treatment facility in substantial compliance with the requirements of its NPDES Permit there have been permit exceedances from time to time that have been reported to the Agency" through a DMR. Pet. at 8. Emerald adds that the Agency has issued a Violation Notice (VN) three times since issuance of the facility's permit in 2007. *Id*. at 8-9.

Violation Notice W-2008-00092. Emerald states that the Agency issued this VN on February 29, 2008, regarding TSS effluent exceedances in October and December 2007 and BOD and TSS effluent exceedances in January 2008." Pet. at 9; *see id*., Exh. 7. Emerald asserts that, after meeting with the Agency, it provided "a thorough response describing the problem that caused exceedances and their efforts, including the results of the various studies conducted by their consulting firm, that were undertaken to resolve the problem." *Id*. at 9. Emerald reports that the Agency accepted a Compliance Commitment Agreement (CCA) on June 12, 2008. *Id*.; *see id*., Exh. 7.

Violation Notice W-2008-00364. Emerald states that the Agency issued this VN on November 20, 2008, regarding Methylene Chloride effluent limit exceedances. Pet. at 9; *see id*., Exh. 8. Emerald asserts that, after meeting with the Agency, it responded by "explaining that the May exceedance was the result of only one sample being taken which was above the monthly average concentration and efforts taken by Emerald to preclude a repeat of what had caused the process upset that results in a discharge of process water that caused the July exceedance." *Id*. at 9. Emerald reports that the Agency approved a CCA on March 10, 2009. *Id*.; *see id*., Exh. 8.

Violation Notice W-2011-30116. Emerald states that the Agency issued this VN on March 31, 2011, regarding TSS effluent exceedances in November and December 2010 and January 2011. Pet. at 9; *see id*., Exh. 9. Emerald asserts that it "submitted a response describing the problems with the solids removal processes and the steps it had taken which results in compliance." *Id*. Emerald reports that the Agency accepted a CCA on June 20, 2011. *Id*.; *see id*., Exh. 9.

CURRENT GENERALLY APPLICABLE STANDARDS

Section 301.345 of the Board's water pollution regulations provides in its entirety that

> 'Population Equivalent' is a term used to evaluate the impact of industrial or other waste on a treatment works or stream. One population equivalent is 100 gallons (380 l) of sewage per day, containing 0.17 pounds (77 g) of BOD_5 (five day biochemical oxygen demand) and 0.20 pounds (91 g) of suspended solids. The impact on a treatment works is evaluated as the equivalent of the highest of the three parameters. Impact on a stream is the higher of the BOD_5 and suspended solids parameters. 35 Ill. Adm. Code 301.345.

Section 304.122 of the Board's effluent standards provides in its entirety that

> a) No effluent from any source which discharges to the Illinois River, the Des Plaines River downstream of its confluence with the Chicago River System or the Calumet River System, and whose untreated waste load is 50,000 or more population equivalents shall contain more than 2.5 mg/L of total ammonia nitrogen as N during the months of April through October, or 4 mg/L at other times.
>
> b) Sources discharging to any of the above waters and whose untreated waste load cannot be computed on a population equivalent basis comparable to that used for municipal waste treatment plants and whose total ammonia nitrogen as N discharge exceeds 45.4 kg/day (100 pounds per day) shall not discharge an effluent of more than 3.0 mg/L of total ammonia nitrogen as N.

> c) In addition to the effluent standards set forth in subsections (a) and (b) of this Section, all sources are subject to Section 304.105. 35 Ill. Adm. Code 304.122; *see* Pet. at 11.

Emerald states that the Board's Rule 406, adopted on January 6, 1972, addressed discharges of ammonia nitrogen to the Illinois River and is now codified as Section 304.122. Pet. at 11. Emerald argues that "[t]he rule as promulgated was specifically intended to reduce the discharge of ammonia nitrogen to the Illinois River from large dischargers because at the time of adoption it was believed that those dischargers were impacting dissolved oxygen at some locations in the river." *Id.; see id*. at 32. Emerald argues, however, that a later study attributed low DO levels not to larger dischargers but primarily to sediment oxygen demand. *Id*. at 32.

In a hearing officer order, the Board asked Emerald to provide more information on the study regarding the cause of low DO concentrations. Emerald cited a report prepared for the Illinois Department of Energy and Natural Resources. The report stated that significantly reducing ammonia nitrogen loads from the Joliet and Metropolitan Sanitary District of Greater Chicago sewage treatment plants upstream from river mile 273, near the junction of the Des Plaines and Kankakee Rivers, was necessary to improve downstream DO levels to river mile 179. Thomas A. Butts, *et al*., THE IMPACT OF GREATER PEORIA SANITARY DISTRICT AMMONIA DISCHARGES ON ILLINOIS RIVER WATER QUALITY (State Water Survey Division, Illinois Department of Energy and Natural Resources November 1985) at 4. Emerald discharges near river mile 198. Apr. Resp. at 1. One study showed that, during 7-day 10-year low flows, 13 percent of downstream oxygen demand was attributable to oxidation of ammonia nitrogen, while 30 percent was attributable to sediment oxygen demand and 57 percent due to carbonaceous BOD (CBOD). Thomas Butts, *et al.*, WATER QUALITY ASSESSMENT AND WASTE ASSIMILATIVE ANALYSIS OF THE LAGRANGE POOL, ILLINOIS RIVER (State Water Survey Division, Illinois Institute of Natural Resources June 1981) at 105; April Resp. at 1.

In addition, Emerald stated that the United States Geological Survey reports DO concentrations upstream and downstream from the facility that meet the 5 mg/L standard. April Resp. at 1. Emerald added that "AquAeTer has also modeled these reaches of the Illinois River at low flow, high temperature conditions and the Illinois River meets the DO standard during critical conditions." *Id*.

EMERALD'S ORIGINALLY PROPOSED ADJUSTED STANDARD

In its petition, Emerald proposed that the Board adopt the following language:

> Emerald Performance Materials LLC ("Emerald") and PolyOne Corporation ("PolyOne") are hereby granted an adjusted standard from 35 Ill. Adm. Code 304.122. Pursuant to this adjusted standard, 35 Ill. Adm. Code 304.122 shall not apply to the discharge of effluent into the Illinois River from the Emerald plant located at 1550 County Road 1450 in Henry, Illinois as regards ammonia nitrogen. The granting of this adjusted standard is contingent upon the following conditions:

A. Emerald shall not discharge at concentrations greater than calculated ammonia nitrogen as N 155 mg/L from its Henry, Illinois plant into the Illinois River.

B. Discharge into the Illinois River shall occur through the existing high rate multi-port diffuser. Pet. at 31-32; *see* 35 Ill. Adm. Code 104.406(f).

EFFORTS TO ACHIEVE COMPLIANCE AND ALTERNATIVES

Emerald states that Noveon and its consultant, Brown and Caldwell, examined a variety of methods for reducing levels of ammonia nitrogen in the facility's wastewater treatment plant effluent. Pet. at 20. Emerald adds that Brown and Caldwell determined in AS 02-5 "that there were no economically feasible treatment alternatives that would reliably reduce the effluent ammonia nitrogen concentrations low enough to comply with applicable requirements. . . ." *Id*. Emerald states that it hired Brown and Caldwell to review this conclusion and weigh any changes since the Board decided AS 02-5 that may change that conclusion. *Id*.; *see* Appendix A (replacing Exhibit 13).

Emerald first summarizes information submitted to the Board in AS 02-5. Emerald states that the facility evaluated the existing wastewater treatment system's "ability to nitrify, or oxidize, ammonia to nitrates through single-stage biological nitrification" in the 1980s. Pet. at 21. That evaluation concluded that "single-stage biological nitrification was not achievable in the existing activated sludge system." *Id*. The Agency requested a more extensive study of the issue, which was completed in December 1995 and submitted to the Agency. *Id*. Emerald states that this treatability study conclusively demonstrated that the facility "could not achieve single-stage nitrification under existing waste loads and optimum conditions of pH, dissolved oxygen ("DO"), temperature, alkalinity, food to microorganism ratio and mean cell residency time." *Id*. Emerald adds that "[t]he study also showed that the addition of a commercially provided 'nitrifier-rich' biomass to the wastewater treatment plant would not prompt the initiation of nitrification due to the waste load characteristics and not the operating conditions." *Id*. Emerald explains that the inability of the facility's system "to nitrify was due to inhibition of nitrifying bacteria by the fundamental constituents in the wastewater." *Id*.

Emerald states that, based on this determination that the facility's system could not nitrify, Noveon investigated other alternatives for control and reduction of ammonia nitrogen in the discharge: in-process reductions, wastewater pretreatment, and post-treatment of wastewater. Pet. at 21. In the following subsections of the opinion, the Board reviews these investigations and the Agency's position on Emerald's reports and conclusions.

In-Process Reductions

Emerald states that Noveon had examined whether the facility "could eliminate the use of amines in its various processes or whether it could recover and/or recycle the precursors to ammonia for reuse in the system." Pet. at 21-22. Emerald asserts that Noveon rejected these methods as feasible alternatives because amines are essential elements of many products produced at the facility. *Id*. at 22. Noveon also rejected the recycling option because recycled

material was inferior and could not guarantee production that would maintain product quality. *Id*. Emerald added that "the waste material generated in the recycling process would likely be classified as a hazardous waste," raising issues regarding cross-media impact. *Id*. Emerald clarified that "[e]xcess amines are, however, currently recovered from processes where recovery methods provide usable quality materials and are not cost prohibitive." *Id*.

In its recommendation, the Agency states that Emerald has not provided information on the process of recovering excess amines. Rec. at 10. The Agency also states that Emerald has not provided information on recovery costs that it considers prohibitive. *Id*. The Agency concludes that it "is not in a position to analyze Emerald's ability to have in-process reductions with the information provided." *Id*.

Pretreatment of Wastestream

Emerald states that this option involves removal of certain constituents from wastewater before treatment. Pet. at 22. Emerald states that alternatives including morpholine recovery, tert-butyl alcohol recovery, and a liquid extraction process did not "achieve reduction that would result in compliance" with Section 304.122(b). *Id*. Emerald adds that "[t]he pretreatment options also raised various technical issues including plant personnel safety issues." *Id*.

In its recommendation, the Agency states that Emerald has not explained why these options will not result in compliance with the generally applicable standard. Rec. at 10. The Agency argues "that Emerald should still provide incremental reductions in ammonia even though it would fail to meet the prescribed 3 mg/L limit." *Id*., citing 35 Ill. Adm. Code 304.122.

Post-Treatment of Wastestream

Emerald states that, after concluding that the facility could not comply through single-stage nitrification, in-process reductions, or pretreatment, Brown and Caldwell evaluated post-treatment alternatives for reduction of ammonia nitrogen in the effluent. Pet. at 22-23. The Board addresses these alternatives in the following subsections of the opinion.

2013 Re-Evaluation

In its July 8, 2013 consideration of treatment alternatives, Brown and Caldwell noted a number of changes in the facility's operation of the wastewater treatment system since 2002. Appendix A at 4; *see* Pet. at 28. First, the facility had instituted the addition of carbon dioxide and sulfuric acid to the polymer chemicals (PC) tank after previous use of acid alone. Appendix A at 4. Second, Brown and Caldwell noted that the facility had begun adding only synthetic flocculent during primary treatment, where it had previously added ferric chloride and anionic flocculent. *Id*. Third, the facility had begun to add synthetic flocculent and synthetic coagulant during secondary treatment, where it had previously added alum and anionic flocculent. *Id*. Finally, Brown and Caldwell noted that the facility operated its west and north biotreaters after it had also operated its east and center biotreaters. *Id*. This change reduced biotreater volume from 1.9 million gallons to 1.3 million gallons. *Id*.

Brown and Caldwell stated that "[t]hese changes appear not to have caused any appreciable change in effluent quality. . . ." Appendix A at 4; *see* Pet. at 29. Their report states that "[t]he lack of nitrification continues to be due to inhibition of nitrifying bacteria. . . . This inhibition has been largely attributed to the presence of mercaptobenzothiazole in the wastewater. This compound is the building block for the products made at the Emerald plant and has a published nitrification threshold of less than 3 mg/L." Appendix A at 4 (citation omitted). Brown and Caldwell concluded that this inhibition and the nature of the facility's wastewater cause treatment alternatives to be unreliable. *Id*.

The July 8, 2013 report re-examined a number of previously-considered alternatives. Pet. at 29. Three of those alternatives "were not reconsidered due to their prior poor economic viability and the continued presence of significant nitrification inhibition, which made these treatment alternatives of questionable reliability." Appendix A at 5; *see* Pet. at 29. Below, the Board reviews the record on the alternatives originally considered by Brown and Caldwell and, where applicable, the 2013 re-evaluation of those alternatives.

Alkaline Air Stripping

Emerald states that ammonia nitrogen exists in aqueous and gaseous forms and that, as pH increases, the aqueous form becomes a gas. Pet. at 23. Emerald adds that, "by increasing the pH of a wastewater stream it is possible to strip or remove the ammonia gas." *Id*. Emerald considered this option at three points in the system: "1) within the PC tank; 2) within the PVC tank and 3) after the secondary clarifier discharge." *Id*.; *see* Appendix B at 2 (block flow diagram).

Emerald noted that, "[b]ecause samples of the PC tank and PVC tank discharges contained greater than 500 mg/L TSS, a packed tower air stripper or horizontal tray stripper would require frequent maintenance due to fouling." Pet. at 23. Accordingly, Emerald chose diffused air stripping and surface aeration processes for evaluation of the PC and PVC tanks. *Id*. Emerald considered this alternative only for its existing tanks. Emerald based this consideration in part on "the slow rate of these stripping processes, the small amount of ammonia available in these tanks, and the large flow rates of wastewater into the PC tank and PVC tank." *Id*. at 23-24. Also, Emerald argued that new equipment would have added little benefit because most of the ammonia nitrogen discharged from the facility is generated in the wastewater treatment facility. *Id*. at 24.

Emerald reviewed conventional packed tower air stripping of the wastewater treatment facility effluent downstream of the secondary clarifier "because this is a well-established stripping technology." Pet. at 24.

Emerald reported that air stripping test results showed some ammonia reduction in wastewaters from the PC tank, PVC tank, and secondary clarified wastewater. Pet. at 24. With surface aeration stripping, treatment of the PC tank and PVC tank wastewater achieved less than 20% combined ammonia removal. *Id.* Emerald stated that these reductions were not sufficient to meet the generally applicable effluent limitation. *Id*. In addition, Emerald noted "the present worth costs (capital, operation and maintenance) in 2004 of $2.3 million for PC tank treatment

and $14.1 million for PVC tank treatment." *Id*. Emerald characterized these alternatives as "economically unreasonable in light of the high costs and low ammonia reduction obtained." *Id*.

In its recommendation, the Agency notes that "[t]he costs of these treatment options are by far the highest in all the alternatives Emerald evaluates." Rec. at 11. The Agency adds that the cost per pound of ammonia nitrogen removal is nearly three times as expensive as the next less expensive option. *Id*., citing Exh. 13, Att. C (cost analysis).

Emerald also reported that packed tower air stripping at the secondary clarifier resulted in ammonia removal of greater than 95 percent. Pet. at 24. Emerald noted, however, that this alternative increased TDS by more than 20%, "which could lead to aquatic toxicity of the effluent." *Id*. Emerald added that total installation, operation, and maintenance of additional equipment for this alternative had a present worth cost of $14 million in 2004. *Id*. at 24-25. Emerald claimed that these costs caused this alternative to be "economically unreasonable." *Id*. at 24.

In its recommendation, the Agency noted Brown and Caldwell's estimated capital costs for this alternative of $9.4 million including off-gas ammonia controls and annual O/M costs of $1.94 million. Rec. at 11, citing Pet., Exh. 13, Att. C. The Agency stated that the cost of ammonia nitrogen removed under this alternative is $20.47 per pound during the first ten years and approximately $13.58 per pound after the first ten years. Rec. at 11, citing Pet., Exh. 13, Att. C. Although the Agency notes Emerald's argument that this alternative will cause fouling and an increase in TDS, "[t]he Agency believes the fouling issue can be solved by use of filtration prior to the air stripper." Rec. at 11.

In addition, the Agency's recommendation argues that Emerald's capital cost estimate for this alternative includes treatment of off-gas emissions without providing support that the controls would be required by state or federal law. Rec. at 11-12. The Agency further argues that, without off-gas treatment, the capital cost to achieve 95% reduction falls to $4.7 million with annual O/M costs of $1.76 million. *Id*. at 11, citing Pet., Exh. 13, Att. C. For this alternative, the Agency stated that the cost of ammonia nitrogen removed would be $15.45 per pound during the first ten years and $12.37 per pound after the first ten years. Rec. at 11-12, citing Pet., Exh. 13, Att. C.

In its July 8, 2013 re-evaluation, Brown and Caldwell determined "conceptual level comparative capital costs" for these three stripping alternatives, which it "considered accurate to within $\pm$ 50 percent." Appendix A at 6. For Option 1, stripping of PC tank contents, estimated capital costs were $1.5 million. *Id*. at 7. For Option 2, stripping of PVC tank contents, estimated capital costs were $430,000. *Id*. For Option 3, stripping of the secondary clarifier effluent, estimated capital costs were $9.4 million. *Id*.

Brown and Caldwell also determined "conceptual level operations and maintenance [O/M] costs," which it also considered "accurate to within $\pm$ 50 percent." Appendix A at 7. For Option 1, annual estimated O/M costs were $536,000. *Id*. For Option 2, annual estimated O/M costs were $3,643,000, and for Option 3, annual estimated O/M costs were $1,942,000. *Id*.

Brown and Caldwell also established total annual costs and ammonia removal for these alternatives. Appendix A at 8. Capital costs are based on a ten-year period, an annual interest rate of 3.5%, and no salvage value. *Id*. O/M costs are based on a ten-year period and an inflation rate of 3.0%. *Id*. For Option 1, total annual costs are $580,000 with an ammonia removal cost of $227 per pound. *Id*. For Option 2, total annual costs are $4,228,000 with an ammonia removal cost of $55 per pound. *Id*. For Option 3, total annual costs are $3,357,000 with an ammonia removal cost of $20 per pound. *Id*.

Brown and Caldwell's re-evaluation also addressed the reliability of these options. The report states that a reliability rating is "based on a relative assessment of mechanical and process performance reliability to achieve the average percent removal (10 being highest reliability). Reliability means the ability of the treatment process to achieve the predicted effluent ammonia nitrogen (NH_3-N) concentrations on a routine basis." Appendix B, Att. D at 1-2. For Option 1, Brown and Caldwell provided a Reliability Rating of 8 and commented that "[p]erformance will vary as volatile amine content varies in wastewater." *Id*. at 1. The report also noted that this alternative will increase effluent TDS. *Id*. For Option 2, the report provided a Reliability Rating of 7 and commented that this alternative is "[s]imple to operate" but "[w]ill increase effluent TDS." *Id*. For Option 3, the report provided a Reliability Rating of 7 and commented that this alternative is "[c]omplex to operate" and "[w]ill increase effluent TDS." *Id*.

Struvite Precipitation

Emerald states that this alternative precipitates struvite ($NH_4MgPO_46H_2O$) from the facility's combined wastewater. Pet. at 25; *see* Appendix B at 3 (block flow diagram). Emerald reported that "under certain operating conditions the combined wastewater ammonia concentration can be reduced to approximately 25 mg/L in the treatment plant influent. This treatment process, however, would provide only a 24% reduction in the average final effluent ammonia level at a present worth costs of $5.1 million in 2004." Pet. at 25. Emerald also noted that this option would also increase TDS in the effluent. *Id*.; *see* Appendix D at 2.

In its recommendation, the Agency noted that this 24% reduction could be obtained with a capital cost of $296,315 and annual O/M costs of $1.43 million. Rec. at 12, citing Pet., Exh. 13, Att. C. The Agency further noted that, broken down over a ten-year period, the cost of ammonia nitrogen removed would be approximately $52.25 per pound. Rec. at 12, citing Pet., Exh. 13, Att. C.

In its July 8, 2013 re-evaluation, Brown and Caldwell determined conceptual level comparative capital costs of $300,000, conceptual level O/M costs of $1.433 million, and total annual costs of $1,678,000 with ammonia removal costs of $52 per pound for this alternative. Appendix A at 7-8. Brown and Caldwell's re-evaluation provided a Reliability Rating of 6. Comments noted that the system is "[s]imple to operate," but added that "the precipitant is prone to foul pumps and piping." Appendix D at 1.

Effluent Breakpoint Chlorination

Emerald stated that "[t]his alternative involved gravity discharge of the secondary clarifier wastewater to a reaction tank where chlorine gas would be sparged into the tank and caustic soda added to maintain a pH of approximately 6.9. Following the addition of chlorine, the wastewater would be discharged to the existing sand filters." Pet. at 25; *see* Appendix B at 4 (block flow diagram). Emerald stated that, although this alternative could meet the generally applicable ammonia standard, it "is prohibitively expensive, at a present worth cost of $9.7 million in 2004." Pet. at 25. Emerald noted that this alternative also would "dramatically increase effluent TDS and may result in the formation of chlorinated organics in the effluent." *Id*. at 25-26.

In its recommendation, the Agency stresses that this alternative would reduce ammonia nitrogen in the effluent by 98% with capital costs of $1.4 million and annual O/M costs of $1.7 million. Rec. at 12, citing Pet., Exh. 13, Att. C. The Agency states that this represents costs of approximately $12.48 per pound of ammonia nitrogen removed. Rec. at 12, citing Pet., Exh. 13, Att. C. While the Agency notes Emerald's claim that this alternative may result in formation of chlorinated organics, "[t]he Agency believes there are treatment alternatives for the possible formation of chlorinated organics in the effluent which Emerald has failed to evaluate." Rec. at 12.

In its July 8, 2013 re-evaluation, Brown and Caldwell determined conceptual level comparative capital costs of $1.4 million, conceptual level O/M costs of $1.692 million, and total annual costs of $2,111,000 with ammonia removal costs of $12 per pound for this alternative. Appendix A at 7-8. Brown and Caldwell's re-evaluation provided a Reliability Rating of 9. Comments noted that this is a "[v]ery complex system requiring active monitoring and safety controls." Appendix D at 1.

Single-Stage Biological Nitrification of Non-PC Wastewater

Emerald reports that Brown and Caldwell considered "what level of ammonia reduction would occur by first-stage nitrification of the non-PC wastewater followed by second-stage biological treatment of the PC tank wastewater after combination with effluent from the first-stage reactor." Pet. at 26; *see* Appendix B at 5 (block flow diagram). Emerald states that "this was not a feasible compliance alternative because of the low level of ammonia reduction achieved. The percent ammonia reduction was only 47% yet had a present worth cost of $4.9 million in 2004." Pet. at 26.

In its recommendation, the Agency notes that "[t]he non-PC waste stream does not contain the inhibitor MBT." Rec. at 12. The Agency adds that half of the facility's bio-treaters are not now in use. *Id*., citing Pet., Exh. 13 at 4. The Agency argues that, at a minimum, "Emerald should be required to treat the non-PC waste streams separately from the PC waste stream because nitrification will not be inhibited," and the facility has equipment available to perform this treatment. Rec. at 12-13. Although the Agency acknowledges that treatment only of the non-PC waste stream will not achieve compliance, failure to perform that treatment supports the Agency's position that "Emerald is not providing the best degree of treatment," a requirement to obtain a mixing zone. Rec. at 13. In addition, the Agency notes that Emerald has not updated the estimated costs of this alterative since the filing of its petition in AS 02-5, when

it reported capital costs of $2.6 million and annual O/M costs of $220,000. *Id*. The Agency states that Emerald has not clarified "whether these costs estimates are based on use of the existing bio-treaters." *Id*.

Biological Nitrification of Combined Wastewater

Emerald states that this alternative involves "pH reduction of the PC tank discharge, followed by river water addition and combined single-stage nitrification with non-PC wastewater." Pet. at 26; *see* Appendix B at 6 (block flow diagram). While Brown and Caldwell determined this to be a technically feasible alternative, it "suffers from a lack of reliability." Pet. at 26. Emerald states that this option is also costly, with present worth costs of $11.7 million in 2004. *Id*. Emerald submits that "this is an economically unreasonable alternative, particularly in light of the associated reliability concerns." *Id*.

In its recommendation, the Agency notes that this alternative would reduce ammonia nitrogen in the effluent by 98%. Rec. at 13 (citing petition in AS 02-5). Although Emerald refers to present worth costs of $11.7 million, the Agency notes estimated capital costs of $4.4 million and annual O/M costs of $730,000 in Noveon's petition in AS 02-5. The Agency adds that Emerald has not updated these estimates since the filing of the petition in AS 02-5. *Id*., n.2.

Ion Exchange

Emerald states that Brown and Caldwell examined "ion exchange treatment of the secondary clarifier effluent using clinoptilolite, and ammonia selective ion exchange resin." Pet. at 27; *see* Appendix B at 7 (block flow diagram). Emerald reports that testing of this alternative showed poor removal efficiency, presumably because of "the large concentration of competing ions in the effluent." Pet. at 27. Emerald added that "[t]his alternative had a present worth cost of $5.1 million in 2004." *Id*.

In its recommendation, the Agency claimed that this alternative could achieve a 98% reduction. Rec. at 13-14. The Agency estimated capital costs of $1.6 million and annual O/M costs of $806,094. *Id*. at 14. The Agency added that the cost of ammonia nitrogen removed was approximately $6.64 per pound for ten years and approximately $5.46 per pound after ten years. *Id*. The Agency noted Emerald's argument that poor selectivity precludes this alternative from further consideration. *Id*. However, the Agency claimed that "[t]his option should not be precluded from consideration considering its low cost and high removal." *Id*.

The Agency's recommendation also noted that Emerald had considered 75% ammonia nitrogen removal by ion exchange with capital costs of $1 million and annual O/M costs of $622,124. Rec. at 14, citing Pet., Exh. 13, Att. C. The Agency stated that the cost of ammonia nitrogen removal under this alternative was $6.59 per pound for ten years. Rec. at 14.

In its July 8, 2013 re-evaluation, Brown and Caldwell determined conceptual level comparative capital costs of $1.6 million, conceptual level O/M costs of $806,000, and total annual costs of $1,121,000 with ammonia removal costs of $6.60 per pound for this alternative. Appendix A at 7-8. Brown and Caldwell's re-evaluation provided a Reliability Rating of 6.

Appendix D at 2. Comments noted that the system is "[c]omplex to operate" and that "[e]quipment must be housed in heated building to prevent freezing." Comments added that this alternative "should have little net effect on effluent TDS." *Id*.

Ozonation

Emerald stated that, although this alternative could meet the generally applicable ammonia standard, it was rejected because of its present worth cost of $20.3 million in 2004. Pet. at 27; *see* Appendix B at 8 (block flow diagram). Emerald added that "this alternative would significantly increase the effluent TDS concentrations" and may also trigger BOD effluent limit violations. Pet. at 27.

In its recommendation, the Agency noted that this alternative would provide 98% reduction of ammonia nitrogen in the effluent with estimated capital costs of $10.3 million and annual O/M costs of $1.69 million. Rec. at 14, citing Pet. at 27; Pet., Exh. 13, Att. C. The Agency stated that the costs of ammonia nitrogen removal would be $18.89 per pound for ten years, and $11.50 per pound after ten years. Rec. at 14, citing Pet., Exh. 13, Att. C.

In its July 8, 2013 re-evaluation, Brown and Caldwell determined conceptual level comparative capital costs of $10.4 million, conceptual level O/M costs of $1,699,000, and total annual costs of $3,196,000 with ammonia removal costs of $19 per pound for this alternative. Appendix A at 7-8. Brown and Caldwell's re-evaluation provided a Reliability Rating of 8. Appendix D at 2. Comments noted that this is a "[v]ery complex system requiring active monitoring and safety controls." *Id*.

Tertiary Nitrification

Emerald states that this alternative involves "pumping the secondary clarifier effluent through a separate aeration basin containing fixed film media where nitrifying bacteria would grow." Pet. at 27. Emerald added that studies confirmed the technical feasibility of this alternative, although it lacks reliability because of "great sensitivity to variations in wastewater characteristics." *Id*. at 28. Emerald reported present worth costs of $11.4 million in 2004 and claimed that these costs made this alternative "economically unreasonable." *Id*.

In its recommendation, the Agency noted that this alternative would provide 98% reduction in ammonia nitrogen with capital costs of $6.76 million and annual O/M costs of $464,000. Rec. at 15 (citing petition in AS 02-5). The Agency states that Emerald has not updated costs for this alternative. *Id*.

Options First Addressed in 2013.

Brown and Caldwell reported that, "[s]ince 2004, several new treatment technologies have become demonstrated" and that these may reduce ammonia in the facility's effluent. Appendix A at 9. Emerald evaluated several of these treatment technologies to determine whether they had the potential to reduce effluent ammonia levels at the facility. Appendix A at 9. Brown and Caldwell concluded that, although these new technologies have been recently

demonstrated and could provide affective ammonia reduction at the facility, none is as effective as those previously considered and discussed above. Appendix A at 9. Brown and Caldwell added that none is as "economically viable" as those previously considered. Pet. at 30-31. Because they were not considered to be economically viable, Emerald did not provide specific costs for these technologies. *See* Appendix A at 9. The Board briefly reviews each of these potential treatment options in the following subsections.

Castion Ammonia Recovery Process. Brown and Caldwell report that "[t]his process removes ammonia by combining stripping with ion exchange. The waste stream is first conditioned to volatilize ammonia for capture by vacuum distillation. Subsequently, the waste stream is exposed to an ion exchange resin." Appendix A at 9. The report adds that this option costs more to build and operate than separate alkaline air stripping and ion exchange alternatives. *Id*.

Ostara Pearl. Brown and Caldwell state that this alternative "recovers nutrients from wastewater, including phosphorus and nitrogen containing compounds, and, subsequently, combines these nutrients with magnesium hydroxide to precipitate struvite." Appendix A at 9. The report states that this is a proprietary name for the struvite precipitation alternative described above. *Id*.

Liqui-Cell Membrane. Brown and Caldwell report that this alternative "uses a membrane module to separate ammonia from a waste stream. The ammonia is then converted to ammonium salt." Appendix A at 9. The report notes that "pH control would be required to elevate pH for stripping and lower pH for effluent discharge." *Id*. The report further notes that the membrane requires a temperature between 40 and 55ºC and that it would take significant expense to heat the waste stream. *Id*. Brown and Caldwell conclude that costs and results make this less viable than the alkaline air stripping alternatives. *Id*.

Anammox. Brown and Caldwell describe this as "a biological process that removes ammonia through anaerobic treatment." Appendix A at 9. The report states that it is more prone to process upsets than the aerobic biological nitrification rejected for the facility because of "the presence of known bio-inhibitors and the complexity of site-wide wastewaters." *Id*.

Anodic Oxidation. Brown and Caldwell state that this process "is capable of removing ammonia from waste streams by electrochemical oxidation." Appendix A at 9. Specifically, the process applies a current to the wastewater, which deposits ammonia on an anode. *Id*. They report that this alternative requires significant capital expenditures and annual power costs of at least $5 million. *Id*. They add that there has been no full-scale demonstration of this process at any facility. *Id*.

Summary of Agency's Review of Alternatives

The Agency first stresses that Emerald has provided cost estimates considered accurate to ± 50%. Rec. at 15, citing Pet., Exh. at 4. The Agency argues that, if these estimates are high by that margin, then "Emerald could achieve 98% reduction at a cost of as low as $3.30 per pound

of ammonia removed by using ion exchange technology in the first ten years, and $2.73 per pound thereafter." Rec. at 15, citing Pet., Exh. 13, Att. C.

Second, the Agency states that Emerald has failed to consider "the use of granulated activated carbon followed by biological treatment." Rec. at 15. The Agency argues that USEPA "guidance indicates that this treatment alternative effectively removes inhibitors, including MBT, which then allows for biological treatment." *Id*. The Agency proposed that "Emerald evaluate the use of granular activated carbon column(s) before the PC tank waste water combines with non-PC tank waste water." *Id*. The Agency adds that this option "may not require dilution." *Id*.

Third, the Agency expresses the view that "the nitrogen in Emerald's effluent could be of agronomic benefit through spray irrigation on crops." Rec. at 15. The Agency argues that Emerald "failed to evaluate land application of its waste stream as an alternative." *Id*.

Fourth, the Agency argues that "Emerald may be able to achieve nitrification by dilution of waste water from the PC tank with water from the Illinois River." Rec. at 15. The Agency notes that the peak flow rate from the PC tank was 150 gallons per minute (gpm) in 2002, and the average flow rate from the same tank in 2011 was 72 gpm. *Id*., citing Pet., Exh. 13 at 2. The Agency asserts that "Emerald should investigate replacing an appropriate amount of the decreased flow from 2001 to 2011 with water from the Illinois River that will allow single-stage nitrification." Rec. at 15-16. The Agency argues that, with a lower flow rate, dilution can have a greater impact on costs and issues such as TDS, fouling, and formation of chlorinated organics. *Id*. at 16. The Agency further argues that Emerald has not conducted testing that addresses this impact. *Id*.

Summary

Emerald argues that it and the facility's previous owner have reviewed a number of alternatives for achieving compliance with the generally applicable ammonia standard. Pet. at 31. Emerald further argues that, as in AS 02-5, "there is no alternative that is both technically feasible and economically reasonable" that would attain compliance with that standard. *Id*.

SUMMARY OF AGENCY'S RECOMMENDATION

On January 14, 2013, the Agency filed its recommendation that the Board deny Emerald's petition. Rec. at 1, 22; *see* 35 Ill. Adm. Code 104.416. Below in its discussion, the Board reviews the Agency's arguments on the Section 28.1 factors. In the following subsections, the Board summarizes the recommendation and the conditions proposed by the Agency in the event that the Board granted relief over the Agency's objection.

Recommendation

The Agency states that it "does not believe Emerald has met its burden of proof to obtain an adjusted standard. Rec. at 22. The Agency also argues that the Board lacks authority to grant the requested relief because the co-permittee, PolyOne, is not a party. *Id*. The Agency recommended that the Board deny Emerald's petition for an adjusted standard. *Id*.

The Agency recommends that, if the Board determines to grant Emerald's requested adjusted standard over this objection, the Board should include conditions. *Id.*; *see* 415 ILCS 5/28.1(a) (2012). The Board summarizes these proposed conditions in the following sections.

Effluent Limit

As the first condition, the Agency proposed that "Emerald's effluent limit for ammonia nitrogen be reduced by 48% from 155 mg/L to 80 mg/L to reflect the 48% reduction in the effluent waste load." Rec. at 22.

In its response to the Board's hearing officer order, Emerald stated that it "is not able to accept the Agency proposed reduced effluent limits and is currently evaluating historical data in order to propose alternative reduced effluent limitations." Oct. Resp. at 6.

In response to the Board's hearing officer order, the Agency recommended "new limits for ammonia based on DMR data from the last 5 years." Agency Resp. Exh. 1 at 8. The Agency proposed a daily maximum of 130 mg/L and 1000 lbs/day, a monthly average of 100 mg/l and 750 lbs/day, and an annual average of 80 mg/L and 550 lbs/day. *Id*. at 9. The Agency claimed that "Emerald should be required to comply with the water quality standards at the edge of the ZID and mixing zone because Emerald is not seeking relief from the water quality standard in this proceeding." *Id*. The Agency argues that these data show Emerald has met these limits "except during the 2011 strike which caused poor treatment performance." *Id*. at 8.

WET Testing

As the second condition, the Agency proposed to require that "Emerald performs aquatic life whole effluent toxicity tests using a fish (fathead minnow) and invertebrate (Ceriodaphnia) using an effluent dilution series that will allow for 100% survival in the lowest effluent concentration tested. A successful test and dilution series will result in an LC50 effluent concentration that does not include a 'less than' designation." Rec. at 22.

In its response to the Board's hearing officer order, Emerald stated that it "understands the issue with the previous testing results and for all future whole effluent toxicity testing, Emerald will contract with a laboratory that understands the requirements, conducts the test using additional dilutions if necessary to report the results such that the LC_{50} effluent concentrations does not include a 'less than' designation." Oct. Resp. at 6.

Emerald subsequently submitted results of whole effluent toxicity testing dated November 22, 2013, showing an LC_{50} result of 16.49% for the 48-hour *Ceriodaphnia dubia* test and 16.79% for the 96-hour *Pimephales promelas* test. Appendix B.

Quarterly Monitoring

As the third condition, the Agency proposed to require that "Emerald conducts quarterly monitoring of ammonia nitrogen in the Illinois River to demonstrate compliance with the ammonia water quality standards in accordance with 35 Ill. Adm. Code 302.212." Rec. at 22.

In its response to the Board's hearing officer order, Emerald noted that "[t]his requirement is a condition contained in the current NPDES permit." Oct. Resp. at 6; *see* Pet., Exh. 2. Emerald added that, "based on the amount of data collected to date, as well as safety concerns, Emerald would like to eliminate this sampling in the future." Oct. Resp. at 6.

Investigation of Production Methods

As the fourth condition, the Agency proposed to require that "Emerald investigates new production methods and technologies that generate less ammonia in Emerald's discharge." Rec. at 22.

In its response to the Board's hearing officer order, Emerald stated that "[t]his requirement is a condition contained in the current NPDES permit." Oct. Resp. at 6. Emerald added that, although there are limitations in the modifications that can be made in the production methods and technologies, Emerald can continue to review available new production methods and technologies (*via* internet searches, consultant or IEPA notifications, etc.) on a regular basis." *Id*.

Investigation of Treatment Technologies

As the fifth condition, the Agency proposed to require that "Emerald investigates new treatment technologies, including but not limited to Fenton's reagent treatment, photo assisted Fenton system, hydrogen peroxide/uv treatment, and evaluates implementation of new and existing technologies based on current plant conditions." Rec. at 23.

In its response to the Board's hearing officer order, Emerald stated that it "can incorporate a review of new treatment technologies into appropriate project reviews and as well as review available treatment technologies (*via* internet searches, consultant or IEPA notifications, etc.) on a regular basis." Oct. Resp. at 6-7. Emerald added that, "[i]f a treatment technology would be determined to be potentially viable, a schedule for further evaluation would be developed. It is anticipated that evaluations and studies would proceed with a phased approach, with termination at any point where it is determined to not be a feasible alternative." *Id*. at 7.

Study of Granular Activated Carbon

As the sixth condition, the Agency proposed to require that "Emerald investigates and submits a study to the Illinois EPA on the use of granular activated carbon column of the PC tank waste water before the waste water combines with non-PC tank waste water, followed by biological nitrification." Rec. at 23.

In its response to the Board's hearing officer order, Emerald noted the Agency's indication that "the study should include a technical feasibility evaluation, and economic feasibility analysis, and test data (or other data) analysis." Oct. Resp. at 7. Emerald stated that it "can complete such a study." *Id*.

Spray Irrigation

As the seventh condition, the Agency proposed to require that "Emerald investigates and submits a study to Illinois EPA on the use of its effluent for spray irrigation on crops." Rec. at 23.

In its response to the Board's hearing officer order, Emerald states that, "[a]lthough land application could be used only when the ground is able to absorb water (*i.e.*, soils not saturated or frozen), Emerald can investigate further, although it is assumed that constituents other than nitrogen/ammonia contained within the effluent (*i.e.*, salts), will have a significant detrimental effect on the land/crops that would preclude this as a viable option for effluent use." Oct. Resp. at 7. Emerald also expressed the view that "it is likely that local farmers/neighbors would be reluctant to use wastewater from the facility." *Id*.

Dilution of Wastewater

As the eighth condition, the Agency proposed to require that "Emerald investigates and submits a study to Illinois EPA on the dilution of waste water from the PC tank with water from the Illinois River." Rec. at 23. In response to a Board hearing officer order, the Agency explained that this proposed condition intends "to dilute the concentration of MTB to a level that would not inhibit nitrification in the treatment plant." Agency Resp. Exh. 1 at 7. The Agency argues that, "[s]ince this would be an internal dilution in order to allow nitrification treatment to occur and is not to merely meet limits on its own, it would be allowable under 35 Ill. Adm. Code 304.102(b) [Dilution]." *Id*.

In its response to the Board's hearing officer order, Emerald stated that, "[a]lthough the Agency believes Emerald should investigate replacing an appropriate amount of the decreased flow from 2001 to 2011 with water from the Illinois River that will allow single-stage nitrification, Emerald does not agree that this option is viable, and future plans for increasing capacity/production at the plant could negate this as an option." Oct. Resp. at 7.

Annual Reports

As the ninth condition, the Agency proposed to require that "Emerald prepares and submits to the Illinois EPA annual reports summarizing its activities to comply with the above stated recommendation." Rec. at 23.

In its response to the Board's hearing officer order, Emerald noted that "[t]his requirement is a condition contained in the current NPDES permit." Oct. Resp. at 7; *see* Pet., Exh. 2. Emerald adds that it "can continue to prepare and submit reports." Oct. Resp. at 7.

Potential Conditions Raised by Board

Sunset

In a hearing officer order, the Board sought comment on a potential condition that would "sunset the requested relief in 7 years, coupled with conditions that would establish annually recurring requirements regarding investigation into new treatment and methods to continually demonstrate Emerald is providing 'best degree of treatment'" and coupled also with specified conditions recommended by the Agency. Oct. Resp. at 8; *see* Rec. at 22-23. Emerald responded that it was discussing potential conditions with the Agency and understood the Board's indication that a sunset may be appropriate. Oct. Resp. at 8. Emerald stated that, although it

> believes that a sunset provision is better than having no relief granted by the Board – and can accept a sunset provision – in lieu of evaluations at the end of the sunset period . . . to determine if a renewal of the adjusted standard in needed, Emerald believes it would be a more effective and meaningful use of monies to evaluate on an ongoing basis new treatment technologies and production methods, and to implement those technologies (if warranted) to ensure the best degree of treatment. *Id*.

The Agency responded that it

> does not believe any relief should be granted to Emerald. If the Board grants Emerald relief, a sunset provision and conditions that would establish annually recurring requirements regarding investigations into new treatments and methods to continually demonstrate Emerald is providing 'best degree of treatment' to be eligible for the dilution provision in 35 Ill. Adm. Code 304.102 should be included. Agency Resp. Exh. 1 at 8.

The Agency added that "Emerald's effluent has a high COD [chemical oxygen demand] to BOD ratio (38.4:1), which suggests the presence of organics that are not amenable to biological degradation. Because of the masking effect that ammonia has, any potential problematic organic compounds would not be revealed by toxicity testing." *Id*. To address this, the Agency "requests that Emerald be required to identify organics in the effluent and to propose treatment technologies that may be used to reduce the organics in the effluent." *Id*.

Best Management Practices

The Board also asked Emerald to comment on a potential condition that would impose the requested ammonia effluent limit, require discharge through the diffuser meeting water quality standards at the edge of the ZID and mixing zone, and implement a non-point source best management practice (BMP) addressing ammonia. Oct. Resp. at 8-9. Emerald stated that,

> [i]f a sunset provision were to be included in an adjusted standard granted by the Board, with a provision to discharge through the diffuser to meet applicable water quality standards at the edge of the ZID and mixing zone, Emerald believes the

> best, most efficient and meaningful use of monies would be to complete evaluations of new treatment technologies and production methods rather than implementing maintaining a non-point source BMP that would provide an environmental benefit that also addresses ammonia. *Id*. at 9.

The Board also asked Emerald to address projects such as the agricultural BMPs outlined on the Agency website. Oct. Resp. at 10. Emerald responded that it did not now regard consideration of such a project is realistic. *Id*. Emerald argued that it has "negligible" ability to affect non-point source pollution from agriculture. *Id*.

The Agency stated that, if the Board grants Emerald's requested relief, it "would not oppose a condition in Emerald's permit to implement and maintain a non-point source best management practices to provide an environmental benefit that also addresses ammonia." Agency Resp. Exh. 1 at 9. The Agency added that it "is unsure that Emerald will be able to find a sufficient number of nonpoint sources to off-set the high levels of ammonia in Emerald's discharge." *Id*.

Hearing

In its Recommendation, the Agency noted Emerald's request that the Board hold a hearing. Rec. at 21. The Agency stated that it did "not believe a hearing is necessary for the Board to determine whether Emerald has provided adequate proof that the elements set forth in Section 28.1(c)" of the Act have been met. *Id*. The Agency notes that the Board held three days of hearing on the petition in AS 02-5. *Id*. The Agency argues that the petition in that case is "virtually identical" to the petition submitted to the Board in this proceeding. *Id*. at 22. The Agency states that it "does not believe additional hearings in this matter will be beneficial." *Id*.

AGREED RECOMMENDED CONDITIONS

The Agency and Emerald reported that they had "reached an agreement on the recommended conditions that should be included in any regulatory relief granted by the Board. Joint Rec. Conds. at 1. The Agency stated, however, that it "continues to maintain that the Board should not grant Emerald's requested adjusted standard for the reasons set forth in its Recommendation." *Id.*, citing Rec. The Agency and Emerald stated that agreed conditions are based on revisions of conditions originally proposed by the Agency in its recommendation. Joint Rec. Conds. at 1-2, citing Rec. at 22-23. In its discussion below, the Board summarizes the agreed recommended conditions and compares them with the conditions imposed by the Board in granting relief in AS 02-5.

BOARD DISCUSSION

Emerald seeks relief in the form of an adjusted standard from the Board total ammonia nitrogen effluent standard at Section 304.122(b) of the Board's water pollution regulations. Although the Agency recommends that the Board deny the request, the Agency and Emerald jointly proposed agreed conditions to be included in any relief granted by the Board. As noted

above under "Legal Framework for Adjusted Standard," Section 28.1(c) of the Act requires Emerald as petitioner for an adjusted standard to demonstrate that

1) factors relating to that petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to the petitioner;

2) the existence of those factors justifies an adjusted standard;

3) the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and

4) the adjusted standard is consistent with any applicable federal law. 415 ILCS 5/28.1(c) (2012); 35 Ill. Adm. Code 104.426 (Burden of Proof).

The Board separately addresses each of these four factors in the following subsections of the opinion.

Substantially and Significantly Different Factors (415 ILCS 5/28.1(c)(1))

Emerald

Emerald states that the generally applicable ammonia nitrogen as N standard is based first on the ability to treat ammonia. Pet. at 33, citing 35 Ill. Adm. Code 304.122. Emerald acknowledges the Board's statement that "present technology is capable of meeting this limit and should result in the removal of much ammonia nitrification oxygen demand. . . ." Pet. at 33, citing In the Matter of Water Quality Standards Revisions, R72-4 (Nov. 8, 1973). Emerald argues that, as applied to its discharge, numerous investigations "have established that there are no alternatives that are both technologically feasible and economically reasonable to achieve the ammonia reduction necessary to comply with 35 Ill. Adm. Code 304.122(b)." Pet. at 33.

Emerald states that the generally applicable effluent standard also intended to address DO sags in the receiving stream believed to be caused by ammonia nitrogen discharges. Pet. at 33. Emerald argues that these "sags were later determined to be caused primarily by sediment oxygen demand." *Id*. Emerald further argues that "[a]mmonia nitrogen discharged at the level requested by Emerald will thus have minimal, if any, impact upon the level of DO in the Illinois River." *Id*. at 33-34, citing Exh. 2 (NPDES permit). Emerald asserts that discharges at this level will not "contribute to any water quality violations or harm to aquatic life." Pet. at 34, citing *id*. at 20-31 (compliance alternatives).

Emerald concludes that "the factors relied upon by the Board in adopting what is now 35 Ill. Adm. Code 304.122 were substantially different" from those factors applicable to the facility. Pet. at 34.

Agency

The Agency states that the Board relied on two factors in adopting the generally applicable standard: "(1) the impact of ammonia nitrogen in wastewater discharges on dissolved oxygen demand in the receiving stream, and (2) technology present in 1974 allowed dischargers to treat their effluent to meet the 3 mg/L limit." Rec. at 16-17, citing Pet. at 33; *see* Water Quality Standards Revisions, R72-4, slip op. at 1 (Nov. 8, 1973). The Agency states that the facility's treatment process "generates large amounts of ammonia nitrogen during secondary treatment because of the presence of degradable organic nitrogen compounds." Rec. at 17. The Agency further states that the presence of MBT inhibits nitrification, causing ammonia nitrogen released during wastewater treatment process to remain in the effluent. *Id*., citing Pet., Exh. 1 at 5-6. The Agency adds that low levels of alkalinity in the wastewater required addition of alkalinity in order to achieve nitrification. Rec. at 17, citing Pet., Exh. 1 at 6.

The Agency cites Emerald's argument that, "while technology exists to treat discharges to meet the ammonia nitrogen limit, these technologies are not technologically feasible and economically reasonable when applied to Emerald's discharge." Rec. at 17, citing Pet. at 33. The Agency notes that the Board concluded in 2004 "that Emerald's discharge has unique characteristics making the plant unable to achieve nitrification, which makes Emerald different from other industries and POTWs [publicly-owned treatment works]." Rec. at 17, citing Pet., Exh. 1 at 17.

The Agency argues that the compliance alternatives addressed by Emerald in its petition existed when the Board adopted the generally applicable standard. Rec. at 17. The Agency also further argues that Emerald's discharge still contains MBT and has not changed since the Board decided AS 02-5. *Id*. The Agency argues that, although nitrification at the facility "may be more complicated, Emerald has provided no evidence that the presence of MBT in the discharge creates technical factors or costs not considered by the Board in initially adopting" the generally applicable standard. *Id*.

Board Discussion

In 1972, the Board adopted as Rule 406 an ammonia effluent standard to address the impact of ammonia nitrogen in municipal wastewater treatment plant discharges on oxygen demand. Effluent Criteria, Water Quality Standards Revisions, Water Quality Standards Revisions for Intrastate Waters (SWB-14), R 70-8, 71-14, 71-20 (cons.), slip op at 6, 25 (Jan. 6, 1972). On June 28, 1973, the Board amended that provision to address industrial dischargers of ammonia. Water Quality Standards Revisions, R 72-4, slip op. at 1 (Nov. 8, 1973). The Board stated that "[a]mmonia removal from such industrial wastes, when compared with removal from domestic wastes is rather easily applied." *Id*. (citation omitted).

In its original adoption of the ammonia nitrogen effluent standard for sources discharging to the Illinois River, the Board stated that "[t]he evidence is clear that for too long the oxygen demand exerted by ammonia in domestic wastes has been overlooked in the emphasis on reduction of five-day BOD [biological oxygen demand]. The State Water Survey has conclusively shown that reduction of ammonia from the larger sources feeding the Illinois River is necessary if existing standards, essential to an adequate fish population, are to be met."

Effluent Criteria, Water Quality Standards Revisions, Water Quality Standards Revisions for Intrastate Waters (SWB-14), R 70-8, 71-14, 71-20 (cons.), slip op at 6 (Jan. 6, 1972). However, since adoption of the effluent standard, studies have addressed dissolved oxygen concentrations in the Illinois River. Emerald produced studies including one reporting that, during 7-day, 10-year low flows in the LaGrange pool of the Illinois River below Peoria, only 13% of oxygen demand was attributable to nitrogenous biochemical oxygen demand. The study reported that oxygen demand during those flows was 57% carbonaceous and 30% sediment. Thomas Butts, *et al.*, WATER QUALITY ASSESSMENT AND WASTE ASSIMILATIVE ANALYSIS OF THE LAGRANGE POOL, ILLINOIS RIVER (State Water Survey Division, Illinois Institute of Natural Resources June 1981) at 105; April Resp. at 1.

In AS 02-5, the Board stated that ammonia nitrogen in the facility's discharge stems from the presence of degradable organic nitrogen compounds and their degradation in the waste treatment process. The Board noted factors, including the presence of MBT, inhibiting the nitrification of the ammonia. Because of these inhibiting factors, ammonia nitrogen released during the treatment process remains in the effluent. The Board stated that the unique characteristics of the facility's wastewater inhibited nitrification. The Board found that the quality and composition of the discharge from the facility "is substantially and significantly different than wastewaters of other industries and POTWs." The Board concluded that it had not anticipated the chemical manufacturing processes at the facility "when it promulgated the ammonia effluent limit at Section 304.122(b), applicable mainly to other industrial dischargers, in 1972." Noveon, slip op. at 17 (Nov. 4, 2004).

The record in this proceeding shows that the operation of the facility has not changed substantially since the Board granted an adjusted standard in AS 02-5. The presence of MBT continues to be a significant factor inhibiting nitrification of ammonia on the facility's discharge. Further, the record shows that the Board's original adoption of generally applicable ammonia nitrogen standards chiefly considered the impact of discharges from POTWs. While the original rule was amended to include industrial dischargers, the Board has found that the facility's wastewater discharge differs substantially and significantly from the discharge of other industries and POTWs. The record also indicates that dissolved oxygen sags in the Illinois River are attributable largely to sediment oxygen demand and CBOD. Also, the record indicates that the Illinois River meets the Board's DO water quality standard of 5 mg/L upstream and downstream from the facility during critical low flow and high temperature conditions. Therefore, the Board finds on the basis of this record that factors relating to Emerald are substantially and significantly different from the factors relied upon by the Board in adopting the generally applicable regulation.

Factors Justify Adjusted Standard (415 ILCS 5/28.1(c)(2))

Emerald

Emerald argues that the generally applicable standard was "based on balancing the potential adverse impact upon DO against the cost and ease of control." Pet. at 34. Emerald first asserts that compliance with the generally applicable standard would provide minimal beneficial impact to the Illinois River. *Id.* Compared to this minimal benefit, Emerald argues that "the high cost of technically feasible control technology makes it economically unreasonable for

Emerald to meet this effluent limitation." *Id*. Emerald concludes that both of these factors support granting the requested relief. *Id*.

Agency

The Agency argues that, while economic reasonableness is a factor the Board considers in adopting regulations, it is not a factor in the level of justification for obtaining an adjusted standard. Rec. at 17, citing 415 ILCS 5/27, 28.1(c) (2012). The Agency suggests that, before the Board considers cost, Emerald "should have to demonstrate that the costs are substantially and significantly different than the costs of treatment that the Board initially considered when promulgating the ammonia nitrogen effluent limit." Rec. at 18.

The Agency argues that Emerald did not "present evidence that the cost of treating its effluent for ammonia nitrogen is higher than the costs expended by POTWs or other industrial plants, or higher than the costs contemplated by the Board when adopting Section 304.122." Rec. at 18. The Agency further argues that Emerald's estimated capital costs are comparable to capital costs paid between 1998 and 2002 by three Illinois municipalities for POTWs. *Id*. The Agency asserts that Emerald "should be expected to pay the same costs as others in the industry." *Id*.

The Agency notes Emerald's argument that generally applicable ammonia nitrogen effluent limit of 3 mg/L "has little to no measurable impact to the Illinois River." Rec. at 19, citing Pet. at 34. The Agency argues that this position fails to justify an adjusted standard. Rec. at 19. The Agency suggests that, if Emerald considers the current regulation to be ineffectual, it should submit to the Board a rulemaking proposal to amend the standard. *Id*.

The Agency explains that the term "LC50" refers to "the concentration of a toxic substance or effluent which is lethal to 50% of the exposed organisms in a given period of time. Rec. at 19, n.3. The Agency states that Emerald "is the only discharger in the state that has failed to improve the toxicity of its effluent above the single digit percentage LC50 level." *Id*. The Agency argues that LC50 values this toxic "are not found at any other Illinois facility." *Id*.

The Agency concludes that "Emerald has failed to meet its burden of proof under Section 28.1(c)(2) of the Act." Rec. at 19, citing 415 ILCS 5/28.1(c)(2) (2012).

Board Discussion

The Board found above that factors relating to Emerald are substantially and significantly different from the factors relied upon by the Board in adopting the generally applicable regulation. Emerald argues that these distinguishing factors justify an adjusted standard because there are no treatment options for removal of ammonia nitrogen that are economically reasonable and technically feasible, especially in light of the impact of removal on DO levels in the Illinois River. *See* Pet. at 34.

Alternative Treatment Technologies. In AS 02-5, the Board compared alternatives investigated by Noveon to those investigated and implemented in site-specific rulemakings addressing other facilities seeking relief from the total ammonia-nitrogen effluent standard at

Section 304.122(b). Noveon slip op. at 17 (Nov. 4, 2004), citing Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14 (Dec. 17, 1998); Site-Specific Petition of Mobil Oil Corp. for Relief From 35 Ill. Adm. Code 304.122, Ammonia Nitrogen Effluent Standards, R97-28 (Jan. 22, 1998). The Board found that, although the costs of some alternatives for ammonia removal at the facility are less than the costs of technologies implemented in previous site-specific rulemakings, "the overall cost of reducing ammonia nitrogen would be significantly higher due to the large quantity of ammonia that Noveon must remove to meet the ammonia nitrogen limit. Noveon, slip op. at 17 (Nov. 4, 2004).

As noted above under "Post-Treatment of Wastestream," the removal alternatives investigated by Emerald vary in cost and effectiveness. The Board notes that reducing Emerald's current effluent concentration from 155 mg/L to the generallyapplicable limit of 3.0 mg/L would require 98% removal. Brown and Caldwell's updated 2013 report summarized the effectiveness of 17 variations of seven alternatives based on factors including off-gas treatment and ammonia-nitrogen removal percentage. The report also presented total annual costs in dollars per year for capital and operations and maintenance (O&M), and cost in dollars per pound of ammonia nitrogen removed:

Alternative	Ammonia-nitrogen removal (%)	Total Annual Capital and O&M Costs ($/year)	Cost of Ammonia-nitrogen removed ($/lb)
1. PC Tank Stripping			
with off-gas treatment	1.5	791,874	309.93
with off-gas treatment	1.5	579,572	226.84
2. PVC Tank Stripping			
without off-gas treatment	44.8	4,227,613	54.63
without off-gas treatment	22.4	2,466,086	63.74
3. Effluent Stripping			
with off-gas treatment	95.0	3,357,314	20.47
without off-gas treatment	95.0	2,533,862	15.45
without off-gas treatment	71.3	2,410,996	19.60
without off-gas treatment	47.5	1,374,025	16.76
without off-gas treatment	23.8	799,936	19.51
4. Struvite Precipitation			
	18.6	1,678,220	52.25
	21.5	1,478,707	39.79
5. Effluent Breakpoint Chlorination	98.0	2,110,918	12.48
6. Effluent Ion Exchange			
	98.0	1,120,526	6.62
	73.5	836,090	6.59
	49.0	590,670	6.98
	24.5	342,842	8.11
7. Ozonation	98.0	3,196,148	18.89

Appendix A, Attachment C. As summarized above, total annual costs of technological alternatives including O&M range from $342,832 per year for approximately 25% removal to $836,090 per year for approximately 75% removal to $1,120,526 per year for 98% removal for the least expensive options. *Id*. The Board emphasizes that reducing Emerald's current effluent concentration limit from 155 mg/L to the generally applicable limit of 3.0 mg/L would require 98% removal.

Agency Objections. The Agency argues that Emerald did not "present evidence that the cost of treating its effluent for ammonia nitrogen is higher than the costs expended by POTWs or other industrial plants, or higher than the costs contemplated by the Board when adopting Section 304.122." Rec. at 18. As in AS 02-5, the Agency argues that "capital costs are comparable or lower than the capital costs expended by POTWs." Rec. at 18. The Agency cites capital costs for single stage nitrification facilities at POTWs for the municipalities of Geneva, Batavia, and Saint Charles, Illinois. These capital costs ranged from $6,000,000 for Batavia's 4.2 mgd plant to $8,400,000 for Geneva's 5 mgd plant and Saint Charles' 9 mgd plants. Rec. at 18; *see* Noveon (June 18, 2003) (Agency recommendation). However, the Agency has acknowledged that "[n]one of these figures include O&M costs which constitute a significant percentage of the figures presented by Noveon." Noveon (June 18, 2003).

In this regard, the Board notes the testimony on behalf of Noveon in AS 02-5 by Mr. T. Houston Flippin:

> The comparisons made by the IEPA considered only the capital costs of single stage nitrification. Operations and maintenance (annual) costs were not included in the comparison. However, . . . these annual costs for Noveon would be significant. The facilities used in the comparisons by the IEPA were likely required to add little or no chemicals to achieve nitrification whereas the Noveon-Henry Plant would be required to spend $788,000 annually on chemicals alone. This high chemical cost is due to chemicals required for the pH 2 pretreatment process (acid to lower the pH and caustic to raise the pH for biological treatment) and caustic required providing the alkalinity consumed in nitrification. This yields a present worth chemical only cost of $5.29 million excluded from the cost comparisons made by IEPA (based on a 10 year project life). . . . [T]his is a significant omission in cost comparisons. . . . Only present worth cost comparisons are meaningful when there is a significant difference in operating costs as in the case here. Noveon (Feb. 9, 2004).

The Board finds that the Agency's comparison of the capital costs of Emerald's alternatives to those of POTWs does not provide a complete perspective. The Agency's comparison did not consider O&M costs, which would be significantly higher for Emerald than a POTW. The Agency also did not offer capital costs in terms of annualized costs or present worth costs as Emerald did to make a more direct comparison. For the values in the table above, Emerald followed USEPA's Interim Economic Guidance for Water Quality Standards, EPA-823-B-95-002, to compute total annual costs based on the annualized capital cost and annual cost of O&M. Pet. at 30. The Agency also did not use total annual costs to normalize the $/lb NH3-

N removed from the POTWs as Emerald did in order to compare costs on a pound-by-pound basis. Appendix A, Attachment C.

In addition, the Board notes that POTWs cited by the Agency treat 4.2 to 9 mgd, while Emerald's operations produce approximately 150,000 gallons per day, a 28- to 60-fold difference. Pet. at 13-14. Also, both the 2013 Brown and Caldwell report and 1995 Eckenfelder Inc. study note that, although the facility's wastewater treatment plant operates at conditions that would prompt biological nitrification, waste load characteristics inhibit nitrifying bacteria. Pet. at 21, 29; Appendix A at 4; Noveon (May 28, 2002) (Exhibit 6 at 1-1).

In light of the factors noted above, the Board concludes that the Agency's comparison of Emerald's facility with single-stage nitrification at a POTW does not accurately reflect Emerald's treatment options in terms of cost, size, or complexity.

Investigation of Production Methods and Technologies under AS 02-5

As noted above under "Summary of Previous Board Proceedings Regarding Facility," the Board granted the previous owner of the facility an adjusted standard subject to a number of conditions. Noveon, slip op. at 22-23 (Nov. 4, 2004). One condition requires continued investigation of production methods and technologies that generate less ammonia in the facility's discharge. The condition also requires preparation and submission of an annual report "summarizing the activities and results of these investigatory issues." *Id*. at 22. Emerald submitted to the Agency annual reports summarizing its investigations since grant of an adjusted standard in AS 02-5.

2006. Emerald reported that it was working on two projects with potential to reduce generation of ammonia at the facility's wastewater treatment system. The first was replacement of a BBTS wet scrubber for particulates with a BBTS Dust Collector System. Exh. 6 at 1; April Resp. at 4. Emerald reported that, "[a]t the time of project development, there was an estimate of 75 to 87 lbs. of BBTS per batch that would be eliminated from the wastewater treatment process. This would translate into a reduction of 8 to 10 lbs. of ammonia to the river for each batch of BBTS produced." April Resp. at 4. In 2007, Emerald reported that it had performed this replacement, which improved process efficiency and prevented loss of an unspecified amount of finished BBTS product to the facility's wastewater. Pet., Exh. 6 at 2.

Emerald stated that the second project was improvement of acetonitrile column efficiency to meet the NESHAP for Miscellaneous Organics. Exh. 6 at 1; April Resp. at 4. Emerald reported that a task force "collected flow, composition and performance data from the process." April Resp. at 4. Emerald added that much of the work involved data collection and analysis and that data regarding reduction of ammonia in the effluent, if any, are not available. *Id*.

2007. Emerald reported that it was working on three projects with potential to reduce generation of ammonia at the facility's wastewater treatment system. *See* Exh. 6 at 2. The first was investigation of a sintered filter media for BHS filters. *Id*. Emerald reported that it had reviewed 2000-2001 studies on changing filter media for some processes and developed specifications for ordering new filter cloths. April Resp. at 5. Emerald considered trials of the

new cloths unsuccessful "as they continued to blind and require frequent change out which was determined to be cost prohibitive." *Id*.

The second project was improving acetonitrile column efficiency to meet the NESHAP for Miscellaneous Organics. Exh. 6 at 2. Emerald stated that the work of the 2006 task force culminated "in a large construction and design capitol project intended to increase column efficiency and reduce emissions to the waste water treatment plant (WWTP). The final proposal was rejected due to cost concerns." April Resp. at 5

The third project was investigation of the Anammox process for anaerobic treatment of high concentrations of ammonia. Exh. 6 at 2-3; April Resp. at 4. Emerald reported that this process experiences more upsets than aerobic biological nitrification that was discounted for use at the facility "due to the presence of known bio-inhibitors and the complexity of site-wide wastewaters." April Resp. at 5. Emerald concluded that its "waste stream would render the process performance unstable." Exh. 6 at 3.

2008. Emerald reported that it was working on three projects with potential to reduce generation of ammonia at the facility's wastewater treatment system. Exh. 6 at 4; *see* Rec. at 7. The first was training wastewater treatment operators with a focus on improving treatment to reduce effluent ammonia. Exh. 6 at 4; *see* April Resp. at 6. Emerald reported that improving biological treatment at the facility "will actually increase effluent ammonia-nitrogen rather than decrease effluent NH_3-N because a greater fraction of organic nitrogen will be degraded to NH_3-N." April Resp. at 6. Emerald states that the facility "cannot support nitrifying bacteria that convert NH_3-N to NO_3-N." April Resp. at 6.

The second project was conducting Feed Batch Reactor testing to quantify bio-inhibitions present in the system. Exh. 6 at 4. Emerald stated that this testing examined "the potential impacts of NASH wastewater on the wastewater treatment system's COD [chemical oxygen demand] (and associated BOD) removal capability." April Resp. at 6. Emerald concluded that "implementation did not reduce ammonia in the effluent." *Id*.

The third project was initiating a study of the effects of carbon dioxide for pH buffering. Exh. 6 at 4. Emerald reported that, although this was considered as a way to reduce chemical costs for neutralization and sludge conditioning, "[i]ts implementation did not reduce ammonia in the effluent." April Resp. at 6. In 2009, Emerald reported that implementation of carbon dioxde neutralization "did not reduce ammonia in the effluent." *Id*. at 5.

2009. Emerald reported that it was working on "[i]mprovements to the Tertiary Butyl Amine column increasing the recovery of TBA resulting in less amine to the sewer." Exh. 6 at 5. Emerald reported that it found no data indicating that "improvements to the TBA column resulted in reduction of ammonia in the effluent." April Resp. at 5.

2010. Emerald reported that it was working on two projects with potential to reduce generation of ammonia at the facility's wastewater treatment system. The first was incorporating "ammonia reduction as a metric in the employee gain sharing plan." Exh. 6 at 7. Emerald specified that "[t]he desired ratio of lbs. of ammonia per MMlbs of product produced was added

to the gain sharing plan for 2010 onward in an effort to keep employees focused on reducing ammonia emissions." April Resp. at 6. Emerald stated that, "[a]lthough reductions in the ammonia in the effluent are noted, data regarding reductions of ammonia that can be attributed specifically to adding this metric to the gain sharing plan are not available." *Id*.

The second project was conducting additional tests to determine sources of ammonia within the facility. Exh. 6 at 7. Emerald specified that "[t]esting was completed in 2011 and focused on the TKN and NH_3-N loading from the various contributing stream to the wastewater treatment plant (PVS tank discharge, PC tank discharge, C-18 tank discharge, and Holding Pond/Well No. 3 discharge)." April Resp. at 6, citing Exh. 13 at 2-3 (Table 1: Influent Wasteloads Used in Developing Treatment Alternatives). Emerald reported that "[a]dditional testing was completed in 2012 and was focused on the C18 tank, the PC tank, the PVC tank, the biotreater feed, and the filter press feed." April Resp. at 6. Emerald stated that "results of the 2012 sampling and analysis are still being evaluated to determine if additional sampling is warranted." *Id*.

2011. Emerald reported that it was working on a project to improve instrumentation around the acetonitrile recovery column to reduce the ammonia concentration in effluent from the facility's wastewater treatment system. Exh. 6 at 9; *see* Rec. at 7-8. Emerald reported that it installed two pressure transmitters in late 2011 and early 2012. April Resp. at 7. Emerald reported that, although this gives "production staff absolute pressure and differential pressure data to assist in the performance of the column," it has no data indicating that this has resulted in reduced effluent ammonia. *Id*.

The Board notes that, although annual reports indicate that Emerald investigated a number of new technologies and production methods for generation of less ammonia, Emerald reported that it had not completed any voluntary environmental projects designed to improve the Illinois River. April Resp. at 8. Emerald cited financial obstacles to projects of this nature. *Id*. at 8-9. Specifically, Emerald reported that it had spent more than $10 million for the design and installation of a sodium hydrosulfide (NaSH) unit, which uses the exhaust gas stream from MBT production that had been sent to a flare. *Id*. at 9. Emerald also cites a labor dispute that disrupted production for more than seven months and the recent recession as reasons that it has lacked capital for projects of this nature. *Id*.

New Production Methods and Technologies

Although the Agency's initial recommendation disputed economic reasonableness, the Agency did not press Emerald to reexamine every alternative it had presented. Instead, the Agency focused on the investigation of new production methods and technologies that generate less ammonia in Emerald's discharge and specific treatment technologies. Rec. at 22-23. In its initial suggested conditions, the Agency identified the following specific methods and technologies: (1) Fenton's reagent treatment; (2) photo assisted Fenton systems; (3) hydrogen peroxide/UV treatment; (4) granular activated carbon treatment of the PC tank wastewater before combination with non-PC tank wastewater followed by biological nitrification; (5) spray irrigation on crops; and (6) dilution of wastewater from the PC tank with Illinois River water. Rec. at 23. Under the joint recommended conditions, Emerald would be obligated to investigate

only the last three, which Emerald and the Agency proposed as Conditions (D), (E), and (F). Joint Rec. Conds., Exh. B at 1. The Board notes that joint recommended condition (C) would require Emerald generally to investigate new technologies and evaluate "implementation of new and existing technology based on current plant conditions." *Id*. The three specific investigations included in the joint recommended conditions are discussed in detail in the following subsections.

Granular Activated Carbon. The Agency argues that Emerald has not thoroughly considered granular activated carbon treatment of the PC tank wastewater before combination with non-PC tank wastewater followed by biological nitrification. Rec. at 15. The Agency further argues that USEPA "guidance indicates that this treatment alternative effectively removes inhibitors, including MBT, which then allows for biological treatment." *Id*.

The Board notes that in AS 02-5, Noveon's evaluation of treatment technologies considered powdered and granulated activated carbon but determined that both would be infeasible.

> At hearing, Mr. Flippin testified that Noveon considered powdered and granulated activated carbon (GAC) as ammonia treatment alternatives, but determined that both would be infeasible. Mr. Flippin stated that Noveon's discharge would require a dose of 5,000 mg/L of powdered activated carbon. A dose proportional to the actual flow would total approximately 17 tons a day of carbon. Mr. Flippin stated that GAC is about twice as efficient, but would still require as much as eight and a half tons per day, or approximately 119,000 tons of the material per week. 2004 Tr. at 490-91. Implementation of this alternative would require additional treatment such as a solids separation step or a polymer addition. Two additional problems that arise from using GAC as an alternative are scaling, resulting from too much salt, and biofouling from lime and biomass as a result of too much BOD. 2004 Tr. at 492. Noveon, slip op. at 12-13 (November 4, 2004).

The Board notes that the agreed recommended condition (D) would focus a study of activated carbon use to just the PC tank wastewater before it combines with the non-PC tank wastewater. In addition, the agreed recommended condition requires, "[t]he study shall include a technical feasibility evaluation and an economic feasibility analysis." Joint Rec. Conds. Exh. B. Emerald stated that it "can complete such a study." Oct. Resp. at 7. However, the Board notes that the recommended condition did not include a deadline to complete the study. The Board concludes that Emerald should complete its investigation as quickly as possible in order to allow the Agency to determine whether the alternative is economically reasonable and technically feasible, especially in light of anticipated revisions to the total ammonia nitrogen water quality standards. The Board notes that the Agency plans to proposed rules updating that standard in its next triennial review. The Agency notes that revised standards may lead to revisions in Emerald's NPDES permit. Agency Resp., Exh. 1 at 4-6. In light of these factors, the Board will require Emerald to complete its investigation within three years of the effective date of this adjusted standard. By doing so, the Board notes that the Agency will have available information about relevant treatment alternatives when implementing revised ammonia standards.

Spray Irrigation on Crops. The Agency proposed that "the nitrogen in Emerald's effluent could be of agronomic benefit through spray irrigation on crops." The Agency stated that Emerald had failed to evaluate land application as an alternative. Rec. at 15. Emerald responded that spray irrigation would only be feasible when the ground is able to absorb the water. Emerald added that farmers may be reluctant to use wastewater for spray application because of the presence of other constituents that might have a detrimental impact on the land or crops. However, Emerald agreed that it could investigate this option. Oct. Resp. at 7.

The Board recognizes Emerald's reservations regarding spray irrigation but also recognizes Emerald's agreement that it is able to investigate this option. The Board expects that this investigation can address ammonia as a nutrient resource for irrigation on crops and other planted areas. Such alternatives may be investigated even if only to provide a seasonal or partial reduction in Emerald's contribution of ammonia to the Illinois River. As with investigation of granular activated carbon, the Board will include this agreed condition with a three-year deadline to complete this investigation.

Dilution of Wastewater from PC Tank with Illinois River Water for Single-Stage Nitrification. The Agency's proposed conditions include a requirement that "Emerald investigates and submits a study to Illinois EPA on the dilution of waste water from the PC tank with water from the Illinois River." Rec. at 23. The Agency explained that this approach intends "to dilute the concentration of MBT to a level that would not inhibit nitrification in the treatment plant." Agency Resp. at 7. The Agency notes that average flow rates from the PC tank and C-18 tank decreased from 2002 to 2011 by 38 gallons per minute (33.6%), which provides capacity to introduce Illinois River water, dilute MBT, and allow single-stage nitrification. Rec. at 9, 15-16, citing Exh. 13 at 2. The Agency argues that, since dilution would take place within the plant and not at the outfall solely to meet effluent limits, "it would be allowable under 35 Ill. Adm. Code 304.102(b) [Dilution]." *Id*.

Emerald noted that Noveon previously considered this option in AS 02-5. However, Brown and Caldwell did not re-evaluate it in its 2013 report. The report stated that "[n]itrification alternatives were not reconsidered due to their prior poor economic viability and the continued presence of significant nitrification inhibition, which made these treatment alternatives of questionable reliability." Appendix A at 5; *see* Noveon(May 22, 2002) (petition at 22). Brown and Caldwell also addressed diluting the primary and secondary clarifier effluents, but found that bio-inhibition continued to prevent nitrification even after a 16-fold dilution of the primary clarifier effluent and 5-fold dilution of the secondary clarifier effluent. Appendix A at 4.

Addressing biological nitrification of the combined wastewater, Emerald explained that it would reduce the pH of the PC tank discharge and add river water. The waste stream would then be combined with the non-PC wastewater to allow for single-stage nitrification. Pet. at 26. Emerald cited a lack of reliability because of variability in the wastewater characteristics caused by different batch processes at the facility. Emerald emphasized that reliability is necessary to demonstrate consistent compliance. Pet. at 26.

Because of these issues, Emerald responded to the Agency's recommendation by stating that the option would not be viable. Oct. Resp. at 7. Emerald also addressed the Agency's apparent view that this option would use capacity created by decreased flows. Emerald replied that the option would interfere with future plans to increase capacity and production at the plant. Oct. Resp. at 7.

In the agreed recommended conditions, however, Emerald agreed to study dilution of the wastewater to determine the potential for subsequent single-stage nitrification. As a part of the study, Emerald agreed to include an evaluation of the technical feasibility and economic reasonableness. Joint Rec. Conds., Exh. B (Condition F).

The Board notes that, in AS 02-5, Noveon listed the costs of this alternative in terms of present worth costs at $4.4 million in capital costs and $7,310,000 in O&M costs, for a total present worth of $11,710,000. Noveon (May 22, 2002) (petition at 22); *id*. (Exhibit 7 at 3). The Board notes that these costs made it one of the most expensive alternatives that Noveon evaluated in AS 02-5.

Brown and Caldwell previously stated that biological nitrification of the combined wastewater stream was technically feasible but presented problems with reliability. Pet. at 26; Noveon (May 22, 2002) (petition at 22). The Board also notes that the record does not establish the relationship between MBT concentrations and inhibition of nitrification. The record does not establish the MBT concentration at which nitrification could allow the facility to meet the 3.0 mg/L ammonia effluent limit or an alternative limit. Also, the record does not show the costs for this alternative in terms of percentage removal. The Board will include this agreed condition with a three-year deadline to complete the investigation.

Summary. As agreed upon by Emerald and the Agency, the Board will include conditions requiring Emerald to investigate the technical feasibility and economic reasonableness of granular activated carbon, spray irrigation on crops, and dilution of wastewater from the PC tank with Illinois River water for single-stage nitrification. In addition, the Board will require Emerald to complete its investigation of these alternatives within three years of the date on which it grants this adjusted standard.

Reduction in Effluent Limit Concentration

The Agency's recommendation noted that none of technologies evaluated by Emerald would result in compliance with the generally applicable standard. Rec. at 10. The Agency asserted that "Emerald should still provide incremental reductions in ammonia even though it would fail to meet the prescribed 3 mg/L limit in section 304.122." *Id*.

The Agency's proposed conditions included a requirement that Emerald reduce ammonia in its effluent by 48%. Rec. at 22. According to Brown and Caldwell's 2013 report, effluent ammonia NH_3-N waste loads decreased by 48% in 2011 from 2002 levels, while effluent flow rates decreased by about 4%. Brown and Caldwell attributed the decrease to shut downs, lower production, and improved recovery. Appendix A at 2. More specifically, Brown and Caldwell stated that

> [t]hese decreases are principally due to lower COD and TKN loads being discharged through the PC Tank to the influent to the WWTF. This reduction has been attributed to the shutdown of X70 and Geltrol, much lower production of OBTS (2 months every 3 months versus weekly before), much lower production of C-18 (2 weeks every quarter versus monthly before) and improved recovery in the tertiary butyl amine (TBA) column. *Id*.

The Agency proposed that "Emerald's effluent limit for ammonia nitrogen be reduced by 48% from 155 mg/l to 80 mg/l to reflect 48% reduction in the effluent waste load." Rec. at 22.

Emerald responded by pointing out that, although the Brown and Caldwell report noted a 48% decrease in NH_3-N waste loads from 2002 to 2011, the decrease was due mainly to temporary shutdowns and lower production. The report also noted that "Emerald is in the process of regaining total production levels previously observed in 2004. As production increases, the effluent flow rate, NH3-N load, and effluent NH3-N concentration are expected to increase." Appendix A at 2.

Emerald stated that it could not accept the Agency's proposed 48% reduction but would evaluate historic data to propose an alternative reduction in the effluent limitation. Oct. Resp. at 6. Emerald's current NPDES Permit establishes a daily maximum effluent limitation of 155 mg/L and a daily maximum load limit of 1,848.6 lbs/day for ammonia (as N). Pet. Exh. 3 at 5. Based on data from January 1, 2007 to January 31, 2012, Emerald stated the concentration of ammonia-nitrogen in Henry Plant's discharge ranged from 23 to150 mg/L. Pet at 16, 19; Exh. 10. Data from 2011 indicate that the peak daily waste load was 1449 lbs/day. Emerald suggested that the maximum daily load limit for ammonia in the NPDES permit could be reduced from 1,848.6 to 1,500 lbs/day to reflect the progress made by Emerald in reducing effluent ammonia to reflect the highest daily load experienced in 2011. Apr. Resp. at 3.

In the joint recommended conditions, Emerald and the Agency proposed a daily maximum effluent limitation of 140 mg/L and a maximum daily load limit of 1,633 lbs/day ammonia (as N). Joint Rec. Conds. at 2. Although not required by the current NPDES permit, Emerald and the Agency also proposed adding a 30-day average effluent limit of 110 mg/L and a 30-day average load limit of 841 lbs/day. The daily maximum load limit and 30-day average load limit are based on a daily maximum flow rate of 1.4 MGD and a daily average flow rate of 0.917 MGD listed in Emerald's 2007 NPDES permit. Pet. Exh. 3, Joint Rec. Conds. at 2.

The Board notes that the jointly-proposed 140 mg/L daily maximum effluent limitation represents a 10% decrease from the current 155 mg/L. The Board further notes that the 1,633 lbs/day maximum daily load limit reflects a 12% decrease from the current 1848.6 lbs/day daily maximum load limit. Likewise, the 30-day average effluent limit of 110 mg/L and load limit of 841 lbs/day are 29% and 55% less, respectively, than the currently permitted daily maximum rates in the NPDES permit. While Emerald initially opposed a 48% reduction in the daily maximum effluent limit proposed by the Agency, Emerald subsequently agreed to ammonia nitrogen discharge limitations in terms of 30-day average effluent and load limits as a condition of the requested relief. Oct. Resp. at 6, Joint Rec. Conds. at 2.

The Board will include the jointly-agreed ammonia nitrogen limits and load limits as conditions of the adjusted standard. In this regard, the Board notes that the jointly-agreed 30-day average effluent limit of 110 mg/L and the load limit of 841 lbs/day would be additional limits not imposed in the facility's current NPDES permit. While a 48% reduction in the waste load observed between 2002 and 2011 was due to temporary shutdowns and lower production, Emerald will be required to comply with the effluent limitations even if it returns to higher production levels.

Additional Condition

Emerald has already implemented strategies to reduce discharge of ammonia to its wastewater treatment plant, including replacement of the BBTS Wet Scrubber with a dust collector, incorporating ammonia reduction as a metric in the employee gain sharing plan, and upgrading instrumentation around the acetonitrile recovery column. Exh. 6 at 1-2, 7, 9, Apr. Resp. at 4-7.

In addition, Emerald agreed to reduce its daily maximum effluent and load limits. Joint Rec. Conds. at 2. However, the Board notes that, even with the reductions, Emerald's requested effluent limitations of a daily maximum of 140 mg/L and a 30-day average of 110 mg/L remain well above the 3 mg/L effluent limitation in 35 Ill. Adm. Code 302.122(b).

In AS 02-5, Noveon's Health and Safety Manager David Griffin stated that, "in light of all the above source reduction and end-of-pipe activities conducted by the plant, the plant has determined that there is no silver bullet that will allow its wastewater treatment system to comply with the three milligram and six milligram ammonia standard. . . ." Noveon (Feb. 17, 2004) (transcript at 41).

The facility has investigated reducing ammonia in its effluent since BF Goodrich Corporation first filed an NPDES permit appeal (PCB 91-17) and variance petition (PCB 92-167). Pet. at 3. Although the facility may find no silver bullet to bring Emerald's discharge into compliance with the generally applicable effluent limit of 3.0 mg/L, the Board notes that the Henry Plant has reduced ammonia discharges through a combination of strategies.

In AS 02-5, the Board stated that, "[t]hroughout the duration of this adjusted standard, the Board encourages Noveon to research and propose means, beyond the wastewater treatment plant and multi-port diffuser, of providing environmentally beneficial improvements to the Illinois River in Marshall County." Noveon slip op. at 19 (Nov. 4, 2004). As noted in AS 02-5, the Board has granted adjusted standards incorporating voluntary environmental projects. *Id.*, citing Petition of Illinois American Water Company's (IAWC) Alton Public Water Supply Replacement Facility Discharge to the Mississippi River for an Adjusted Standard from 35 Ill. Adm. Code 302.203, 304.106, and 304.124, AS 99-6 (Sept. 7, 2000); Petition of City of Rock Island for an Adjusted Standard from 35 Ill. Adm. Code 304, AS 91-13 (Oct. 19, 1995); Petition of City of East Moline and IEPA for and Adjusted Standard from 35 Ill. Adm. Code 304, AS 91-9 (May 19. 1994). In AS 99-6, the Board found that the adjusted standard and environmental project "is a much better and more cost effective way to obtain sediment loading reductions in

the watershed than employing other options to remove residuals from [the facility's wastewater]." Petition of Illinois American Water Company's (IAWC) Alton Public Water Supply Replacement Facility Discharge to the Mississippi River for an Adjusted Standard from 35 Ill. Adm. Code 302.203, 304.106, and 304.124, AS 99-6, slip op. at 20 (Sept. 7, 2000). Although AS 99-6 contained a 7-year sunset provision, the Board renewed the adjusted standard indefinitely as long as the conditions of the receiving stream do not render the adjusted standard obsolete or infeasible, the offset ratio is maintained, and the tons of soil saved from entering the project waterway is maintained above a certain level. Proposed Extension of Adjusted Standard Applicable to Illinois-American Water Company's Alton Public Water Supply Facility Discharge to the Mississippi River Under 35 Ill. Adm. Code 304.124, and 304.106, AS 07-2, slip op. at 24 (Oct. 18, 2007). The Board also granted the adjusted standards in AS 91-9 and 99-13 indefinitely as long as the petitioner met conditions including maintaining the benefit of the environmental project.

In AS 02-5, the Board stated that, if Emerald requests renewal of the adjusted standard, it would consider projects proposing improvements to the Illinois River in Marshall County. Noveon, slip op. at 19 (Nov. 4, 2004). Since Emerald seeks renewal, the Board's August 1, 2013 Hearing Officer Order requested that Emerald provide information on any environmental projects. Emerald responded that it had not yet completed and was not planning any such projects. Emerald stated that is "has not had available capital to spend on additional projects that do not allow some return on investment or at least offset some operating expenses." April Resp. at 8-9.

The order also asked Emerald to comment on a condition requiring it to implement and maintain a nonpoint source BMP addressing ammonia if it sought to continue to rely on dilution under 35 Ill. Adm. Code 304.102. Emerald responded that it did not now view consideration of such a project to be realistic and argued that it has "negligible" ability to affect non-point source pollution from agriculture. Oct. Resp. at 10. Emerald argued that evaluating new treatment technologies and production methods would be more productive than implementing and maintaining a non-point source BMP. *Id*. at 9.

The Board also asked Emerald if it "would consider cost-share incentives to implement or install best management practices (BMP) for an environmental project, such as applying to the Agency for funds through Section 319(h) of the Clean Water Act nonpoint source management grants" as described on the Agency's website. Emerald responded that it was not likely to consider such options because of the funds needed for such a project. Emerald added that there is a lack of identified BMPs for reduction of nitrogen discharges from non-point sources, and it has not found any that would be "economically feasible or result in a quantifiable environmental benefit." Oct. Resp. at 11.

The Agency stated that, if the Board grants Emerald's requested relief, it "would not oppose a condition in Emerald's permit to implement and maintain non-point source best management practices to provide an environmental benefit that also addresses ammonia." Agency Resp. at 9. The Agency added that it "is unsure that Emerald will be able to find a sufficient number of nonpoint sources to off-set the high levels of ammonia in Emerald's discharge." *Id*.

On November 25, 2014, the Agency and Department of Agriculture issued a draft "Illinois Nutrient Loss Reduction Strategy" (Nutrient Strategy) for public comment.[2] The Nutrient Strategy sets a target of reducing nitrate-nitrogen loading to the Mississippi River by 15% by 2025 with an ultimate target of 45% reduction, as recommended by the USEPA Science Advisory Board and outlined in the Gulf Hypoxia Action Plan 2008.[3] Nutrient Strategy at 2.1.

The Nutrient Strategy identifies the "Illinois River-Senachwine Lake Watershed" as one of five priority watersheds in Illinois for both point sources and agricultural non-point sources of nitrate-nitrogen. Nutrient Strategy at 4.2-4.3. The Board notes that the Henry Plant discharges to the Illinois River just downstream of Senachwine Lake, which places the facility's discharge within the Illinois River-Senachwine Lake Watershed. Noveon Pet. Exh. 3, Figure 1-2; Hearing Exh. 18; PC1.

The Nutrient Strategy addresses several nutrient reduction strategies, including agricultural BMPs. Some BMPs are cost negative, which means that agricultural producers would save money. Others cost $1.38/lb nitrate-nitrogen removed or more. Nutrient Strategy at 3.30-3.33. The Board has stated that an environmental project can be "a much better and more cost effective way to obtain sediment loading reductions in the watershed than employing other options to remove residuals from [the facility's wastewater]." Petition of Illinois American Water Company's (IAWC) Alton Public Water Supply Replacement Facility Discharge to the Mississippi River for an Adjusted Standard from 35 Ill. Adm. Code 302.203, 304.106, and 304.124, AS 99-6, slip op. at 20 (Sept. 7, 2000). The Nutrient Strategy states that "Illinois EPA will promote trading or other offsets as part of watershed planning and implementation efforts and may use such trading when considering NPDES permits after an appropriate, enforceable, and transparent program has been developed." Nutrient Strategy at 5.9. In 2017, the Agency intends to propose rules establishing nutrient water quality standards. Nutrient Strategy at 8.3.

The Board notes that the process sought by Emerald and the Agency to achieve nitrification of the ammonia in the facility's discharge would convert the ammonia-nitrogen (NH_4^+) into nitrite-nitrogen (NO_2^-) and then into nitrate-nitrogen (NO_3^-) for discharge into the Illinois River. *See* Noveon (Feb. 9, 2004) (Flippin testimony at 9-10). Nitrate-nitrogen is one of the targeted pollutants in the Illinois Nutrient Reduction Strategy for the Illinois River-Senachwine Lake Watershed.

Given the facility's efforts to reduce ammonia-nitrogen in the effluent, the strength of the ammonia nitrogen discharge from the facility, and the location of its outfall into a priority watershed for sources of nitrate-nitrogen; the Board finds that a condition addressing offsets through BMPs is appropriate for providing relief from 35 Ill. Adm. Code 304.122(b) should Emerald seek to renew or modify the adjusted standard. The Board will include a condition

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[2] *See* http://www.epa.illinois.gov/topics/water-quality/watershed-management/excess-nutrients/nutrient-loss-reduction-strategy/index

[3] Mississippi River/Gulf of Mexico Watershed Nutrient Task Force. 2008. Gulf hypoxia action plan 2008 for reducing, mitigating, and controlling hypoxia in the northern Gulf of Mexico and improving water quality in the Mississippi River Basin, Washington, DC.

requiring Emerald, if it seeks to renew or modify the adjusted standard, to implement agricultural BMPs to offset contributions from the facility's discharge of nitrogen to the Illinois River. This condition intends to provide a partial reduction in the nitrogen loading to the watershed. Consistent with the Nutrient Strategy's ultimate target of a 45% reduction in nitrate-nitrogen loadings, the condition provides that, if Emerald seeks to renew or modify this adjusted standard, it must implement agricultural BMPs within the Illinois River-Senachwine Lake Watershed to provide a partial reduction in the total nitrogen loading to the watershed by offsetting at least 45% of the nitrogen represented in 841 lbs/day ammonia-nitrogen based on the 30-day average load limit.

The Board recognizes that Illinois' nutrient strategy is in the early stages of implementation and that Emerald may be faced with other regulatory changes pertaining to total ammonia nitrogen water quality standards during the next few years. However, because the adjusted standard sunsets in five years, the Board firmly concludes that Emerald must begin planning to offset the nitrogen loading to the Illinois River. Based on the Nutrient Strategy's goals and deadlines, the Board expects that the Agency is planning to develop "an appropriate, enforceable, and transparent program" beyond the adjusted standard. The Board expects that this program will incorporate BMPs for agricultural non-point sources and a mechanism that Emerald could use to meet an offset such as that required in this order. Nutrient Strategy at e, 5-9, 8-3. Additionally, the Board stresses that the condition pertaining to BMPs does not supersede or offset requirements under the other conditions of the adjusted standard.

Best Degree of Treatment

In AS 02-5, the Board described the concept of a mixing zone and its relationship to the prerequisite BDT.

> Under the 'allowed mixing concept,' a discharger that is unable to comply with the requirements of not causing or contributing to water quality violations, 'after making every effort to fulfill the obligations of the discharger . . . and given the limits imposed by the nature of the receiving water body and the character of the outfall(s), is entitled to use a limited portion of the receiving body of water to effect mixing of the effluent with the receiving water. Within this limited portion of the receiving body of water, the discharger is excused from compliance with 304.105." Marathon Oil Co. v. IEPA, PCB 92-166 (Mar. 31, 1994).
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> Depending on the Agency's permit decisions about the mixing zone, the permittee may use mixing as a means of compliance with the Board's water quality standards. *See* 35 Ill. Adm. Code 302.102(g), (h). Board regulations state that a mixing zone is available where the discharger has made every effort to comply with 304.102, which requires all dischargers to provide BDT. 35 Ill. Adm. Code 302.102(a). The regulations further provide that BDT must be consistent with technological feasibility, economic reasonableness and sound engineering judgment. 35 Ill. Adm. Code 304.102(a).
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> The Board further finds in this order that Noveon qualifies for an adjusted standard from the ammonia effluent limit because no other alternative investigated is both technologically feasible and economically reasonable. Thus, the Board finds that Noveon meets the threshold requirement for a mixing zone and ZID by providing BDT at the Henry Plant. Noveon, slip op at 19-20 (Nov. 4, 2004).

The Board notes that the facility has achieved reductions of ammonia in its effluent through a combination of strategies. Emerald has not indicated it intends to discontinue any of these strategies, including the high-rate, multi-port diffuser; use of the BBTS Wet Scrubber in place of a dust collector (Exh. 6 at 1-2, Apr. Resp. at 4); incorporation of ammonia reduction as a metric in the employee gain sharing plan (Pet. Exh. 6 at 7, Apr. Resp. at 5-6); or upgrading instrumentation for the acetonitrile recovery column (Pet. Exh. 6 at 1, 9, Apr. Resp. at 7).

Based on Brown and Caldwell's 2013 re-evaluation of alternatives and the investigation of newly-demonstrated treatment technologies, the Board again finds after additional consideration that no investigated alternative beyond those already implemented at the facility is both technologically feasible and economically reasonable. The Board finds that Emerald's multi-faceted approach provides the best degree of treatment at the facility. The Board further finds that this approach is consistent with the provisions for technological feasibility, economic reasonableness and sound engineering judgment in 35 Ill. Adm. Code 304.102(a) pursuant to the requirements of 35 Ill. Adm. Code 302.102(a).

However, in addition to the joint recommended conditions, the Board will add two conditions, one of which requires Emerald to maintain the high-rate, multi-port diffuser for the discharge. The second additional condition requires Emerald to maintain use of the BBTS Wet Scrubber in place of a dust collector; the incorporation of ammonia reduction as a metric in the employee gain sharing; and the upgrade of the instrumentation for the acetonitrile recovery column. The Board considers these additional conditions necessary for Emerald to continue to meet the requirement of providing BDT as a prerequisite for a mixing zone and ZID.

In AS 02-5, the Board found that Noveon provided BDT at the facility, but the Board's determination hinged on the sunset date of the adjusted standard. The Board stated that it

> drafts this adjusted standard so that it terminates after seven years. . . . The Board also notes that in seven years results of the water quality monitoring will be in and new, more economically reasonable technology may become available and revisiting the ammonia nitrogen issue at that time will be beneficial. Noveon, slip op. at 21 (Nov. 4, 2004).

In this case, the Board provides that the adjusted standard and determination of BDT terminate five years from the effective date of this order. *See* Joint Rec Conds. at 4 (recommending 10-year termination). The Board notes that, over five years, Emerald will have the opportunity to investigate and evaluate strategies for reduction of ammonia-nitrogen discharged to the Illinois River. Also, the Agency will have the opportunity to propose revisions to the total ammonia nitrogen water quality standards based on USEPA's 2013 update of the

ammonia water quality criteria. As the Agency stressed, revised standards may lead to revisions in Emerald's NPDES permit. Agency Resp. Exh. 1 at 4-6. Additionally, as discussed above under "Additional Condition," other issues may generate additional Agency proposals to amend nutrient water pollution regulations. Within the next five years, Emerald must adapt its strategies to any requirements adopted through those amended rules. If Emerald seeks to renew or modify the adjusted standard, revisiting Emerald's discharge and treatment after five years will be beneficial.

As discussed above, the Board found that factors relating to Emerald are substantially and significantly different from the factors relied upon by the Board in adopting the generally applicable regulation. Because its existing wastewater treatment plant is inhibited from nitrifying ammonia, Emerald has investigated alternative strategies for reducing ammonia in its effluent. The Board has carefully reviewed the record and noted above that comparing Emerald's facility with POTWs does not accurately reflect Emerald's treatment options in terms of cost, size, or complexity. The Board has also noted that the facility's wastewater discharge differs substantially and significantly from the discharge of other industries. . The Board finds that the existence of the substantially and significantly different factors described above justifies the requested adjusted standard.

Impact on the Environment or Health (415 ILCS 5/28.1(c)(3)

Emerald

Emerald argues that granting the requested adjusted standard would have "no measurable impact upon the environment or human health." Pet. at 34. Emerald further argues that the facility's discharge "will meet the winter and summer acute water quality standards for total ammonia nitrogen as N at the edge of an appropriately calculated ZID." *Id*., citing *id*. at 19-20 (describing discharge). Emerald asserts that "winter and summer acute and chronic standards will also be met at the edge of an appropriately calculated mixing zone." *Id*. at 34-35, citing *id*. at 19-20. Emerald concludes that "the impact will not be significantly more adverse than that contemplated by the regulation of general applicability." *Id*. at 35.

In a hearing officer order, the Board stated that it had ordered Noveon "to demonstrate compliance with the applicable ammonia water quality standards at the edge of the mixing zone and ZID, as will be defined by the Agency." Noveon, slip op. at 18-19 (Nov. 4, 2004). The Board asked Emerald to provide additional information on the ZID and mixing zone approved by the Agency, including their dimensions.

Emerald responded that its NPDES permit does not specify the dimensions of a ZID or mixing zone, which will vary with the flow in the Illinois River. April Resp. at 10. Emerald states that, after field work, modeling, and permitting, it installed a new multi-port diffuser for discharge of treated effluents. *Id*. The diffuser "was designed to provide a dispersion of at least 11:1 to meet the most stringent of the acute ammonia standards based on data at the time and 99:1 to meet the most stringent of the chronic ammonia standards based on data at the time." *Id*. Emerald reported that "[t]esting of the diffuser showed a dispersion of 39.78:1 at a distance 20 feet downstream from the diffuser. This exceeds the dispersion required to meet the acute standard within a short distance." *Id*. Testing also showed that "dispersion of 299.9:1 was

achieved at 1,090 feet from the diffuser. This more than exceeds the dispersion required to meet the chronic ammonia standard." *Id*.; *see* Pet., Exh. 4 at 3-14 (Table 3-8).

In response to a Board hearing officer order, Emerald employed a more recent Agency database and the Agency's current methodology to calculate updated ammonia standards and required dispersions. April Resp. at 13 (Table A). Emerald states that it followed the Agency's recommendation to use median or 50th percentile values of pH in determining ammonia standards. *Id*. Emerald explains that its dispersions are based on the combined Emerald/PolyOne effluent of 1 million gallons per day (mgd) and the City of Henry POTW effluent of 0.3 mgd with an effluent ammonia concentration of 126 mg/L. *Id*. Emerald also states that the dispersions are based on meeting the Early Life Stage Present criteria, which will also meet the Early Life Stage Absent Criteria. *Id*.

Emerald states that the acute ammonia standard does not reflect a seasonal change. *Id*. Based on background pH, "[t]his translates to an acute ammonia standard of 6.62 mg/L." April Resp. at 13. Emerald further states that the diffuser test shows that the dispersion of 19.2:1 required to meet this standard was met within 20 feet of the diffuser. *Id*. Emerald states that the chronic standard is based on temperature and time of year, for each of which there is a different equation for calculating the proper standard. *Id*. Emerald argues that "the critical dispersion required is 121.2:1." *Id*. Emerald argues that, because dispersion of 299.9:1 was measured 1,090 feet from the diffuser, "all chronic standards are met." *Id*.

Emerald stated that its multi-port diffuser is designed to discharge toward the surface. April Resp. at 11. Emerald reported that, during diffuser testing, data from the edge of the ZID "showed that the main portion of the plume extended from the surface or near the surface to 5 feet below the water surface, with dye concentrations falling off significantly to 8 feet below the water surface." *Id*. Emerald stated that, while the acute toxicity standard for mussels was met at the edge of the zone of initial dilution 20 feet downstream, there was little to no effluent in the water column along the bottom waters. *Id*. Emerald added that the actual ZID, where effluent is mixed top to bottom, extends approximately 99 feet downstream from the discharge. Emerald claimed that this is "the plume's first opportunity to impact the macro-invertebrates in the Illinois River." *Id*.

Emerald states that its diffuser minimizes the mixing area and volume so that "the plume area is less than 1.5 acres versus 26 acres allowed by the Illinois regulations." April Resp. at 11. Emerald argues that its "mixing zone is very small compared to the area of the Illinois River in this reach of the river." *Id*.

The Board asked Emerald to indicate how it demonstrates compliance with the applicable ammonia nitrogen water quality standards at the edge of the ZID and mixing zone. Emerald states that it relies on a third party to conduct quarterly sampling. April Resp. at 11. AquAeTer prepared guidance documents for this sampling. Pet., Exh. 5. Emerald states that it has provided results of this monitoring to the Agency through annual reports. April Resp. at 11, citing Pet., Exh. 6. Emerald concludes that it met the ammonia nitrogen standard for its effluent at the edge of the ZID in all years. April Resp. at 12, citing Att. 3 (sampling results).

Agency

The Agency notes Emerald's argument that granting the requested adjusted standard will cause "no environmental or health impact because the discharge will not cause the winter and summer acute ammonia nitrogen water quality standards to be exceeded at the edge of the zone of initial dilution (ZID), or the winter [and] summer acute and chronic standards at the edge of the mixing zone." Rec. at 19; *see* Pet. at 34-35.

The Agency states that "Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, EPA-822-D-09-001 includes previously unavailable mollusk toxicity data in criteria derivation and concludes that acute and chronic criteria must be lowered by approximately a factor of five over the previous national criteria for ammonia published in 1999 in order to protect mollusks." Rec. at 19-20. Based on draft guidance, the Agency states that "the Emerald effluent will require more mixing than is available in the Illinois River to be protective of mollusks." *Id*. at 20. The Agency argues that, if USEPA adopts the draft criteria, state standards must be amended to match them. *Id*. at 20. The Agency states that,

> under the current state general use water quality standards for ammonia, Emerald may have a daily maximum ammonia concentration of up to 249.5 mg/L in the Spring and Fall months and a monthly average concentration of up to 213.7 mg/L in the summer months and still be compliant with the water quality standards of 5.2 mg/L acute and 0.8 mg/L chronic at the edge of the zone of initial dilution (ZID) and mixing zone, respectively. This mixing follows the demonstrated 47.9:1 dilution in the ZID based on Emerald's high rate diffuser modeling and 300:1 dilution in the mixing zone per Section 301.102 in the mixing zone (25% of 7Q10 flow[4]). *Id*.; *see* Agency Resp. Exh. 1 at 2-3, citing 35 Ill. Adm. Code 302.212(b)(1), (b)(2)(A)(ii) (equations to calculate acute and chronic standards).

The Agency stated that these effluent concentrations are water quality based effluent limits. Agency Resp. Exh. 1 at 4.

Asked by the Board to indicate the pH and temperature values used to calculate these standards, the Agency responded that

> [t]he 75th percentile pH value for spring and fall months resulting in an acute water quality standard of 5.2 mg/L total ammonia and a daily maximum permit limit of 249.5 mg/L total ammonia is 8.25 SU. The 75th percentile pH and temperature values for summer months resulting in a chronic water quality standard of 0.8 mg/L total ammonia and a monthly average permit limit of 213.7 mg/L are 8.08 SU and 27.5 degrees Celsius, respectively. Agency Resp. Exh. 1 at 2.

[4] "7Q10 flow" refers to the average seven-day low flow occurring once every ten years. *See* 35 Ill. Adm. Code 375.203(b)(2).

The Agency reported that it obtained these pH and temperature values from data it collected "at Ambient Water Quality Monitoring Network station D-09, Illinois River at Lacon during the period 2006 through 2010." *Id*.

In a hearing officer order, the Board noted that Emerald had relied on a 50th percentile background pH of 8.125 and temperature of 23.30º C to calculate "acute and chronic ammonia water quality standards for early life stages present of 6.62 mg/L (or 6.56 mg/L) and 1.14 mg/L, respectively." Agency Resp. Exh. 1 at 2. Asked to comment on these values, the Agency responded that its "calculations follow 35 Ill. Adm. Code Part 355.203(a) whereby the 75th percentile pH and temperature data from the receiving stream are used to calculate water quality standards for ammonia and hence permit limits." *Id*. The Agency states that Emerald was incorrect to rely on the 50th percentile pH and temperature in its calculations. *Id*.

In its recommendation, the Agency claimed that "draft national criteria would cut the allowable effluent concentrations to approximately 50 mg/L as a daily maximum and 43 mg/L as a 30 day average." Rec. at 20. The Agency suggests that, because current effluent concentrations exceed these levels, there is a basis to "conclude that the effluent could be causing harm to mollusks in the Illinois River." *Id*. Relying on the 2009 draft criteria document, the Agency argues that "relief from effluent concentrations believed to be harmful to mollusks after mixing must not be allowed." *Id*.

In its response to a Board hearing officer order, the Agency clarified that USEPA adopted a final version water quality criteria for ammonia in August 2013. Agency Resp. Exh. 1 at 4, 6. The Agency stated that "[t]he acute and chronic criteria are not as stringent as those in the 2009 draft. There is no longer a 'mussels present and mussels absent" dichotomy in the final version." *Id*. Employing USEPA criteria and the pH and temperature values reported above, the Agency stated that "the spring/fall acute water quality criterion is 2.2 mg/L and the summer chronic water quality criterion is 0.4 mg/L." *Id*. at 4-5. Applying the USEPA criteria to the ZID, the daily maximum permit limit would be 102.8 mg/L. *Id*. at 5 (showing calculation). Applying the USEPA criteria to the mixing zone, the monthly average summer permit limit would be 106.9 mg/L. *Id*. (showing calculation). The Agency determined that, using USEPA criteria, current Part 355 implementation rules, and dilution ratios of 47.9 for the ZID and 300:1 for the mixing zone, Emerald would have a spring/fall daily maximum of 102.8 mg/L and 30-day average of 120.5 mg/L, a summer daily maximum of 69.0 mg/L and 30-day average of 106.9 mg/L, and a winter daily maximum of 324.8 mg/L and 30-day average of 343.2 mg/L. *Id*. at 6. The Agency stated that, because "the 30 day average limits are all lower than the daily maximum limits, the permit would contain only daily maximum limits." *Id*.[5]

Responding to a Board hearing officer order asking when the Agency seeks to propose to update the state ammonia standards, the Agency expressed "the understanding that under the Clean Water Act, states have one Triennial Review period in which to adopt as state standards published USEPA national criteria as just finalized for ammonia." Agency Resp. Exh. 1 at 6. Asked how adoption of such criteria may affect an adjusted standard if granted, the Agency replied that, "[i]f Illinois adopts the new ammonia water quality standards identical to the

[5] The Board notes that the 30-day average limits appear to be higher than the daily maximums presented by the Agency. Agency Resp. Exh. 1 at 6.

national criteria and uses the existing Part 355 implementation rules, the above daily maximum permit limits would be required in Emerald's NPDES permit regardless of any relief granted." *Id*. at 7. The Agency added that it did not then know whether it would propose that the Board adopt the criteria or whether Part 355 properly implements the criteria. *Id*. The Agency states that it "intends to study the issues and develop a plan for an upcoming general rulemaking, including holding stakeholder workgroups." *Id*.

Addressing WET testing, the Agency indicates that substances in Emerald's effluent other than ammonia may also be toxic to aquatic life. Rec. at 20. The Agency notes that WET testing of the Emerald effluent on January 23, 2012, "found that the LC50 was <6.25% effluent for fathead minnows, a standard test organism." *Id*.; *see* Agency Resp. Exh. 1 at 1. Without an exact LC50 value derived from the January 23, 2012 sample, the Agency argues that "[t]he Emerald effluent may have been more toxic than the available dilution (47.9:1) in the ZID could render non-toxic." Rec. at 21.

The Agency argues that Emerald has available options to lower the ammonia nitrogen concentration in its effluent but has failed to do so. Rec. at 21. The Agency further argues that, because Emerald is not providing the best degree of treatment, it is not eligible for a mixing zone. *Id*.; *see* 35 Ill. Adm. Code 304.102. The Agency "encourages the Board to require Emerald to at least implement some ammonia reductions rather than granting the relief requested by Emerald." Rec. at 21.

The Agency concludes that "Emerald has failed to meet its burden of proof under Section 28.1(c)(3) of the Act. Rec. at 21, citing 415 ILCS 5/28.1(c)(3) (2012).

Discussion

In AS 02-5, the Board included a condition requiring the facility to demonstrate compliance with the applicable ammonia nitrogen water quality standards at the edge of the ZID and mixing zone and to monitor ammonia nitrogen in the Illinois River on a quarterly basis. Pet. at 6; *see* Noveon, slip op. at 22 (Nov. 4, 2004).

In this proceeding, Emerald has presented evidence that the facility complies with the ammonia water quality standards at the edge of a mixing zone established in the facility's NPDES permit. In its April response to the Board's hearing officer order, Emerald reported that the multi-port diffuser achieved the effluent dispersion necessary to meet both the acute and chronic water quality standards at the edge of the ZID and mixing zone. April Resp. at 10. Emerald relies on quarterly sampling by a third party to monitor compliance. *See* Pet., Exhs. 5, 6. Emerald asserts that it has submitted to the Agency monitoring results showing that its effluent complies with the ammonia water quality standards at the edge of the ZID and mixing zone in all years. *See* April Resp. at 11-12, Exh. 3 (sampling results at diffuser); Pet., Exh. 6 (annual reports). The Board notes that there has been no change to the ammonia nitrogen water quality standards applicable to Illinois River at the facility since 2002. 35 Ill. Adm. Code 302.212 (Total Ammonia Nitrogen); *see* 26 Ill. Reg. 16931 (Nov. 22, 2002), eff. Nov. 8, 2002. As the Agency has noted, new ammonia water quality standards may need to be reflected in Emerald's permit regardless of relief granted. *See* Agency Resp. Exh. 1 at 6-7.

In addition, Emerald has argued that the generally applicable ammonia nitrogen effluent standard from which it seeks an adjusted standard is intended in part to address sags in DO concentrations. *See* Pet. at 33. Emerald states that data reported by the USGS show that DO concentrations in the Illinois River both upstream and downstream from the facility meet the DO water quality standards. April Resp. at 1.

In submitting joint recommended conditions, Emerald and the Agency stress that Emerald's NPDES permit will include requirements for both continued monitoring and WET testing. The joint recommended conditions also include a requirement that Emerald submit to the Agency annual reports on the performance and results of investigations into methods and technologies that may reduce ammonia in the facility's effluent.

Finally, the Board notes that the first joint agreed recommended condition would require that "Emerald's effluent limit for ammonia nitrogen is a daily maximum of 140 mg/L and 1633 lbs/day and a 30-day average of 110 mg/L and 841 lbs/day." This lowers the 155 mg/L maximum limit allowed under the adjusted standard granted by the Board in AS 02-5 and adds a daily maximum loading limit and 30-day average limits.

The Board concludes that the requested relief will not result in environmental or health effects substantially or significantly more adverse than those considered by the Board in adopting the generally applicable effluent standard.

Consistency with Federal Law

Emerald

Emerald asserts that "[t]here are no applicable federal numeric effluent standards or water quality standards for ammonia nitrogen as N." Pet. at 35. Emerald states that, under federal regulations, a water quality standard defines water quality goals by designating uses of the body of water and setting criteria necessary to protect the uses. *Id*. Emerald further states that, subject to USEPA review and approval, "[s]tates adopt water quality standards to protect public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act." *Id*., citing 40 C.F.R. §§ 131.2, 131.4(a). Emerald adds that state standards must protect designated uses and, where uses are not protected, offer technical and scientific support for failing to do so. Pet. at 35, citing 40 C.F.R. § 131.5(b). States can remove designated uses that have not come into existence only by showing that designated causes make it infeasible to attain that use. Pet. at 35, citing 40 C.F.R. § 131.10(g).

Emerald argues that granting the requested adjusted standard "will not impair any beneficial use of the receiving stream in that the generally applicable state water quality standards (which were established at a level to protect aquatic life) will be met with an appropriately calculated zone of initial dilution and mixing zone so as to be fully supportive of all beneficial uses." Pet. at 36.

In a hearing officer order, the Board noted Emerald's claim that granting the adjusted standard would not impair any beneficial uses (Pet. at 36) and asked Emerald to address whether granting it could potentially impair any designated or existing uses. Emerald responded that the 303(d) list submitted to USEPA on December 20, 2012, shows the section of the Illinois River including the facility is "1) Fully Supporting Aquatic Life; 2) Not Supporting Fish Consumption; 3) Not Supporting Primary Contact; 4) Not Assessed for Secondary Contact; and 5) Not Assessed for Aesthetic Quality." April Resp. at 2, citing Att. 2 (Specific Assessment Information for Streams, 2012). Emerald states that "[t]he causes given for the impairments are mercury, polychlorinated biphenyls, and fecal coliforms. The sources of the impairments are listed as atmospheric deposition and sources unknown." April Resp. at 2, citing Att. 2.

The Board also asked whether any Illinois River sections affected by Emerald's discharge are listed on the Agency's current 303(d) list as impaired for ammonia or dissolved oxygen. Emerald responded that no sections of the Illinois River are listed as impaired for either of these causes. April Resp. at 2. Emerald argues that "[i]t is unlikely that Emerald's discharge would cause an impairment in the section into which it discharges, nor the segments downstream." *Id*. Emerald cites modeling by AquAeTer showing DO "above 5 mg/L for the Illinois River downstream from the Emerald discharge for the most critical low-flow and high-temperature conditions." *Id*.

Agency

The Agency notes that Emerald must submit "adequate proof that the adjusted standard is consistent with any applicable federal law." Rec. at 21, citing 415 ILCS 5/28.1(c)(4) (2012); 35 Ill. Adm. Code 104.426(a)(4). Emerald states that, in AS 02-5, "the Board found that the adjusted standard was not inconsistent with federal law." Rec. at 21, citing Noveon, slip op. at 19 (Nov. 4, 2004). The Agency states that it "agrees." Rec. at 21.

Discussion

Emerald states that the requested relief is consistent with federal law, and the Agency agrees that there is no inconsistency between that requested relief and federal law. Accordingly, the Board finds that the record demonstrates that Emerald has presented adequate proof that its requested relief satisfies each of the Section 28.1 factors. The Board grants Emerald an adjusted standard from the Board's ammonia nitrogen effluent limit, subject to the conditions discussed in the following section of this opinion.

ADJUSTED STANDARD LANGUAGE

Having concluded above that Emerald has satisfied the four factors at Section 28.1(c) of the Act (415 ILCS 5/28.1(c) (2012)) and determined to grant Emerald relief from Section 304.122(b), the Board turns to the language of the adjusted standard. In granting an adjusted standard, "the Board may impose such conditions as may be necessary to accomplish the purposes of this Act." 415 ILCS 5/28.1(a) (2012); 35 Ill. Adm. Code 104.428(a). As noted above, while the Agency has continued to recommend that the Board deny the petition for an adjusted standard, Emerald and the Agency have agreed on recommended conditions that the

Board should impose if it determines to grant the requested adjusted standard. Below, the Board summarizes the agreed conditions and compares them to the conditions imposed by the Board in granting an adjusted standard in AS 02-5.

Effluent Limit

In AS 02-5, the Board imposed a condition providing that the facility "must not discharge calculated total ammonia nitrogen at concentrations greater than 155 mg/L." Noveon, slip op. at 22 (Nov. 4, 2004). Emerald's petition proposed that the Board impose a condition maintaining this 155 mg/L limit. Pet. at 31. In its recommendation, the Agency proposed a condition requiring that "Emerald's effluent limit for ammonia nitrogen be reduced by 48% from 155 mg/L to 80 mg/L to reflect the 48% reduction in the effluent waste load." Rec. at 22.

As the first agreed recommended condition, the Agency and Emerald proposed to require that "Emerald's effluent limit for ammonia nitrogen is a daily maximum of 140 mg/L and 1633 lbs/day and a 30-day average of 110 mg/L and 841 lbs/day." Joint Rec. Conds. (Condition A); Exh. B (Condition A). The Agency and Emerald state that "[t]he daily maximum load limit and 30-day average load limit are based on a daily maximum flow rate of 1.4 MGD and a daily average flow rate of 0.917 MGD, respectively, as is listed in Emerald's 2007 NPDES permit." Joint Rec. Conds. at 2; *see* Pet., Exh. 2.

WET Testing

While the Agency had proposed a second condition requiring Emerald to perform aquatic whole effluent toxicity tests (Rec. at 22), the Agency and Emerald agreed to withdraw it. Joint Rec. Conds. at 2. The Agency and Emerald reported agreement that "Emerald's NPDES permit will contain the whole effluent toxicity testing requirements." *Id*.

Quarterly Monitoring

In AS 02-5, the Board imposed a condition requiring that the facility "must monitor ammonia nitrogen in the Illinois River on a quarterly basis to demonstrate compliance with the applicable ammonia water quality standards in accordance with 35 Ill. Adm. Code 302.212." Noveon, slip op. at 22 (Nov. 4, 2004). Emerald's petition had not proposed a similar condition. *See* Pet. at 31-32.

While the Agency had proposed a third condition requiring that Emerald conduct quarterly monitoring of ammonia nitrogen (Rec. at 22), the Agency and Emerald agreed to withdraw it. Joint Rec. Conds. at 2. The Agency and Emerald stated that "Emerald's 2007 NPDES permit and the renewal NPDES Permit that will be proposed following the conclusion of this proceeding will contain the monitoring requirements." *Id*.

Investigation of Production Methods

In AS 02-5, the Board imposed a condition requiring that the facility "must continue to investigate production methods and technologies that generate less ammonia" in its discharge.

Noveon, slip op. at 22 (Nov. 4, 2004). The condition provided that, when practicable, the facility "must substitute current methods or technologies with new ones so long as the substitution generates less ammonia." *Id.* Emerald's petition had not proposed a similar condition. *See* Pet. at 31-32. As the fourth condition, the Agency had proposed to require that "Emerald investigates new production methods and technologies that generate less ammonia in Emerald's discharge." Rec. at 22.

The Agency and Emerald reported that they had agreed on the following language to address this issue: "Emerald investigates new production methods and technologies that generate less ammonia and nitrification inhibitors in Emerald's discharge. The nitrification inhibitors such a 2-Mercaptobenzothiazole ("MBT") are the chief cause of inhibiting nitrification in the treatment system which allows for ammonia to discharge." Joint Rec. Conds. at 2 (Condition D); Exh. B (Condition B).

Investigation of Treatment Technologies

As the fifth condition, the Agency proposed to require that "Emerald investigates new treatment technologies, including but not limited to Fenton's reagent treatment, photo assisted Fenton system, hydrogen peroxide/uv treatment, and evaluates implementation of new and existing technologies based on current plant conditions." Rec. at 22. The Board had not imposed a similar condition in AS 02-5, and Emerald had not proposed one. *See* Noveon, slip op. at 22-23 (Nov. 4, 2004); Pet. at 31-32.

The Agency and Emerald reported that they had agreed on the following language for this condition: "Emerald investigates new treatment technologies and evaluates implementation of new and existing technology based on current plant conditions." Joint Rec. Conds. at 2 (Condition E); Exh. B (Condition C). The Agency and Emerald supported this condition by stating that "[t]here are constant advances in treatment technologies and considering the type of discharge and the length of the agreement, such an investigation would be beneficial." *Id*. at 2-3.

Study of Granular Activated Carbon

As the sixth condition, the Agency proposed to require that "Emerald investigates and submits a study to the Illinois EPA on the use of granular activated carbon column of the PC tank waste water before the waste water combines with non-PC tank waste water, followed by biological nitrification." Rec. at 22. The Board had not imposed a similar condition in AS 02-5, and Emerald had not proposed one. *See* Noveon, slip op. at 22-23 (Nov. 4, 2004); Pet. at 31-32.

The Agency and Emerald reported that they had agreed on the following condition:

> Emerald investigates and submits a study to the Illinois EPA evaluating the use of granular activated carbon to treat the PC tank waste water before it combines with non-PC tank waste water to determine if this treatment alternative effectively removes inhibitors, including MBT, which would then allow for biological treatment. The study shall include a technical feasibility evaluation and an

economic feasibility evaluation. Joint Rec. Conds. (Condition F), Exh. B (Condition D).

For the reason above, the Board will require Emerald to complete its investigation and study within three years of the effective date of this adjusted standard.

Spray Irrigation

As the seventh condition, the Agency proposed to require that "Emerald investigates and submits a study to Illinois EPA on the use of its effluent for spray irrigation on crops." Rec. at 22. The Board had not imposed a similar condition in AS 02-5, and Emerald had not proposed one. *See* Noveon, slip op. at 22-23 (Nov. 4, 2004); Pet. at 31-32.

The Agency and Emerald reported that they had agreed on the following condition: "Emerald investigates and submits a study to Illinois EPA evaluating the technical feasibility and economic feasibility of a spray irrigation program. The feasibility determinations will include an evaluation of compliance with the applicable design standards for slow rate land application of treated wastewaters (35 Ill. Adm. Code: Subtitle C, Part 372)." Joint Rec. Conds., Exh. B (Condition E). The Agency argues "that the nitrogen in Emerald's effluent could be of agronomic benefit through spray irrigation on crops, and Emerald has not previously evaluated land application of its waste stream as an alternative means to reduce ammonia discharges to the Illinois River." Joint Rec. Conds. at 3 (Condition G). For the reasons above, the Board will include this agreed condition with a three-year deadline to complete the investigation and study.

Dilution of Wastewater

As the eighth condition, the Agency proposed to require that "Emerald investigates and submits a study to Illinois EPA on the dilution of waste water from the PC tank with water from the Illinois River." Rec. at 22. The Board had not imposed a similar condition in AS 02-5, and Emerald had not proposed one. *See* Noveon, slip op. at 22-23 (Nov. 4, 2004); Pet. at 31-32.

The Agency and Emerald reported that they had agreed on the following condition: "Emerald investigates and submits a study to Illinois EPA evaluating the addition of water from the Illinois River to the wastewater in order to determine the potential for subsequent single-stage nitrification in light of the potential dilution. The study would include a technical feasibility analysis and an economic feasibility analysis." Joint Rec. Conds., Exh. B (Condition F). The Agency argues "that Emerald may be able to achieve nitrification by dilution of waste water from the PC tank with water from the Illinois River." Joint Rec. Conds. at 3 (Condition H). For the reasons above, the Board will include this agreed condition with a three-year deadline to complete the investigation and study.

Annual Reports

In AS 02-5, the Board imposed a condition requiring that the facility "must prepare and submit each year an annual report summarizing the activities and results of these investigatory

efforts." Noveon, slip op. at 22-23 (Nov. 4, 2004). Emerald's petition had not proposed a similar condition. *See* Pet. at 31-32.

As the ninth condition, the Agency proposed to require that "Emerald prepares and submits to the Illinois EPA annual reports summarizing its activities to comply with the above stated recommendations." Rec. at 22. The Agency and Emerald stated that they agreed to this condition as originally proposed by the Agency. Joint. Rec. Conds. at 4 (Condition I); *id*., Exh. B (Condition G).

Modification of Relief

The Agency and Emerald report that they had agreed to add a new recommended condition providing that, "[i]f, upon the review of the annual reports required by Paragraph G above, the Illinois EPA determines that new technology to treat ammonia is available that is economically reasonable and technically feasible, the Illinois EPA may petition the Board to modify the relief granted by the Board." Joint Rec. Conds. (Condition J), Exh. B (Condition H).

Sunset

In AS 02-5, the Board imposed a condition that "[t]his adjusted standard will expire on November 4, 2011." Noveon, slip op. at 22 (Nov. 4, 2004). Neither Emerald's petition not the Agency's recommendation proposed a condition establishing a sunset date. *See* Pet. at 31-32; Rec. at 22-23.

The Agency and Emerald noted that the August 1, 2013 hearing officer order sought comment on a condition that would sunset requested relief in seven years. The Agency and Emerald concurred "that if the Board grants relief to Emerald that the requested relief be subject to the agreed upon conditions and that the relief terminate ten (10) years from the effective date of the Board Order granting such relief." Joint Rec. Conds. at 4 (Condition K). However, the joint recommended conditions filed on June 17, 2014, do not include a sunset date. *See* Joint Rec. Conds., Exh. B.

As in AS 02-5, however, the Board includes a condition terminating this adjusted standard relief, although it changes that expiration from seven years to five years. Noveon, slip op. at 22 (Nov. 4, 2004). The Board's order includes conditions requiring Emerald to conduct investigations and perform studies of various production and treatment options. During this five-year period, Emerald will also have the opportunity to examine any revisions to the ammonia water quality standards based on USEPA's 2013 update of the ammonia water quality criteria, which may lead to revisions in Emerald's NPDES permit. Additionally, Emerald will have the opportunity to assess its options under any proposed regulations for nutrient water pollution. Based on these factors, each of which may have a substantial impact on the facility's discharge or permit, the Board concludes that a five-year sunset is appropriate and includes that as a condition on the relief granted below.

CONCLUSION

Pursuant to Section 28.1 of the Act (415 ILCS 5/28.1 (2012)), the Board grants Emerald relief from the ammonia effluent limit at 35 Ill. Adm. Code 304.122(b) at its facility at Henry, Marshall County. Emerald remains subject to the water quality limits at 35 Ill. Adm. Code 304.105 and the conditions included below in the Board's order. This adjusted standard relief is effective as of the date of this order.

This opinion and order constitutes the Board's findings of fact and conclusions of law.

ORDER

1. Pursuant to Section 28.1 of the Environmental Protection Act (415 ILCS 5/28.1 (2012)), the Board grants Emerald Performance Materials, LLC (Emerald) an adjusted standard from 35 Ill. Adm. Code 304.122(b). Under this adjusted standard, the total ammonia nitrogen effluent standard at 35 Ill. Adm. Code 304.122(b) does not apply to the discharge of effluent into the Illinois River from the Emerald facility at 1550 County Road 1450 N. in Henry, Marshall County. Instead, Emerald's effluent for total ammonia nitrogen must comply with a daily maximum of 140 milligrams per liter (mg/L) and 1633 pounds per day (lbs/day), as well as a 30-day average of 110 mg/L and 841 lbs/day. This adjusted standard takes effect on April 16, 2015, and expires on April 16, 2020.

2. The adjusted standard granted in paragraph 1 of this order is subject to the following conditions:

    a. Emerald must continue to maintain the high-rate, multi-port diffuser for the discharge into the Illinois River to achieve an effluent dispersion necessary to meet the applicable ammonia nitrogen water quality standards at the edge of the mixing zone and zone of initial dilution (ZID).

    b. Emerald must maintain the following ammonia reduction measures: replacement of the BBTS Wet Scrubber with a dust collector; incorporation of ammonia reduction as a metric in the employee gain sharing plan; and upgrade of instrumentation for the acetonitrile recovery column.

    c. Emerald must investigate new production methods and technologies that generate less ammonia and nitrification inhibitors in Emerald's discharge. The nitrification inhibitors such as MBT are the chief cause of inhibiting nitrification in the treatment system which allows for ammonia to discharge.

d. Emerald must investigate new treatment technologies and evaluate implementation of new and existing treatment technology based on current plant conditions.

e. By April 16, 2018, Emerald must investigate and submit to the Illinois Environmental Protection Agency (Agency) the following studies:

i) A study evaluating the use of granulated activated carbon to treat the polymer chemicals tank waste water before it combines with non-polymer chemicals tank waste water to determine if this treatment alternative effectively removes inhibitors, including MBT, which would then allow for biological treatment. The study must include a technical feasibility evaluation and an economic reasonableness analysis;

ii) A study evaluating the technical feasibility and the economic reasonableness of a spray irrigation program. The studies must include an evaluation of compliance with the applicable design standards for slow rate land application of treated wastewaters (35 Ill. Adm. Code 372); and

iii) A study evaluating the addition of water from the Illinois River to the wastewater to determine the potential for subsequent single-stage nitrification in light of the potential dilution. The study must include a technical feasibility evaluation and an economic reasonableness analysis.

f. Emerald must prepare and submit to the Agency annual reports summarizing its activities to comply with paragraphs 2(c) through 2(e).

g. If, upon review of the annual reports required by condition 2(f), the Agency determines that new technology to treat ammonia is available that is economically reasonable and technically feasible, the Agency may petition the Board to modify the relief granted by this order.

h. If Emerald seeks to renew or modify this adjusted standard, Emerald must by the time it requests renewal or modification implement agricultural best management practices (BMPs) within the Illinois River-Senachwine Lake Watershed to provide a partial reduction in the total nitrogen loading to the wastershed by

offsetting at least 45% of the nitrogen represented in 841 lbs/day ammonia-nitrogen based on the 30-day average load limit.

i. Emerald must operate in full compliance with the Clean Water Act, its National Pollutant Discharge Elimination System permit, the Board's water pollution regulations, and any other applicable requirement.

IT IS SO ORDERED.

Board Chairman D. Glosser dissents.

Section 41(a) of the Environmental Protection Act provides that final Board orders may be appealed directly to the Illinois Appellate Court within 35 days after the Board serves the order. 415 ILCS 5/41(a) (2012); *see also* 35 Ill. Adm. Code 101.300(d)(2), 101.906, 102.706. Illinois Supreme Court Rule 335 establishes filing requirements that apply when the Illinois Appellate Court, by statute, directly reviews administrative orders. 172 Ill. 2d R. 335. The Board's procedural rules provide that motion for the Board to reconsider or modify its final orders may be filed with the Board within 35 days after the order is received. 35 Ill. Adm. Code 101.520; *see also* 35 Ill. Adm. Code 101.902, 102.700, 102.702.

I, John T. Therriault, Clerk of the Illinois Pollution Control Board, certify that the Board adopted the above opinion and order on April 16, 2015, by a vote of 4-1.

John T. Therriault, Clerk
Illinois Pollution Control Board