

**BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

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) )

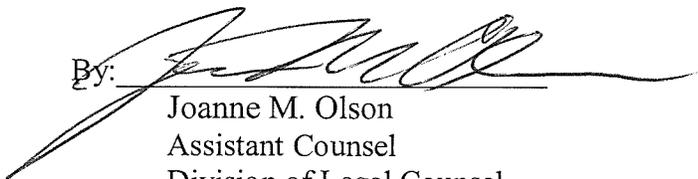
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Pollution Control Board

**NOTICE OF FILING**

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board the RECOMMENDATION OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY for the above-captioned proceeding, a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL  
PROTECTION AGENCY

By: \_\_\_\_\_



Joanne M. Olson  
Assistant Counsel  
Division of Legal Counsel

DATED: 1/16/13

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**THIS FILING IS SUBMITTED ON RECYCLED PAPER**

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**JAN 12 2013**

**STATE OF ILLINOIS**  
**Pollution Control Board**

**RECOMMENDATION OF**  
**THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY**

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA" or "Agency"), by and through its counsel, and pursuant to Section 28.1 of the Environmental Protection Act ("Act")(415 ILCS 5/28.1) and 35 Ill. Adm. Code 104.416, hereby recommends that the Pollution Control Board ("Board") DENY Emerald Performance Materials LLC's ("Petitioner" or "Emerald") Petition for Adjusted Standard (Petition). In support therefore, the following statements are made:

**I. INTRODUCTION**

1. Emerald filed its Petition on September 28, 2012, requesting the Board grant Emerald relief from the discharge prohibition of effluent containing more than 3.0 mg/L of total ammonia nitrogen as N found in 35 Ill. Admin Code 304.122(b).

2. Section 28.1(d)(1) of the Act requires the Petitioner to publish notice of the Petition by advertisement in a newspaper of general circulation in the area likely to be affected, and to provide proof to the Board of such publication. Petitioner filed its Notice of Publication on October 12, 2012, fulfilling the requirements of this Section.

3. On November 1, 2012, the Board accepted this Petition for hearing.

4. On November 8, 2012, the Agency filed a motion for extension of time to file its recommendation in order to facilitate a meeting between the Agency and the Petitioner. The Hearing Officer extended the recommendation deadline to January 14, 2013.

5. On December 3, 2012, the parties met in Springfield Illinois to discuss the petition.

## **II. BACKGROUND**

6. The waste water treatment plant at Emerald's chemical manufacturing facility ("Henry Plant" or "Plant") is located on the West Branch of the Illinois River, north of the City of Henry at 1550 Country Road, 1450 N., Henry Illinois. (Pet. 1; PCB 91-17, p. 3.)

7. The Henry Plant has two manufacturing units: a specialty chemical manufacturing unit owned and operated by Emerald and a poly-vinyl chloride (PVC) resins unit owned and operated by PolyOne Corporation's ("PolyOne"). (PCB 91-17, p. 3.) Emerald produces accelerators used in tires and other rubber goods and antioxidants used to inhibit oxidation in rubber, jet fuel, greases, oils and polypropylene.

8. The Plant discharges waste water effluent pursuant to NPDES Permit No. IL00013921; this discharge contains the treated effluent from both Emerald's specialty chemical facility and PolyOne's resin portion of the special chemical facility. (Pet. 13.) The Plant's NPDES permit expired on April 30, 2012. (Pet. Ex. 2.)

9. PolyOne generates approximately 380,000 gallons per day of effluent, and Emerald generates approximately 150,000 gallons per day. The wastewater treatment plant also treats approximately 270,000 gallons per day of combined utility waters and potential contact stormwater. (Pet. 13-14.)

10. Emerald uses sulfur, aniline, carbon disulfide and amines in the production of accelerators. The first step in the production is the manufacture of an intermediate product, sodium mercaptobenzothiazole (MBT). The intermediate product is then reacted with an amine and other raw materials to form an accelerator product. (Pet. 14.)

11. In the production of antioxidants, Emerald uses diphenylamine or one of several phenols as a starting material. The production process consists of batch and continuous reactors, filtration operations and solidification. (Pet. 15.)

12. PolyOne produces polyvinyl chloride (PVC) resins. Ammonia is used as an ingredient to produce an emulsifier for use in one of the PVC processes. (Pet. 16.)

13. Most of the ammonia in Petitioner's discharge originates as influent organic nitrogen that is bio-hydrolyzed to ammonia during the treatment provided at the Plant. (Pet. Ex. 13.)

14. The waste water treatment at the Henry Plant begins with the collection of waste water from Emerald and PolyOne in equalization tanks. (Pet. 17.) Emerald's waste stream is collected in the PC equalization tank and C-18 storage tank. (Pet. Ex. 11.) PolyOne's waste stream is collected in the PVC tank. *Id.*

15. In the primary treatment system, Emerald's and PolyOne's separate waste streams are mixed together with non-process waste water; the pH is adjusted, coagulant and flocculent are added, and then the waste water is sent to the primary clarifier. (Pet. 17; Pet. Ex. 11.)

16. The secondary treatment system consists of four activated sludge biotreaters with air blowers, and secondary clarification. Additional coagulant and flocculant are added. (Pet. 17.)

17. Tertiary treatment consists of traveling bridge sand filters.

18. The discharge from the City of Henry's publicly owned treatment works combines with Emerald's effluent and is discharged through an outfall located on the Illinois River between mile 198 and 199. (Pet. 18.)

19. In 1991, the Henry Plant's NPDES Permit issued on December 18, 1990,<sup>1</sup> was appealed (PCB 91-17) because this NPDES permit contained an effluent limitation of 3.0 mg/L for ammonia nitrogen based on Section 304.122(b). This appeal was stayed by agreement of the parties.

20. A variance petition for relief from Section 304.122 was filed October 30, 1992 (PCB 92-167), stayed by agreement of the parties, and withdrawn on June 20, 2002.

21. A petition for an adjusted standard ("Initial Petition") was filed with the Board on May 22, 2002. (AS 02-5.)

22. On September 16, 2004, the Board issued its Opinion and Order in the NPDES permit appeal, (PCB 91-17), and upheld the Agency's inclusion of the ammonia nitrogen effluent limit based on Section 304.122(b) in the permit. (Pet. 4; PCB 91-17, p. 10.)

23. On November 4, 2004, the Board issued its Opinion and Order on the Initial Petition granting an adjusted standard from the ammonia nitrogen effluent limitation in Section 304.122(b). Under the adjusted standard, the ammonia nitrogen discharge from the Henry Plant could not exceed 155mg/L. (Pet. Ex. 1; PCB AS 02-5, p. 22.)

24. The Board found that the treatment process at the Henry Plant provided the Best Degree of Treatment (BDT), and that the discharge qualified for a mixing zone and a zone of initial dilution (ZID) pursuant Section 302.102. The Board, however, did not grant a mixing

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<sup>1</sup> In 1990, the Henry Plant was owned by B.F. Goodrich. In 1993, B.F. Goodrich sold a portion of the Henry Plant to the Geon Company, now PolyOne. The remaining portion of the Henry Plant was sold to Noveon, Inc. in 2001, the Lubrizol Company in 2004 and finally Emerald in 2006.

zone or a ZID as a part of the relief, but directed the Agency to define the mixing zone and ZID through the NPDES permit. (Pet. Ex. 1; PCB AS 02-5, p. 19.)

25. The Board ordered the discharge to 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 ZID. (Pet. Ex. 1; PCB AS 02-5, p. 22.)

26. The Board stated its concern that Emerald had “not provided any in-stream monitoring studies to assess the actual impact of its discharge on aquatic life.” The Board refrained from ordering bio-monitoring as a part of the Adjusted Standard because bio-monitoring was already a condition of the Petitioner’s NPDES permit. (Pet. Ex. 1; PCB AS 02-5, p. 18.)

27. The Board ordered in-stream quarterly monitoring to be performed in the Illinois River to demonstrate compliance with the total ammonia nitrogen water quality standard in Section 302.212. The Petitioner was ordered to report the monitoring results to the Agency in its annual report. (Pet. Ex. 1; PCB AS 02-5, p. 22.)

28. The Board also ordered Emerald to investigate production methods and technologies that generate less ammonia in the Henry Plant’s discharge into the Illinois River. “Where practicable, [Emerald] must substitute current methods or technologies with new ones so long as the substitution generates less ammonia in [Emerald’s] discharge.” The Board ordered Petitioner to submit an annual report “summarizing the activities and results of these investigatory efforts.” (Pet. Ex. 1; PCB AS 02-5, p. 22.)

29. Emerald installed a multi-port diffuser on October 4, 2005. (Pet. 7.)

30. On December 18, 2006, Emerald submitted its 2006 annual report.

a. This annual report did not contain the quarterly monitoring results, but indicated that Discharge Monitoring Reports have been submitted to the Agency with ammonia monitoring results. The annual report does not indicate how the samples were collected.

b. The Petitioner indicated that it was working on the following programs with the potential to reduce ammonia generation: (1) BBTS Dust Collector System and (2) Improved acetonitrile column efficiency to meet the Miscellaneous Organic NESHAP's (Mon) standard. (Pet. Ex. 6.)

31. On December 24, 2007, Emerald submitted its 2007 annual report.

a. The Petitioner provided the Agency with two quarterly monitoring results of samples from the Illinois River: the sampling on March 28, 2007, indicated 0.23 mg/l of ammonia nitrogen, and the sampling on September 28, 2007 indicated 0.20 mg/l of ammonia nitrogen.

b. The Petitioner removed the BBTS scrubber and replaced it with a BBTS dust collector.

c. The Petitioner indicated that it was working on the following programs with the potential to reduce ammonia generation: (1) an investigation into sintered filter media for BHS filters, (2) continued efforts to improve acetonitrile column efficiency to meet the Miscellaneous Organic NESHAP's (Mon) standard, and (3) investigation into the Anammox process, with the conclusion that Petitioner's waste stream would render the process performance unstable. (Pet. Ex. 6.)

32. On December 22, 2009, Petitioner submitted its 2009 annual report.

a. The Petitioner provided the Agency with four quarterly monitoring results of samples from the Illinois River: the sampling on March 26, 2007 indicated less than 0.20

mg/l of ammonia nitrogen; the sampling on June 18, 2009, indicated less than 0.20 mg/l of ammonia nitrogen; the sampling on September 28, 2009, indicated less than 0.10 mg/l of ammonia nitrogen; and the sampling on November 20, 2009, indicated less than 0.20 mg/l of ammonia nitrogen.

b. The Petitioner indicated that it was working on the following programs with the potential to reduce ammonia generation: (1) improvements to the Tertiary Butyl Amine column, increasing the recovery of TBA resulting in less amine to the sewer; and (2) utilization of carbon dioxide for pH adjustment reducing the overall loading on biotreaters. (Pet. Ex. 6.)

33. On March 20, 2010, Emerald submitted its 2008 annual report:

a. The Petitioner provided the Agency with four quarterly monitoring results: the sampling on March 14, 2008, indicated 0.27 mg/l of ammonia nitrogen; the sampling on June 19, 2008, indicated less than 0.10 mg/l of ammonia nitrogen; the sampling on September 28, 2008, indicated less than 0.20 mg/l of ammonia nitrogen; and the sampling on December 13, 2008, indicated less than 0.20 mg/l of ammonia nitrogen.

b. The Petitioner indicated that it was working on the following programs with the potential to reduce ammonia generation: (1) waste water treatment operator training; (2) study the effects of carbon dioxide for pH buffering; and (3) conducted fed batch reactor testing to quantify any bio-inhibitors present in the system. (Pet. Ex. 6.)

34. On January 14, 2011, Emerald submitted its 2010 annual report.

a. The Petitioner provided the Agency with three quarterly monitoring results: the sampling on March 31, 2010, indicated less than 0.20 mg/l of ammonia nitrogen; the sampling on June 30, 2010, indicated less than 0.10 mg/l of ammonia nitrogen; and the sampling on September 23, 2010, indicated less than 0.20 mg/l of ammonia nitrogen.

b. The Petitioner indicated that it was working on the following programs with the potential to reduce ammonia generation: (1) incorporate ammonia reduction as a metric in the employee gain sharing plan; and (2) conduct additional testing to further determine sources of ammonia within the facility. (Pet. Ex. 6.)

35. On December 20, 2011, the Petitioner submitted its 2011 annual report.

a. The sampling results for all four quarterly samples was less than 0.10 mg/l of ammonia nitrogen.

b. The Petitioner indicated that it was working on a project to upgrade instrumentation around the acetonitrile recovery column. (Pet. Ex. 6.)

36. In 2006, the average ammonia discharge from the Henry plant was 81 mg/l, and the highest discharge was 140 mg/l. The 2007 average ammonia discharge was 85 mg/l, and the highest discharge was 150 mg/l. The 2008 average ammonia discharge was 68 mg/l, and the highest discharge was 130 mg/l. The 2009 average ammonia discharge was 56 mg/l, and the highest discharge was 89 mg/l. The 2010 average ammonia discharge was 76 mg/l, and the highest discharge was 110 mg/l. The 2011 average ammonia discharge was 86 mg/l, and the highest discharge was 180 mg/l.

37. Emerald exceeded the 155mg/l effluent limitation established by the 2002 adjusted standard order of the board on six occasions: On August 9th, 10th and 11th of 2011, the ammonia discharge from the Henry plant was 180 mg/l. (Pet. 19; Pet. Ex. 10.) On August 30th and 31st of 2011, the ammonia discharge from the Henry plant was 170 mg/l. On September 1st, 2011, the ammonia discharge from the Henry plant was 160 mg/l. (Pet. 19; Pet. Ex. 10.)

38. On April 27, 2010, the Agency modified the permit to add PolyOne Corporation as a co-permittee. (Pet. 13; Pet Ex. 3.)

39. The average flow rate from the PVC tank which contains PolyOne's waste water decreased approximately 14% (56 gpm) from 2002 to 2011. (Pet. Ex. 13 p. 2.) Likewise, Emerald's average flow rates from the PC tank and the C-18 tank decreased approximately 33.6% (38 gpm) between 2002 to 2011. *Id.*

### **III. STANDARD FROM WHICH RELIEF IS SOUGHT**

40. Section 304.122(b) provides a total ammonia nitrogen effluent limitation for the Illinois River of 3.0 mg/l for sources 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). This is the standard from which Emerald seeks relief.

### **VI. EFFORTS NECESSARY TO ACHIEVE COMPLIANCE**

41. Section 104.406(e) requires the Petitioner to describe the compliance alternatives available to the Petitioner that reduce the discharge of ammonia nitrogen to 3 mg/l. This discussion must include the cost of each alternative, the overall capital costs and the annualized capital operating costs.

42. Ammonia treatment is referred to as "nitrification" because treatment of ammonia involves oxidizing ammonia to nitrates. Emerald studied the nitrification ability of the existing Plant and concluded that: "The results of the treatability study conclusively demonstrated that the Henry Plant could not achieve single-stage nitrification under existing waste loads and optimum conditions of mixed liquor pH, D.O., temperature, alkalinity, F/M ratio and mean cell residency time." (Pet. 21.) Emerald also determined that addition of nitrifier-rich bio-mass would not help because of waste load characteristics rather than operating conditions. "The inability of the

Henry Plant wastewater treatment system to nitrify was due to inhibition of nitrifying bacteria by the PC tank and C-18 tank contents flows.” (Pet. 21.)

43. Emerald analyzed the alternative compliance methods by looking at three categories of alternatives: 1) in-process reductions; 2) pretreatment of the waste stream; and 3) post-treatment of the waste stream. (Pet. 21.)

44. In evaluating in-process reduction, Emerald concluded that amines could not be eliminated from the process and recycling would create an inferior product and potentially generate a hazardous waste material by-product. Emerald states that: “Excess amines are, however, currently recovered from processes where recovery methods provide reusable quality materials and are not cost prohibitive.” (Pet. at 22.) Emerald does not provide information on the recovery process, and what it considers to be “cost prohibitive.” The Agency is not in a position to analyze Emerald’s ability to have in-process reductions with the information provided.

45. Emerald reviewed its pretreatment options by studying morpholine recovery, tert-butyl alcohol recovery, and a liquid extraction process in which a solvent is passed counter-current to the wastewater removing the amines from the water. (Pet. at 22.) According to Emerald, none of these alternatives would result in compliance with Section 304.122. Emerald fails to explain why these pretreatment options will not result in compliance with Section 304.122. The Agency believes 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.

46. In its Petition, Emerald reviews numerous potential post-treatment compliance options, but concludes they are not technologically feasible and economically reasonable.

47. First, Emerald evaluates alkaline air stripping at different points in the wastewater treatment system (e.g., PC tank, PVC tank, and secondary clarifier). (Pet. at 23-25.) This alternative involves increasing pH in the wastewater to remove the ammonia by turning it into a gas. This treatment technology could be used at three points in the current process: within the PC tank, within the PVC tank and after the secondary clarifier effluent. Emerald claims a reduction of 20% of the ammonia was achieved in the PC tank and the PVC tank. The costs of these treatment options are by far the highest in all the alternatives Emerald evaluates, almost three times as expensive for the cost per pound of ammonia nitrogen removal as the next expensive option. (Pet. Ex. 13, Attachment C.)

48. When alkaline air stripping was used after the secondary clarifier, the ammonia nitrogen removal was 95%. (Pet. 24.) Brown and Caldwell estimates the capital cost is \$9.4 million (including off-gas emission controls.) The annual operating and maintenance cost for this treatment option is \$1.94 million. (Pet. 25; Pet. Ex. 13 at 6.) The cost per pound of ammonia nitrogen removed over the first ten years is \$20.47 per pound. (Pet. Ex. 13, Attachment C.) Emerald will see a cost reduction after the first 10 years to approximately \$13.58 per pound. (*See Id.*) Emerald claims that this treatment option would result in fouling and an increase in TDS. The Agency believes the fouling issue can be solved by use of filtration prior to the air stripper.

49. The Petitioner's capital cost estimate of \$ 9.4 million includes treatment for the off-gas emissions that result from the air stripping. Without the off-gas, the estimated capital costs to achieve 95% removal is \$4.7 million. (Pet. Ex. 13, Attachment C.) The annual operating and maintenance costs for this treatment option is \$1.76 million. (Pet. 25; Pet. Ex. 13 at 6.) The cost per pound of ammonia nitrogen removed over the first ten years is \$15.45 per

pound. (Pet. Ex. 13, Attachment C.) After the first 10 years, the cost per pound is \$12.37. (*See Id.*) Emerald has failed to provide any support that the off gas emission controls would be required under state or federal law.

50. Struvite precipitation would result in 24% reduction in the ammonia nitrogen in Emerald's effluent with a capital cost of \$296,315 and an annual operating cost of \$1.43 million. (Pet. Ex 13 Attachment C.) Emerald characterized 24% removal as "only a small portion" and disregarded this treatment option because of its high costs. (Pet. 25.) When this cost is broken down into the cost per pound of ammonia nitrogen removed over ten years, it would cost Emerald approximately \$52.25 per pound of ammonia nitrogen removed. (*See* Pet. Ex 13 Attachment C.)

51. According to Petitioner, effluent breakpoint chlorination would reduce the ammonia nitrogen in the effluent by 98%. (Pet. Ex 13 Attachment C.) The capital cost of effluent breakpoint chlorination is \$1.4 million, and the annual operating costs of \$1.7 million. (Pet. Ex. 13 at 6 and Attachment C.) When this cost is broken down into the cost per pound of ammonia nitrogen removed over ten years, it would cost Emerald approximately \$12.48 a pound. *Id.* Petitioner claims that this treatment option may result in the formation of chlorinated organics in the effluent and the increase of TDS. The Agency believes there are treatment alternatives for the possible formation of chlorinated organics in the effluent which Emerald has failed to evaluate.

52. Emerald evaluated single-state biological nitrification of non-PC waste stream combined with separate biological treatment of the PC tank discharge and determined that this treatment would result in 47% reduction. (Pet. 26.) The non-PC waste stream does not contain the inhibitor MBT. Half of the bio-treaters at the Henry Plant are currently not in use. (Pet. Ex.

13 p.4.) At a minimum, the Agency believes that 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 Plant has existing infrastructure for such treatment. Emerald has not updated its estimated cost of this treatment since its Initial Petition. Emerald claimed in its Initial Petition that the capital cost of this treatment would be \$2.6 million, and the annual operating and maintenance costs would be \$220,000. (AS 02-05 Petition Attachment 7, p. 3.) Emerald has failed to explain whether these costs estimates are based on use of the existing bio-treaters. While Illinois EPA acknowledges that treating only the non-PC waste stream will not achieve full compliance with Section 304.122, the Illinois EPA encourages the Board to require Emerald to at least implement some ammonia reductions rather than granting the relief requested by Emerald. It is the Agency's opinion that Emerald's failure to treat the non-PC waste stream separately supports the Agency's conclusion that Emerald is not providing the best degree of treatment, a condition precedent to obtaining a mixing zone.

53. Emerald also evaluates biological nitrification of its combined waste water. The pH of the PC tank would be reduced, and river water added for dilution. This waste stream would then combine with the non-PC tank wastewater for single stage biological nitrification (Pet. 26.) This treatment option would reduce the ammonia nitrogen in the effluent by 98%. (AS 02-05 Petition Attachment 7, p. 3.) While Emerald finds this treatment option as technically feasible, it claims that it would not be reliable because of the different batch processes and that this treatment is too costly. Emerald estimates the capital cost of this treatment to be \$4.4 million, and the annual operating costs to be \$730,000.<sup>2</sup>

54. Ion exchange is another technology that Emerald considered in meeting the effluent limit in Section 304.122(b) by achieving a 98% percent reduction, but summarily

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<sup>2</sup> Emerald has not updated its costs of this treatment since its Initial Petition.

dismissed this option as too expensive. (Pet. 27.) The initial estimated capital cost is \$1.6 million, and the total annual operating and maintenance cost is estimated to be \$806,094. (Pet. Ex 13 Attachment C.) When this cost is broken down into the cost per pound of ammonia nitrogen removed over ten years, it would cost Emerald approximately \$6.62 a pound of ammonia nitrogen removed. *See Id.* After 10 years, the cost per pound of ammonia removal is \$5.46. Emerald claims that poor selectivity of this treatment alternative for removing ammonia precludes this option from further consideration. Even if there is a selectivity issue, Emerald's cost calculations included increased resin usage, and this treatment alternative still has the lowest cost per pound of ammonia removed besides biological treatment. This option should not be precluded from consideration considering its low cost and high removal.

55. Emerald also evaluated the costs of 75% ammonia nitrogen removal by ion exchange, at an annual operating cost of \$622,124, and an initial capital investment of \$1 million dollars. (Pet. Ex 13 Attachment C.) When this cost is broken down into the cost per pound of ammonia nitrogen removed over ten years, it would cost Emerald approximately \$6.59 a pound. *See Id.*

56. Ozonation is another treatment option considered by Emerald that would result in 98% reduction of ammonia nitrogen in its effluent. (Pet. 27.) The initial capital investment is estimated to be \$10.3 million, and the annual operating costs are estimated to be \$1.69 million. (Pet. Ex 13 Attachment C.) When these costs are broken down over ten years, the cost per pound ammonia nitrogen removed is \$18.89. After the first 10 years, the cost per pound is \$11.50. *See Id.*

57. Finally, Emerald evaluates tertiary nitrification as a treatment option, where the effluent from the secondary clarifier would be pumped to a separate aeration basin containing

fixed film media where nitrifying bacteria would grow. Tertiary nitrification results in 98% reduction in ammonia nitrogen, with an initial capital cost of \$6.76 million and an annual operating cost of \$464,000. Emerald did not update the cost figures in its 2012 Petition for this treatment option. (See AS 02-05 Petition Attachment 7, p. 3.)

58. The Agency believes that the numbers provided by Emerald for the above cost estimates are problematic. The costs provided are considered accurate to  $\pm 50\%$ . (Pet. Ex 13 at 4.) Assuming that the estimates are high, 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 10 years, and \$2.73 per pound thereafter. (Pet. Ex. 13 Attachment C.)

59. The Illinois EPA believes that Emerald failed to thoroughly evaluate the use of granular activated carbon followed by biological treatment. United States Environmental Protection Agency guidance indicates that this treatment alternative effectively removes inhibitors, including MBT, which then allows for biological treatment. The Agency proposes that Emerald evaluate the use of granular activated carbon column(s) before the PC tank waste water combines with non-PC tank waste water. The use of this alternative may not require dilution.

60. The Agency also believes that the nitrogen in Emerald's effluent could be of agronomic benefit through spray irrigation on crops. The Petitioner failed to evaluate land application of its waste stream as an alternative.

61. The Illinois EPA believes that Emerald may be able to achieve nitrification by dilution of waste water from the PC tank with water from the Illinois River. In 2002, the peak flow rate from the PC tank was 150 gpm. (Pet. Ex. 13 p. 2.) In 2011, the average flow rate from this tank was 72 gpm. *Id.* 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. Now that Emerald is operating at a lower flow rate dilution from the river can have a much higher impact than was previously possible. The Agency does not believe Emerald has conducted nitrification testing taking into account river water dilution which now has a greater effect due to low flow rate.

62. The Agency believes Emerald failed to re-evaluate all treatment options in light of the decreased flow and potential of using river water dilution. Emerald must consider whether these factors reduce the costs of treatment, or treatment issues such as nitrification inhibition, fouling, TDS and the formation of chlorinated organics.

#### **V. LEVEL OF JUSTIFICATION REQUIRED**

63. Section 302.122(b) does not provide a specific level of justification required by the Petitioner to obtain an adjusted standard. Therefore, pursuant to Section 28.1(c) of the Act, the level of the justification requires the petitioner to present adequate proof of the following:

- (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 that 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.

#### **VIII. PETITIONER'S JUSTIFICATION**

##### **A. Substantially Different factors**

64. The factors the Board relied on in adopting an ammonia nitrogen effluent limit include (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 3mg/L limit. (Pet. 33.) Emerald argues 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. *Id.* The Board, in its opinion on the Initial Petition, held that Emerald's discharge has unique characteristics making the plant unable to achieve nitrification, which makes Emerald different from other industries and POTWs. (Pet. Ex 1 at 5-6.) The treatment process at the Henry Plant generates large amounts of ammonia nitrogen during secondary treatment because of the presence of degradable organic nitrogen compounds. The presence of MBT which inhibits the growth of nitrifying bacteria, and the low levels of alkalinity require the addition of alkalinity to achieve nitrification. *Id.*

65. The unique nature of Emerald's discharge has not changed since the Initial Petition, in that its discharge still contains MBT. While achieving nitrification at the Henry Plant 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 this standard. The technologies articulated by Emerald in its Petition were in existence when the Board adopted Section 304.122(b).

**B. Adjusted Standard Justification**

66. Emerald correctly asserts that the Board must consider economic reasonableness when adopting regulations. Section 27 of the Act provides: "The Board shall take into account . . . the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution." Economic reasonableness alone, however, is not an element in the required level of justification to obtain an adjusted standard as set forth in Section 28.1(c) of the Act.

67. Before cost of treatment becomes a factor in an adjusted standard petition, the petitioner 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.

68. The Agency does not believe that the existence of MBT in Emerald's waste stream justifies the Board's grant of an adjusted standard because the cost of treatment of ammonia is not substantially and significantly different for Emerald than for other waste water treatment plants that do not contain MBT in its waste stream. Petitioner has failed to 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. Second, the Agency has been able to determine that the capital costs are comparable or lower than the capital costs expended by POTWs. In January 1998, Geneva proposed to pay a capital cost \$8.4 million to reduce 1,042 lbs/ day of ammonia in its effluent. In February 2002, Batavia proposed to pay a capital cost of \$6 million to reduce 875.7 lbs/day of ammonia in its effluent. In April 2002, St. Charles proposed to pay a capital cost of \$8.4 million to reduce 976 lbs/day from its effluent. The capital costs for POTWs to treat ammonia are comparable to Emerald's estimate capital costs for alkaline air stripping of the secondary clarifier effluent: \$9.4 million; single-stage nitrification of non-PC wastewater: \$2.68 million; biological nitrification of combined wastewater: \$4.4 million; break point chlorination: \$1.4 million; and ion exchange: \$1.6 million. Emerald's figures are within the range of the comparable POTW's cost, and it should be expected to pay the same costs as others in the industry.

69. Emerald also claims that the ammonia nitrogen effluent limitation of 3 mg/L has little to no measurable impact to the Illinois River. (Pet. 34.) 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.<sup>3</sup> In the present day, LC50 values this toxic are not found at any other Illinois facility. Additionally, a petition for an adjusted standard is the improper venue to challenge the validity of the Board's ammonia nitrogen effluent limitation. Emerald argues that it should not have to follow the ammonia nitrogen effluent limitation because the effluent limitation does not have a meaningful effect. Asserting that a regulation does not have a meaningful effect does not provide adequate justification under Section 28.1 of the Act for the Board to grant an adjusted standard. Instead, the proper manner to obtain relief from a regulation that the petitioner believes is ineffectual is to file a regulatory proposal to change the effluent limitation.

70. Emerald has failed to meet its burden of proof under Section 28.1(c)(2) of the Act.

**C. Environmental or Health Impacts**

71. Emerald argues that there will be 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 summer acute and chronic standards at the edge of the mixing zone.

72. Information has become available recently on the toxicity of ammonia to mollusks. The 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

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<sup>3</sup> LC50 means the concentration of a toxic substance or effluent which is lethal to 50% of the exposed organisms in a given period of time.

protect mollusks. The current Illinois water quality standards for ammonia are based on the 1999 national criteria and therefore, if the draft criteria is adopted our state ammonia standards will have to be lowered by a factor of five to be identical to the new national criteria. According to the draft guidance, the Emerald effluent will require more mixing than is available in the Illinois River to be protective of mollusks. For example, 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 302.102 in the mixing zone (25% of 7Q10 flow). The 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. Since current and projected effluent concentrations are much higher than these levels, one could conclude that the effluent could be causing harm to mollusks in the Illinois River outside the ZID and mixing zone. Given the recently developed science as presented in the 2009 ammonia criteria document, relief from effluent concentrations believed to be harmful to mollusks after mixing must not be allowed.

73. Whole effluent toxicity (WET) is also a concern in Emerald's effluent. Besides the expected toxicity from ammonia there are also other substances that may be toxic to aquatic life. These substances are those, at least, that Emerald claims interferes with nitrifying bacteria and prevents them from removing ammonia from the effluent. A recent WET test with Emerald effluent found that the LC50 was <6.25% effluent for fathead minnows, a standard test organism.

The results of this test leaves the amount of dilution required to achieve a non-toxic condition undetermined. The laboratory did not dilute the effluent sufficiently to determine the exact LC50 value. A dilution ratio of at least 16 to one (16:1) is necessary for rendering the effluent non-toxic. The Emerald effluent may have been more toxic than the available dilution (47.9:1) in the ZID could render non-toxic. In the present day, LC50 values this toxic are not found at any other Illinois facility.

74. Illinois EPA believes that a mixing zone is improper because Emerald is not providing the best degree of treatment. Emerald presented many options that achieve 75% or less ammonia reduction, with correspondingly lower costs. The Agency believes that Emerald has tools available to it to lower its ammonia nitrogen concentration in its effluent, but fails to take action to do so. Illinois EPA encourages the Board to require Emerald to at least implement some ammonia reductions rather than granting the relief requested by Emerald.

75. Emerald has failed to meet its burden of proof under Section 28.1(c)(3) of the Act.

**D. Consistency with the Federal Law (104.406(i))**

76. Before the Board may grant an adjusted standard, the Petitioner must have submitted adequate proof that the adjusted standard is consistent with any applicable federal law. 415 ILCS 5/28.1(c)(4); 35 Ill. Adm. Code 104.426. In ruling on the Initial Petition, the Board found that the adjusted standard was not inconsistent with federal law. The Agency agrees.

**X. HEARING**

77. Petitioner has requested a hearing in this matter. The Illinois EPA does 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 Environmental Protection Act have been met. Emerald's Petition presents the same technical treatment alternatives as

presented in the Initial Petition, on which the Board held three days of hearing in 2004. As the petitions in 2002 and 2012 are virtually identical, the Illinois EPA does not believe additional hearings in this matter will be beneficial.

## **XI. RECOMMENDATION AND CONCLUSION**

WHEREFORE, for the reasons stated herein, Illinois EPA respectfully recommends that the Pollution Control Board DENY Emerald's Petition for Adjusted Standard. First, the Illinois EPA does not believe Emerald has met its burden of proof to obtain an adjusted standard. Second, the Illinois EPA believes the Board lacks authority to grant the requested relief because the co-permittee, PolyOne, is not a party in this action. Furthermore, should the Board decide to grant Emerald's requested adjusted standard over the Agency's objection, the Agency recommends the following conditions be included:

A. 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.

B. 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.

C. 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.

D. Emerald investigates new production methods and technologies that generate less ammonia in Emerald's discharge.

E. Emerald investigates new treatment technologies, including but not limited to Fenton's reagent treatment, photo assisted Fenton systems, hydrogen peroxide/uv treatment, and evaluates implementation of new and existing technologies based on current plant conditions.

F. 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.

G. Emerald investigates and submits a study to Illinois EPA on the use of its effluent for spray irrigation on crops.

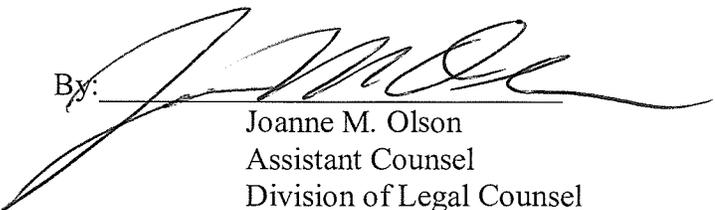
H. Emerald investigates and submits a study to Illinois EPA on the dilution of waste water from the PC tank with water from the Illinois River

I. Emerald prepares and submits to the Illinois EPA annual reports summarizing its activities to comply with above stated recommendations.

The Agency reserves the right to modify its above stated Recommendations after reviewing Petitioner's written responses to the December 17, 2012 Hearing Officer Order.

Respectfully Submitted,

ILLINOIS ENVIRONMENTAL  
PROTECTION AGENCY

By: 

Joanne M. Olson  
Assistant Counsel  
Division of Legal Counsel

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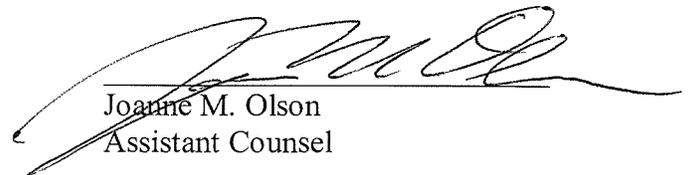
**CERTIFICATE OF SERVICE**

Joanne M. Olson, Assistant Counsel for the Illinois EPA, herein certifies that she has served a copy of the foregoing NOTICE OF FILING, and RECOMMENDATION OF THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY upon:

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by mailing a true copy thereof in an envelope duly addressed bearing proper first class postage and deposited in the United States mail at Springfield, Illinois on 1/11/13.

  
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Joanne M. Olson  
Assistant Counsel

