ILLINOIS POLLUTION CONTROL BOARD

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

RESPONSE TO HEARING OFFICER ORDER

Now comes Emerald Performance Materials, LLC ("Emerald") by its attorneys, Drinker Biddle & Reath LLP to provide the following response to the Hearing Officer Order which directed Emerald to respond to the following questions:

28.1.c.1.

1. *Emerald states that the Board's rationale behind adopting the standards that are now codified as 35 Ill. Adm. Code 304.122 were based on the belief that large dischargers were contributing to low dissolved oxygen (DO) levels in the Illinois River. Pet. At 32. Emerald then references a study underlying the rationale that was later refuted by its authors who found that sediments oxygen demand was the primary cause of the DO sags. Pet. At 32.*

   Please provide more information on the study or studies alluded to in the petition regarding the sediment oxygen demand as the primary cause of DO sags in the Illinois River.

RESPONSE

The report entitled "The Impact of Greater Peoria Sanitary District Ammonia Discharges on Illinois River Water Quality" prepared for the State Water Survey Division (Butts et al, November 1985) discusses the issue succinctly. On Page 4 of that report, the authors describe that the original need for the reduction in ammonia-N was important for loads originating upstream from River Mile 273 (Emerald Discharges near Illinois River Mile 198) in order to meet the dissolved oxygen standard. However, in the LaGrange pool, studies in 1981 and 1983 found that only 13% of the oxygen demand at the 7-day, 10-year low flow was due to nitrogenous biochemical oxygen demand. These studies found that 30% of the oxygen demand in this pool was due to sediment oxygen demand and 57% of the oxygen demand was due to CBOD. Copies of these referenced studies are presented in Attachment 1.

The dissolved oxygen in the Illinois River upstream and downstream from the site meet the DO standard of 5 mg/L based on data reported by the USGS. 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.

28.1.c.4.

2. *Petition states that "granting of this adjusted standard will not impair any **beneficial** use of the receiving stream…" (Pet at 36, emphasis added.)*

   a. *Please address whether granting the adjusted standard has the potential to impair any designated or existing uses of the receiving stream?*

   b. *Are any of the portions of the Illinois River affected by Emerald's discharge on IEPA's current 303(d) list as being impaired for ammonia or dissolved oxygen?*

RESPONSE

In answer to 2.a) above, the assessment Unit ID of this section of the Illinois River is IL D-09. The 2012 303(d) list, as submitted to USEPA, Region 5 on December 20, 2012, provides the following for this section of the River: **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. The 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. A copy of Appendix B-2 from the 2012 303(d) list containing this information is provided in Attachment 2. Granting the adjusted standard does not have the potential to impair any designated or existing uses of the receiving stream.

In answer to 2. b) above, there are no sections of the Illinois River on the 303(d) list that are listed as impaired for either ammonia or dissolved oxygen. It is unlikely that Emerald's discharge would cause an impairment in the section into which it discharges, nor the segments downstream. AquAeTer conducted QUAL2E modeling of the Illinois River downstream from the Henry discharge and determined that the dissolved oxygen was not impacted by the Henry discharge; i.e., the dissolved oxygen was above 5 mg/L for the Illinois River downstream from the Emerald discharge for the most critical low-flow and high-temperature conditions.

35 IAC 104.406(d)

3. *Emerald states the range of ammonia-nitrogen in Henry Plant's discharge is 23 – 150 mg/L based on data from January 1, 2007 to January 31, 2012, and refers to Exhibit 10. Pet at 16, 19. Further, Emerald states that the total volume of discharge is 800,000 gal/day (380,000 gal/day from PolyOne, 150,000 gal/day from Emerald, and 270,000 gal/day from utility and contact stormwater). Pet. At 13 – 14. Emerald provides sampling results for the Henry Plant Effluent for Ammonia in mg/L and flow in gallons per minute, but the data does not present ammonia in terms of pounds per day. Pet. Exh. 10. The previous petition indicated the average ammonia in the effluent was estimated at 909 pounds/day. Exh. 1 at 6. The NPDES Permit provides for a daily maximum load limit of 1848.6 pounds per day for Ammonia (as N). Pet. Exh. 2 at 5.*

According to the report from Brown and Caldwell, effluent NH3-N loads have decreased by 48 percent since 2002 due to shut downs, lower production, and improved recovery. Exh. 13 at 2. The 800,000 gal/day total discharge and the 909 pounds/day ammonia are figures used in AS 02-5 before the changes noted by Brown and Caldwell took place. Exh. 1 at 1.

a. *Since the changes noted by Brown and Caldwell took place, please indicate if the total volume of wastewater discharged is still 800,000 gal/day or if a new value is appropriate.*

b. *Please provide the ammonia data in terms of pounds per day and indicate the average.*

c. *Since Brown and Caldwell indicate changes at the Henry Plant have resulted in a 48 percent decrease in effluent NH3-H loads, does Emerald still need a daily maximum load limit of 1848.6 pounds/day Ammonia (as N) as currently expressed in its NPDES permit?*

RESPONSE

Table 2 was included as part of Exhibit 13 to the Petition and shows effluent wasteloads used in developing treatment alternatives. As shown in that table, the total volume of wastewater discharged has not appreciably changed during the period of 2002 through 2011. As noted in Table 2 of Exhibit 13, the average was 560 gpm (806,000 gpd) in 2002 and 538 gpm (775,000 gpd) for the time period from March 2010 to February 2011. A review of the values (for the full year of 2011) indicates the peak was 738 gpm and the average was 549 gpm. In 2012, the peak was 884 gpm and the average was 596 gpm.

Also noted in Table 2 of Exhibit 13, the ammonia expressed as nitrogen (NH_3-N) averaged 473 lbs/day for the time period from March 2010 to February 2011. 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.

The maximum daily load limit for ammonia as N (NH_3-N) in the permit 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.

104.406(e)

4. *Condition 6(a) and (b) of AS 02-5 and Special Conditions 15 and 17 of the NPDES Permit required Noveon to investigate production methods and technologies that generate less ammonia and submit an annual report to 'EPA summarizing these investigatory efforts. (Pet. Exh. 1 at 22, Pet. Exh. 2 at 8.) Annual Summary Reports in Pet. Exh. 6 briefly refer to such efforts as follows. Please provide more detail on these investigatory efforts, including the potential amount of ammonia reduction in the effluent.*

Pet. Exh. 6:

Key P2 [pollution prevention] projects that the plant is currently working on which have the potential to reduce ammonia generation at the waste treatment system include the following:

2006 (12-18-06)

a. BBTS Dust Collector System

b. Improved acetonitrile column efficiency to meet the Miscellaneous Organic NESHAP's (MON) standard.

RESPONSE

a. In mid-2006, it was proposed that the BBTS Wet Scrubber for Particulates be replaced with a dust collector. At the time of the 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.

b. A task force was formed to assess the performance of the acetonitrile column. This group collected flow, composition and performance data from the process to improve efficiency. The majority of the work done during 2006 was data collection and analysis; however, this group was responsible for process improvements in the course of their work; data regarding reductions of ammonia, if any, in the effluent are not available.

2007 (12-24-07)

a. Investigation of a sintered filter media for the BHS filters that would not be prone to tearing and loss of BBTS product to the waste water.

b. Continued efforts to improved acetonitrile column efficiency to meet the Miscellaneous Organic NESHAP's (MON) standard.

c. Investigation of a new process in the Netherlands called the Anammox (anaerobic ammonia oxidation) process. This is a relatively new method of treating high concentrations of ammonia anaerobically. The first commercial process was installed 2002 and was featured in the January 2007 issue of Chemical Engineering. Based on Brown and Caldwell Environmental Consultants, the bacteria cultured in this system would render the process performance unstable.

RESPONSE

a. The studies done in 2000-2001 on changes to the filter media for a couple of processes were reviewed and specifications made for ordering new filter cloths. Trials using the new cloths were unsuccessful as they continued to blind and require frequent change out which was determined to be cost prohibitive.

b. The 2006 task force continued their work, culminating 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.

c. Anammox is a biological process that removes ammonia through anaerobic biological treatment. These systems are more subject to process upsets than aerobic biological nitrification that was discounted for use at the Henry Plant due to the presence of known bio-inhibitors and the complexity of site-wide wastewaters.

2009 (12-22-09)

a. Improvements to the Tertiary Butyl Amine column increasing the recovery of TBA resulting in less amine to the sewer.

b. Utilization of carbon dioxide for pH adjustment reducing overall loading on the biotreaters. The use of CO2 reduces the slug feeing of caustic in the system at the primary clarifier adding stability throughout the system.

RESPONSE

a. No data that indicates the improvements to the TBA column resulted in reduction of ammonia in the effluent could be found.

b. Neutralization with carbon dioxide was considered as a means of reducing the chemical costs of neutralization and subsequent sludge conditioning. Its implementation did not reduce ammonia in the effluent.

2010 (1-14-10)

a. Incorporate ammonia reduction as a metric in the employee gain sharing plan.

b. Conduct additional testing to further determine sources of ammonia within the facility.

RESPONSE

a. The 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. Although 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.

b. Testing was completed in 2011 and focused on the TKN and NH_3-N loading from the various contributing streams to the wastewater treatment plant (PVC tank discharge, PC tank discharge, C-18 tank discharge, and Holding Pond/Well No. 3 discharge). The results of this additional testing are summarized in Table 1 of Exhibit 13. Additional 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. The results of the 2012 sampling and analysis are still being evaluated to determine if additional sampling is warranted.

2008 (5-20-10)

a. Brown and Caldwell conducted training in August with waste water treatment operators to optimize the WWT system.

b. Initiated study on the effects of Carbon Dioxide for pH buffering.

c. Conducted Fed Batch Reactor testing to quantify any bio-inhibitions present in the system.

RESPONSE

a. The training course presented by Brown and Caldwell focused on improving wastewater treatment as a means of reducing ammonia in the effluent. However, improved biological treatment at the Henry Plant 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 because the Henry Plant cannot support nitrifying bacteria that convert NH_3-N to NO_3-N.

b. Neutralization with carbon dioxide was considered as a means of reducing the chemical costs of neutralization and subsequent sludge conditioning. Its implementation did not reduce ammonia in the effluent.

c. Feed Batch Reactor testing evaluated the potential impacts of NASH wastewater on the wastewater treatment system's COD (and associated BOD) removal capability. This did not result in reduction of ammonia in the effluent.

2011 (12-20-2011)

One source of ammonia to the WWTP is the bottoms stream from the acetonitrile recovery column in the 3114 process. It has been determined that the recovery efficiency of the column is sensitive to absolute pressure at the bottom of the column. A project was defined during the fourth quarter of 2011 to upgrade the instrumentation around the column in order to more effectively control absolute pressure. These upgrades will be implemented in 2012.

RESPONSE

Two pressure transmitters were installed in late 2011 and early 2012. They are currently in service, and give production staff absolute pressure and differential pressure data to assist in the performance of the column. No data is available that indicates a resulting reduction of ammonia in the effluent.

12-18-06:

The plant participated in the Pollution Prevention Program in 2006 by supporting a P2 intern. Additionally, the plant [sic] participated in a joint IEPA-USEPA P2 conference by presenting P2 project that have been conducted and completed at the plant.

12-24-07:

The plant participated in the Pollution Prevention Program in 2007 by supporting a P2 intern.

RESPONSE

The work done by the interns in 2006 and 2007 resulted in reductions in air emissions, however, no data is available that indicates a resulting reduction of ammonia in the effluent.

5. *Condition 6(b) of AS 02-5 and Special Condition 16 of the NPDES Permit require Emerald test any new technology or economically reasonable production methods or materials which may reduce ammonia concentration in effluent which IEPA requests they do.*

Please indicate if IEPA requested any such tests.

RESPONSE

No requests for such tests have been made by the IEPA.

104.406(f)

6. The opinion in AS 02-5 stated,

*Throughout 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. The Board has incorporated voluntary environmental projects proposed by petitioners into adjusted standards in the past. 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 for an adjusted standard for offensive discharges and conditions, and discharges of total suspended solids and iron); Petition of City of East Moline and IEPA for an Adjusted Standard from 35 Ill. Adm. Code 304, AS 91-9 (May 19, 1994); Petition of City of Rock Island for an Adjusted Standard from 35 Ill. Adm. Code 304, AS 91-13 (Oct. 19, 1995). In IAWC's adjusted standard, IAWC was allowed to discharge directly into the Mississippi in exchange for IAWC's financial support of nearby non-point source sediment loading reduction projects. The projects were implemented by a charitable non-profit trust, the Great Rivers Land Trust, whose goal it is to protect the watersheds in the area.*

Any 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. While research of potential improvements is not part of the Board's order, the Board will consider proposals by Noveon should Noveon choose to renew this adjusted standard at a future date. AS 02-5, slip op. at 19 (November 4, 2004), emphasis added.

a) Since Emerald has chosen to request renewal of AS 02-5, please provide information on projects that Emerald has identified or plans to research and propose as set forth above in the Board's opinion in AS 02-5.

b) Indicate whether Emerald is working with IEPA [sic] in the research and selection of potential projects.

c) Please include information on capital and annual costs as well as duration for the potential project(s) to form a comparison with costs for full or partial compliance with the ammonia effluent standards.

RESPONSE

Emerald has not yet completed any projects specifically targeted to provide environmentally beneficial improvements to the Illinois River. Capital investment funds have been limited from the onset of Emerald's ownership given the debt payments required to be retired from this initial purchase. Additionally, a significant investment (in excess of $10 million

dollars) was made that improved the environment in Marshall County, namely the design and installation of the NaSH unit. Emerald completed the installation of the new process in order to produce sodium hydrosulfide or NaSH using the existing exhaust gas stream from the sodium mercaptobenzothiazole or MBT production unit that contained carbon disulfide (C2S) and hydrogen sulfide (H2S) that previously was sent to a flare. Emerald was not required to install the NaSH system to comply with the Board's sulfur dioxide or SO2 emission limitations.

Emerald has also suffered through a major labor problem which resulted in the lock-out of the hourly workforce that lasted over 7 months in 2011 which greatly impacted operations and profitability. The continuation of the recent economic slowdown has also had a significant economic impact upon Emerald, and regrettably, Emerald 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.

At this time, no specific projects targeted to provide environmentally beneficial improvements to the Illinois River are planned, however, Emerald continue to evaluate improvements to its production processes which have the potential of reducing the amount of waste water discharged to its treatment system in an effort to both improve plant efficiency and reduce operating costs while at the same time reducing the amount of treated waste water constituents discharged to the Illinois River.

104.406(e)

7. *The opinion in AS 02-5 states, "[S]ince the Board's finding concerning the impact on aquatic life is partly premised on Noveon's compliance with the ammonia nitrogen water quality standards, the Board orders Noveon to demonstrate compliance with the applicable ammonia nitrogen water quality standards at the edge of the mixing zone and ZID, as will be defined by the Agency." Pet. Exh. 1 at 18-19, AS 02-5, slip op. at 18-19 (November 4, 2004).*

   Emerald states that the water quality standards for ammonia (acute and chronic, summer and winter) will be met at the edge of an appropriately calculated zone of initial dilution (ZID) and mixing zone. Pet. at 34. The June 20, 2006 letter from AquAeTer indicates that at the edge of the ZID and the edge of the mixing zone, the dispersion is 47.9:1 and 299.9:1, respectively. Pet. Exh. 5 at 1. The "Diffuser Performance Evaluation" indicates these values correspond to 92 feet and 1090 feet from the diffuser, respectively. Pet. Exh. 4. Table 3-8 at page 3-14. However, in the body of the petition, Emerald states the edge of the ZID is twenty feet downstream of the diffuser. Pet. at 10.

   a) *Please provide more information, including the dimensions, of the ZID and mixing zone approved by IEPA.*

   b) *Please indicate the dispersion at the edge of the ZID and mixing zone.*

c) *Please indicate how Emerald demonstrates with quarterly monitoring that compliance with the applicable ammonia nitrogen water quality standards has been met at the edge of the ZID and mixing zone.*

RESPONSE

In answer to 7.a) above, it should be noted that the IEPA did not specify mixing zone or ZID dimensions in the NPDES Permit issued to Emerald and that the flow in the River will dictate the actual size of the mixing zone at any given time. During lower flows with lower velocities, the water quality standards will tend to be met closer to the diffuser, because the plume is not pushed as far downstream as it would be during higher flows. The USEPA *Technical Support Document for Water Quality Toxics Control* discusses this in their discussion that the acute mixing zone should be met within a few minutes which indicates that the acute zone is not limited to just a short distance from the diffuser.

As noted in the Diffuser Performance Evaluation report included as Exhibit 4 to AS 13-2, several discharge designs were investigated to determine the best engineering technology for dispersion of the combined effluent into the Illinois River. Ambient river characteristics, including flow analysis, bathymetry, water velocities, and background and effluent densities, were gathered during a field study conducted in December 2004.

Following the completion of the field work and the subsequent predictive modeling efforts, a Joint Application Permit was submitted to the United States Army Corps of Engineers, the IEPA, and the Illinois Department of Natural Resources. Following agency approvals and issuance of the permit, the new discharge structure was commissioned in October 2005, and treated effluents began to be discharged directly to the Illinois River through the new multiport diffuser.

The diffuser is a multi-port diffuser that provides optimal mixing efficiency. It 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. Testing of the diffuser showed a dispersion of 39.78:1 at a distance of 20 feet downstream from the diffuser. This exceeds the dispersion required to meet the acute standard within a short distance, minimizing the dimensions of the Zone of Initial Dilution. The Diffuser Performance Test also demonstrated that a 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.

The zone of immediate mixing is not realized until the point where the individual plumes from each diffuser port have merged, which can be from one diffuser length to greater than two diffuser lengths. This point for the Emerald diffuser was determined to be approximately 99 feet downstream where the plume first reached the bottom and top of the water column.

The multi-port diffuser is designed so that the treated effluent is discharged towards the surface. During the Diffuser Performance Testing, the data collected at the edge of the zone of initial dilution 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. That is, meeting the acute zone toxicity standards for mussels, etc. was met at the edge of the ZID at 20 ft downstream, but the plume within the ZID was primarily in the upper portions of the water column with minimal to no effluent in the water column along the bottom waters. The plume was not mixed top to bottom in the water column or the true jet momentum zone or ZID until about 99 ft downstream from the diffuser. This distance varies based on flow in the River and stream velocity. The 20 ft distance is a derived distance and does not relate to the total jet momentum zone resultant from the discharge from the diffuser.

The Emerald Performance discharge meets the IEPA definition of the ZID and the actual immediate mixing zone distance which changes based on flow in the River. The actual ZID is where the effluent is mixed top to bottom in the water column which for the Henry discharge is about 99 ft downstream from the discharge. This is also at about the point where the Henry discharge is mixed top to bottom and has the plume's first opportunity to impact the macro-invertebrates in the Illinois River.

The high rate multi-port diffuser minimizes the area and volume utilized for mixing. Simplifying the plume as a trapezoidal shape, with the top being 15 feet wide (the width of the diffuser header pipe with open ports), the bottom 101 feet wide at a distance of 1,090 feet from the diffuser, the plume area is less than 1.5 acres versus 26 acres allowed by the Illinois regulations. The Emerald Performance mixing zone is very small compared to the area of the Illinois River in this reach of the river.

In answer to 7.b) above, the dispersion achieved at the edge of the ZID is 39.78:1. The dispersion achieved at a distance of 1,090 feet is 299:1. These values are based on the Diffuser Performance Test as noted in Diffuser Performance Evaluation report (Exhibit 4 to AS 13-2).

In answer to 7.c) above, Emerald utilizes a third party to sample the Illinois River on a quarterly basis at the edge of the ZID. A sampling guidance document was prepared by AquAeTer for Emerald Performance Materials initially in 2006 and revised in 2007 to reflect the issued NPDES Permit. Petitioner's Exhibit 5 contained both of these guidance documents.

The results of this monitoring program have been submitted to the IEPA as part of the Annual Summary Reports beginning with 2007 letter. Petitioners Exhibit 6 contained all of the Annual Summary Reports through the 2011 year.

Sampling from 2007 resulted in measured ammonia concentrations ranging from 0.20 to 0.23 milligrams per liter (mg/L). Sampling from 2008 resulted in measured ammonia concentrations ranging from less than 0.10 mg/L (non-detect) to 0.27 mg/L. Sampling from 2009 resulted in no detections, with ammonia detection limits ranging from 0.10 to 0.20 mg/L. Sampling from 2010 resulted in no detections, with a detection limit of 0.20 mg/L. Sampling result from 2011 and 2012 showed all samples below the ammonia detection limit of 0.10 mg/l

with one exception. The sample from September 28, 2012 had an ammonia level of 1.1 mg/l. This concentration still met the acute ammonia standard at the edge of the ZID.

The ammonia standard for the Emerald Performance effluent diffuser at the edge of the ZID was met in all years. Ammonia sample results from the Annual Summary Reports are provided in Attachment 3.

8. *Pet. Exh. 12 (May 10, 2012 letter from AquAeTer) states, "Utilizing the new projected ammonia limit with the analysis on the entire background dataset, the dispersion required to meet the acute standard is 11.5:1 and to meet the chronic standard is 68.1:1." Pet. Exh. 12 at 2. These values don't seem to coincide with the table in the same letter, Table 1: Comparison of Analysis. Pet. Exh. 12, Table 1.*

   a. *Please indicate the basis of the values of 11.5:1 and 68.1:1. The quarterly sampling results have been reported to the IEPA in all of the sampling results from 2011 were less than 0.10 mg/l.*

   b. *Please indicate whether these values represent dispersion required to meet both the summer and winter standards.*

   c. *Of the 50 and 75 percentile statistics used in Table 1, please indicate which was used for this determination. Please comment on the appropriateness of using the 50 or 75 percentile for a compliance determination.*

RESPONSE

In answer to 8.a) above, the calculated dispersion numbers provided in the text of Exhibit 12 were based on a previous analysis. The numbers that should have been referenced in the text were provided in Table 1 of Exhibit 12. Upon review of the dataset in answering this question, we have found that the methodology used in calculating the values presented in Table 1 of Exhibit 12 were based on a different calculational method than what IEPA is now using. Additionally, the more recent IEPA database uses a limited time period resulting in a higher background pH of 8 to 8.1 standard units (S.U.).

We have added the IEPA new pH database to the total database and have utilized the methodology utilized by IEPA in developing the new ammonia Water Quality Based Effluent Limitation criteria to determine the dispersion needed at the Henry plant. With this in mind, the methodologies have been revised to be consistent with IEPA guidance and all the available river water quality data. The revised dispersion numbers are provided in Table A.

ILLINOIS POLLUTION CONTROL BOARD
IN THE MATTER OF: PETITION OF EMERALD PERFORMANCE MATERIALS, LLC FOR ADJUSTED STANDARD FROM 35 ILL. ADM. CODE 304.122(b)
AS 13-2

Table A: AMMONIA STANDARDS AND REQUIRED DISPERSION

PARAMETER	STATISTIC	SUMMER			WINTER		
		AQUAETER, 1994 (1977 - 1994)	2006-2010 PERIOD	ALL AVAILABLE	AQUAETER, 1994 (1977 - 1994)	2006-2010 PERIOD	ALL AVAILABLE
pH	50th Percentile	7.80	8.13	8.01	7.70	8.09	7.90
	75th Percentile	8.10	8.34	8.28	7.84	8.23	8.10
	Count, n	91	28	204	53	7	109
Temperature	50th Percentile	22.00	23.30	21.33	4.00	4.35	4.03
	75th Percentile	26.00	24.74	25.50	6.50	7.06	7.18
	Count, n	97	27	210	61	7	118
Ammonia	50th Percentile	0.205	0.10	0.16	0.65	0.11	0.47
	Count, n	98	18	153	61	7	85
Ammonia Standard	Acute, using 50th Percentile	12.14	6.56	8.25	14.44	7.08	10.13
	Acute, using 75th Percentile	6.95	4.34	4.88	11.30	5.46	6.95
	Chronic, using 50th Percentile	1.96	1.14	1.55	3.58	2.13	5.50
	Chronic, using 75th Percentile	1.00	0.74	0.77	3.03	1.72	3.37
Previous Ammonia Variance - Dispersion Required, Effluent = 155 mg/L from Emerald, 126 mg/L combined							
	Acute, using 50th Percentile	10.5	19.5	15.6	9.1	18.1	13.0
	Acute, using 75th Percentile	18.7	29.7	26.7	11.8	23.5	19.4
	Chronic, using 50th Percentile	71.5	121.2	90.8	42.8	62.3	24.9
	Chronic, using 75th Percentile	158.2	197.8	205.4	52.7	78.0	43.3

Note: Dispersion achieved within zone of initial dilution (acute mixing zone) was 39.7:1.
Dispersion achieved at 1,090 feet downstream from diffuser was 299.9:1.

In answer to 8.b) above, the criteria are based on Early Life Stage Present or Early Life Stage Absent. For both the acute and chronic criteria, the Early Life Stage Present is more critical. A dispersion that meets the Early Life Stage Present criteria will also meet the Early Life Stage Absent criteria. Therefore, all dispersions provided are based on meeting the Early Life Stage Present criteria and would also meet the Early Life Stage Absent criteria.

The acute ammonia standard does not reference a seasonal change in the standard. Therefore, the annual 50th percentile background pH is 8.125 standard units. This translates to an acute ammonia standard of 6.62 mg/L. The 50th percentile background ammonia concentration is 0.06 mg/L. The dispersion required to meet the acute ammonia standard is 19.2:1. Based on the diffuser performance test, this dispersion was met within 20 feet downstream from the diffuser.

The chronic standard is based on time of year and temperature. The year is broken into Early Life Stage Present (March through October) and Early Life Stage Absent (the remainder of the year). For each of these, there is a temperature cut-off providing for different equations with which to calculate the proper chronic standard. The background concentrations, standards, and required dispersion for each chronic condition are presented in Table A above. A dispersion of 299.9:1 was measured at a distance of 1,090 feet from the diffuser. At this distance, all chronic standards are met. As shown in Table A, above, the critical dispersion required is 101.2:1.

In response to 8.c above, the IEPA previously recommended using the median (50th percentile) values of the pH for determination of the ammonia standard. Therefore, the values for background pH determined using this methodology were utilized and are considered appropriate for a compliance determination. The background sampling station is at Hennepin, IL. Data provided by the State indicate 34 samples for pH and temperature were collected between January 1, 2006 and October 10, 2010. Five of these were collected during the Early Life Stage Absent. The rest of them were collected during the Early Life Stage Present. Although 5 samples represent a poor statistical dataset, the Early Life Stage Absent standard calculated is not as stringent as for the Early Life Stage Present.

9. *The opinion in AS 02-5 stated, "[T]he Board shares the Agency's concern that Noveon has not provided any in-stream monitoring studies to assess the actual impact of its discharge on aquatic life. Ag. Memo at 26." AS 02-5, slip op. at 18 (November 4, 2004).*

   Special Condition 14 of the NPDES Permit required the permittee to conduct biomonitoring of the effluent by running acute toxicity tests on at least two tropic levels of aquatic species representative of the aquatic community in the Illinois River (i.e. fish and invertebrate). If the results of the biomonitoring identify toxicity, the NPDES permit states, "IEPA may require that the Permittee prepare a plan for toxicity reduction evaluation and identification." Pet. Exh. 2 at 7.

   Pet. Exh. 5 describes the procedure for the toxicity testing, but the petition does not appear to contain the results of the testing. Emerald states, "...Emerald has conducted effluent toxicity testing and submitted the results to the Agency quarterly as required by their NPDES Permit." Pet. at 10.

   a. *Please provide information concerning the results of the toxicity testing.*

   b. *Please indicate if IEPA has required the Permittee to prepare a plan for toxicity reduction evaluation and identification.*

RESPONSE

In response to part 9.a) above, samples for toxicity tests were collected on June 13, 2011, July 25, 2011, October 12, 2011, and January 23, 2012. The toxicity test reports are included in Attachment 4. The results of the testing are presented in the following Table B.

TABLE B: RESULTS OF TOXICITY TESTING

Date	LC_{50}	
	96-Hour	48-Hour
June 13, 2011	8.5%	11.27%
July 25, 2011	8.68%	12.5%
October 12, 2011	22.75%	31.8%
January 23, 2012	<6.25%	9.42%

Note: The 96-hour test is an acute test performed on Pimephales promelas. The 48-hour test is an acute test performed on Ceriodaphnia dubia. There was a problem with the sample collected on July 25, 2011 and the laboratory was only able to perform a 48-hour test on the Pimephales promelas.

In response to part 9.b) above, the NPDES Permit provides specifications relating to the toxicity testing in Special Condition 14. The Permit specifies that the IEPA may require that the Permittee prepare a plan for toxicity reduction evaluation and identification. IEPA 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%.

10. Emerald states that the mixing zone study showed that the multi-point diffuser achieved a dispersion ratio of 39.8:1 at the edge of the ZID twenty feet downstream of the diffuser, yielding a LC_{50} of 2.51% by volume. Pet. at 10. Emerald stated, "Because all the acute toxicity testing results to date have been the [sic] above this value, Emerald is meeting their toxicity limit for LC_{50} of greater than or equal to 2.51 percent by volume." Pet. At 10.

Please more fully explain the basis for stating that the toxicity limit for LC_{50} is greater than or equal to 2.51 percent by volume.

RESPONSE

The 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.

104.406(k)

11. The petition at 7 refers to Exh. 4 entitled "Diffuser Performance Evaluation" dated December 2005. Exh. 4 only included Appendix 1 of 4 from the Diffuser Performance Evaluation. Please provide a copy of the remaining appendices: Appendix 2--Joint Application Form and Acceptance Correspondence, Appendix 3--Fluorometer Calibration Curves, and Appendix 4--Field Notes and Data.

RESPONSE

A copy of the Appendices to the Diffuser Verification Evaluation is presented in Attachment 5.

Emerald Performance, LLC by its attorney

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ILLINOIS POLLUTION CONTROL BOARD
IN THE MATTER OF: PETITION OF EMERALD PERFORMANCE MATERIALS, LLC FOR ADJUSTED STANDARD FROM 35 ILL. ADM. CODE 304.122(b)
AS 13-2

CERTIFICATE OF SERVICE

It is hereby certified that true copies of the foregoing were mailed, first class, on Friday, April 12, 2013, to each of the persons on the attached service list and also delivered electronically.

It is hereby certified that a true copy of the foregoing was hand delivered to the following on Friday, April 12, 2013:

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