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**BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

**JUN 16 2004**

IN THE MATTER OF: )

Petition of Noveon, Inc. for an )  
Adjusted Standard from )  
35 Ill. Adm. Code 304.122 . )

AS 02-5 )  
(Adjusted Standard – Water) )

STATE OF ILLINOIS  
Pollution Control Board

**NOTICE OF FILING**

TO: Dorothy Gunn, Clerk  
Illinois Pollution Control Board  
James R. Thompson Center  
100 W. Randolph  
Suite 11-500  
Chicago, Illinois 60601

Mark Latham  
Richard Kissel  
Sheila Deely  
Gardner, Carton, & Douglas  
191 North Wacker Drive, Suite 3700  
Chicago, Illinois 60606

Bradley P. Halloran, Hearing Officer  
Illinois Pollution Control Board  
James R. Thompson Center  
100 W. Randolph, Suite 11-500  
Chicago, Illinois 60601

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the  
Pollution Control Board the attached Post-Hearing Memorandum of the Illinois Environmental  
Protection Agency and Documentation of Mixing Zone Guidance Requested by the Board of the  
Illinois Environmental Protection Agency, a copy of which is herewith served upon you.

ENVIRONMENTAL PROTECTION AGENCY OF THE  
STATE OF ILLINOIS

BY: 

Deborah J. Williams  
Assistant Counsel  
Division of Legal Counsel

DATED: June 15, 2004  
Illinois Environmental Protection Agency  
1021 N. Grand Ave. East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

**THIS FILING IS SUBMITTED  
ON RECYCLED PAPER**

**BEFORE THE ILLINOIS POLLUTION CONTROL BOARD JUN 16 2004**

STATE OF ILLINOIS  
Pollution Control Board

IN THE MATTER OF: )

PETITION OF NOVEON, INC. FOR )  
AN ADJUSTED STANDARD FROM )  
35 ILL. ADM. CODE 304.122 )

AS 02-5 )  
(Adjusted Standard - Water)

**POST-HEARING MEMORANDUM OF THE ILLINOIS**  
**ENVIRONMENTAL PROTECTION AGENCY**

NOW COMES the ILLINOIS ENVIRONMENTAL PROTECTION AGENCY ("Illinois EPA" or "Agency"), by one of its attorneys, Deborah J. Williams, and pursuant to the Hearing Officer's order of March 17, 2004, submits its Post-Hearing Memorandum in the above-captioned Petition for Adjusted Standard ("Petition") of Noveon, Inc. ("Noveon" or "Petitioner") from 35 Ill. Adm. Code 304.122 and in support of its Recommendation pursuant to 35 Ill. Adm. Code 104.416 that the Pollution Control Board ("Board") **DENY** Noveon's request for an Adjusted Standard and states as follows:

**I. INTRODUCTION AND PROCEDURAL HISTORY**

On December 28, 1990, the Illinois EPA issued a renewal of the National Pollutant Discharge Elimination System ("NPDES") permit number IL0001392 to Petitioner's Henry, Illinois manufacturing facility. At that time, the facility was owned and operated by BF Goodrich. Currently, the permitted facility is owned and operated by Noveon, Inc. and hereinafter Petitioner will be referred to as Noveon.

On January 24, 1991, Petitioner filed an appeal with the Board pursuant to Section 40(a) of the Environmental Protection Act ("Act") of the issuance of Noveon's renewal permit. 415

ILCS 5/40(a). *See*, PCB 91-17. While the permit appeal was pending, Noveon filed a Petition for Variance on October 30, 1992. *See*, PCB Docket 92-167. After 10 years of study, Noveon concluded that no affordable compliance options were available and filed the instant Adjusted Standard petition to obtain permanent relief from the Board's requirements on May 22, 2002. A motion to voluntarily withdraw Noveon's Variance Petition was granted by the Board on June 20, 2002.

Noveon's petition for Adjusted Standard requests relief from 35 Ill. Adm. Code 304.122 as these regulations apply to the discharge of ammonia nitrogen from Noveon's Henry, Marshall County, Illinois facility. Pursuant to Section 28.1(d) of the Act, Petitioner filed a Certificate of Publication with the Board on June 11, 2002 stating that notice of the Adjusted Standard petition was timely published on May 29, 2002. 415 ILCS 5/28.1(d). On June 20, 2003, the Board accepted the Petition for hearing. The Illinois EPA's Recommendation in this matter pursuant to 35 Ill. Adm. Code 104.416 was filed with the Board on June 18, 2003.

As the parties were unable to reach settlement on either the permit appeal or adjusted standard, hearings were scheduled and held on both matters. The hearing in this matter began on February 17, 2004 and concluded on February 19, 2004 before Hearing Officer Halloran at the Marshall County Courthouse in Lacon, Illinois. Several members of the public and media attended the hearing.

Noveon filed a Motion to Incorporate the transcript from the 1991 hearing in PCB 91-17 with the Board on February 6, 2004. Illinois EPA filed a Response on February 9, 2004. Hearing Officer Halloran denied the Motion by written order dated February 10, 2004. Petitioner made the same motion orally on February 19, 2004 at the hearing in this matter and expanded

that motion to include the transcript (at that time not yet available) of the conclusion of the Permit Appeal Hearing held on February 17, 2004. Hearing Transcript ("Tr.") at 15, 324. Hearing Officer Halloran again denied this oral motion. Tr. at 15, 326.

Noveon submitted extensive pre-filed testimony for several witnesses in this matter. Testimony from Houston Flippin, David Giffin, Linda Shaw, William Goodfellow and Michael Corn was submitted on Friday, February 6, 2004. Exhibits accompanying Mr. Corn's and Mr. Flippin's testimony were filed on February 9, 2004. With regard to the testimony of Mr. Flippin, on Monday, February 9, 2004, with three business days remaining before the hearing, Petitioner submitted a Motion to Withdraw and Substitute Expert Written Testimony of T. Houston Flippin. This Motion was granted by Hearing Officer Halloran for this proceeding. No pre-filed testimony was submitted, but oral testimony was also taken from Guy Davids. The Agency presented two witnesses at the hearing, Robert Mosher and Rick Pinneo. Statements were taken at the hearing from four members of the public: Richard Jansen, Bill Maupin, Richard Gillfillan and Doug Hermann.

The public comment period in this matter closed on March 22, 2004. Written comments were received from six members of the public prior to the close of the public comment period.

## **II. BACKGROUND ON PETITIONER'S FACILITY**

Noveon's Henry, Illinois Plant is located on 1550 County Road, 850 N. in northwestern Marshall County. Petition for Adjusted Standard ("Pet.") at 9. This facility was owned and operated by BF Goodrich until 1993. At that time, part of the facility was divested to form The Geon Company and is now known as PolyOne. Pet. at 9. The PolyOne portion of the former BF Goodrich facility manufactures poly-vinyl chloride resins and compounds. Pet. at 10, Tr. at 21.

The resins are used in a variety of specialty niche markets including by the medical industry for blood bags and other medical equipment and by the construction industry as coatings for flooring and wallpaper and for house siding and vertical blinds. Tr. at 23. In 2001, the remainder of the Henry facility was sold by BF Goodrich and is now known as Noveon. Pet. at 9. Noveon's portion of the former BF Goodrich facility produces specialty polymers and chemicals used either as rubber accelerators in the tire curing process or production of anti-oxidant additives to prevent degradation of polyethylene for the rubber, lubricant, and plastic industries. Pet. at 9, Tr. at 22. Recently, the facility has added Personal Care and Carboset products to its mix of products. One product called Geltrol is approved for food grade applications such as baby bottle nipples. Petitioner's Post-Hearing Brief ("Pet. Br.") at 3-4, Tr. at 22. Noveon operates the wastewater treatment facilities for both PolyOne's and Noveon's productions processes. Tr. at 21.

Noveon treats 360,000 gallons per day from PolyOne's operations and 180,000 gallons per day from Noveon's operations. Tr. at 157. Process and non-process water discharged per day is approximately 800,000 gallons. Tr. at 320. Effluent monitoring is currently conducted after all wastestreams from both plants are combined. The wastewater treatment system treats process wastewater from both plants, while stormwater and non-contact cooling water are sent to holding ponds. Pet. at 10. Treatment begins with pre-treatment of Noveon's Cure-Rite 18 wastestream. Noveon's process water is then sent to one of two tanks for equalization (the Polymer Chemical (PC) Tank or a separate equalization tank for the Cure-Rite 18 wastestream) while PolyOne's wastewater receives equalization in the Polyvinyl Chloride (PVC) Tank. This is followed by primary treatment (pH adjustment and addition of coagulant and polymer to remove

solids) and a primary clarifier. Solids are then sent to a collection tank and are dewatered in a filter press and sent to a landfill. Primary clarification is followed by activated sludge treatment in four biotreaters to degrade the organic matter. Finally, the wastewater is sent to a secondary clarifier followed by tertiary treatment that consists of polishing by a traveling bridge sand filter. Pet. at 12-13, Pet. Br. at 5-6. The stormwater and utility waters wastestream are either pumped from the holding ponds into the wastewater treatment process to add additional flow or sent to a sand filter prior to discharge to the Illinois River.

Noveon asserts that its wastewater treatment facility is constructed as a publicly owned treatment works ("POTW") would be constructed to treat ammonia through nitrification, but in fact nitrification does not occur at Noveon's facility. Noveon's existing plant is unable to achieve nitrification for a variety of reasons including: inhibition of growth of nitrifying bacteria by specific inhibitory compounds in Noveon's wastestream, insufficient oxygen due to poor oxygen transfer rates and the need for additional alkalinity to be chemically added. Pet. Br. at 7-8.

The discharge from the City of Henry's POTW combines with Noveon's effluent and is discharged through Noveon's outfall to the Illinois River. Pet. at 13. The total flow of the two discharges is around 1.1 million gallons per day ("mgd") or 1.7 cubic feet per second ("cfs"). Pet. Br. at 6. Noveon's Outfall 001 is located on the Illinois River between river mile 198 and 199. Pet. at 14. According to Noveon, the 7-day, 10-year low flow for the Illinois River at Henry, Illinois is 3,400 cubic feet per second. Pet. at 14. The major source of ammonia in Noveon's wastewater is generated from the destruction of amine compounds in the secondary treatment activated sludge portion of the wastewater treatment process. Pet. at 10. There is no

dispute in the Record that Noveon's discharge of ammonia nitrogen to the Illinois River exceeds 100 pounds per day ("lbs/day").

Noveon's wastewater treatment plant was upgraded in 1987. Pet. at 10. This included installation of two above ground biotreaters, two above ground equalization tanks, and a tertiary filtration system. Pet. at 10. In addition, a third bioreactor was added in 1989 and a fourth in 1998. Noveon testified that aeration tank capacity was increased by 100 percent in 1998 to accommodate expanded production. Tr. at 107.

In addition to the requirements of the Act and the Board's regulations, Noveon is subject to federal requirements for the Organic Chemicals, Plastics, and Synthetic Fiber industry category promulgated by U.S. EPA. See, 40 CFR Section 414.90 *et seq.* and Development Document for Effluent Limitations Guidelines and Standards for the Organic Chemicals, Plastics and Synthetic Fibers Point Source Category, U.S. Environmental Protection Agency Industrial Technology Division, Office of Water Regulations and Standards, EPA 440/1-87/009 (October 1987).

### **III. BURDEN OF PROOF AND STANDARD OF REVIEW**

The Petitioner has the burden of proof in all Adjusted Standard proceedings. 35 Ill. Adm. Code 104.426. Where, as in this case, the regulation of general applicability from which Petitioner seeks relief (35 Ill. Adm. Code 304.122) does not specify a level of justification or other requirements necessary for an adjusted standard, the Board must apply the standard of review contained in Section 28.1 of the Act. 415 ILCS 5/28.1. Section 28.1(c) of the Act contains the general level of justification the Board must find a petitioner to have met when granting an adjusted standard petition. 415 ILCS 5/28.1(c). That subsection provides:

[T]he Board may grant individual adjusted standards whenever the Board determines, upon adequate proof by petitioner, 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 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.

The Illinois EPA has maintained that Noveon has failed to meet this standard of review for the reasons outlined more fully below. In particular, Noveon has failed to demonstrate that it possesses substantially and significantly different factors than those considered by the Board in adopting the regulation of general applicability that justify the adjusted standard requested and that there will not be a negative environmental impact from this adjusted standard greater than the rule of general applicability.

Petitioner must also justify their adjustment consistent with the requirements of Section 27(a) of the Act. The Illinois EPA also argues that the Petitioner has failed to demonstrate that the rule of general applicability is technically infeasible and economically unreasonable when applied to Petitioner's facility.

#### **IV. RELIEF REQUESTED**

Petitioner has requested an adjusted standard from 35 Ill. Adm. Code 304.122. That provision contains an ammonia effluent limit for large dischargers of ammonia to specified water bodies, including the Illinois River. As a result of this regulation, the Illinois EPA has placed in Noveon's NPDES permit ammonia effluent limitations and requirements for monitoring and reporting of ammonia effluent concentrations in Noveon's discharge. The requirements of the



ammonia effluent limitations contained in 35 Ill. Adm. Code 304.122 provide as follows:

- 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.

The Illinois EPA placed ammonia effluent limitations in Noveon's NPDES permit based on subsection (b) of 304.122, which applies to dischargers whose "untreated waste load cannot be computed on a population equivalent basis comparable to that used for municipal waste treatment plants." The effluent limitations placed in Noveon's permit require that when the facility's 30-day average ammonia loading to the Illinois River is greater than 100 lbs/day, Petitioner is required to comply with a 30-day average ammonia concentration of 3 milligrams per liter ("mg/l"). If the daily maximum loading of ammonia in Noveon's effluent exceeds 200 lbs/day, Petitioner is limited to a daily maximum concentration of 6 mg/l.

The regulatory relief requested by Petitioner in some places refers to 304.122 generally and in other places refers to the provision the Agency has applied to the Petitioner, 304.122(b). Pet. Br. at 2, 42. While Noveon has argued that 304.122(a) applies rather than subsection (b), it has never presented a justification for relief from 304.122(c). The Illinois EPA wants to be clear, for the Record, that it would not support and the Board should not consider granting relief that

could be interpreted as granting relief from 304.122(c). Any relief granted to Petitioner must include compliance with 304.122(c), which in turn requires compliance with the requirement contained in 304.105 that Noveon's effluent may not be permitted to cause a violation of water quality standards.

The Illinois EPA's Post-Hearing Memorandum in this matter will not discuss in any detail the applicability of 304.122 to the Petitioner. The Agency has long maintained that subsection (b) of this provision applies and Noveon has tirelessly argued that subsection (a) is the appropriate condition. The Board will be forced to rule on this issue directly in PCB 91-17. While it is not unheard for a party to seek declaratory relief from the Board that a rule does not apply in an adjusted standard case, such relief is disfavored and has not been sought in this matter. Petitioner has properly challenged the applicability of the provision at issue in an appeal of its NPDES permit in PCB 91-17. By proceeding additionally with AS 02-05, the Agency will assume acknowledgment for the purpose of this proceeding that the effluent limitation of 304.122(b) does apply to its facility, for otherwise there would be no need for Noveon to file or for the Board to rule on Noveon's requested relief in AS 02-05. This adjusted standard proceeding presumes that the Agency's position on this question has been upheld by the Board in its ruling on Noveon's permit appeal. The only exception to this is that the Illinois EPA will briefly attempt to highlight conflicting testimony from the Petitioner regarding flow and population equivalent ("P.E.") calculations for Petitioner's wastestream.

In identifying the relief requested Petitioner has stated: "This Petition is submitted in the alternative to the NPDES Permit Appeal. . . Noveon therefore seeks relief from Section 304.122(b) and requests as part of the relief that the Board also grant Noveon a mixing zone

calculated in accordance with federal and state regulations.” Pet. Br. at 2. Noveon has not requested relief from the ammonia nitrogen water quality standards of 35 Ill. Adm. Code 302.212, because it claims it can meet those standards. However, Noveon stated in its initial Petition that “Noveon also seeks from the Board as part of this proceeding, a determination that the ammonia water quality standards will be met with the ZID and mixing zone calculated in Exhibit 1 and 3 and as discussed above for the Henry plant discharge.” Pet. at 8. The Agency will discuss below why the request for the Board to calculate a mixing zone in this case is inappropriate, unnecessary and possibly an attempt to gain relief from the water quality standard into the future without requesting or justifying such relief directly.

Petitioner originally presented three alternative forms of relief in its adjusted standard Petition. Each alternative exempted Noveon from the requirements of 35 Ill. Adm. Code 304.122 and required Noveon to install a multi-port diffuser, but each alternative presented an effluent limit expressed in a different format that would allow Noveon to continue discharging ammonia at and even above current levels. In its Post-Hearing Brief Noveon withdraws its proposed alternatives #1 (with an effluent limit expressed as an un-ionized ammonia limitation) and #2 (with an effluent limit expressed as pounds of ammonia loading) and changes alternative #3 as originally presented to its final request to the Board. Instead of its original request in alternative #3 for an effluent limit concentration of 155 mg/L total ammonia nitrogen during the months of April through October and 225 mg/L during the months of November through March. Noveon now requests an effluent limit of 225 mg/L year round. Although the Agency appreciates the Petitioner’s decision to limit the proposed alternatives to one from three, the Illinois EPA cannot support Noveon’s request for an even higher limit in the summer months

than originally requested at this late date.<sup>1</sup> The Board should not allow an alternative effluent adjusted standard that implements a limit greater than that required to meet the water quality standard year round. Noveon's request is also misleading to the Board when it attempts to base this request on an Illinois EPA memo, because this conclusion of the Agency was premised on the requirement that best degree of treatment ("BDT") for ammonia be met and a full review of a proposed multi-port diffuser be conducted before any mixing zone is available. Tr. at 337, 390-91.

#### **V. PETITIONER'S MOTION TO OVERTURN HEARING OFFICER ORDER**

As explained above, Noveon's Motion to incorporate the transcripts and exhibits from PCB 91-17 was denied by the hearing officer twice. Tr. at 326. In its Post-Hearing Brief, Noveon argues that the Board should overturn this ruling. The Illinois EPA supports the Hearing Officer's use of discretion in this matter and argues that the Board should uphold Hearing Officer Halloran's ruling in this regard. Noveon claims this information is relevant to the Board's decision in this matter, but testimony related to the application of 304.122 to Noveon's facility is not relevant to this proceeding as this posture of this proceeding assumes the Board has already ruled on this question in the Agency's favor.

While Noveon claims it removed unrelated material from the 1991 transcript in PCB 91-17, the material submitted as an offer of proof in Exhibit contains 131 pages of the 160 total pages of that Transcript and all of the Exhibits. Tr. at 324.

Noveon cites to the Board's procedural rules at 35 Ill. Adm. Code 101.306(a) to support

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<sup>1</sup> Noveon's own consultants initially determined that the water quality standards would be met with a year round effluent limit of 189 mg/L. Pet. at 7, 15. Petitioner presented testimony from Mike Corn that the acute ammonia water quality standard would be met at the edge of the zone of initial dilution he has calculated with the single port diffuser at 224 mg/L though that testimony was later modified to 220 mg/L. Tr. at 319, 480.

its argument. That provision allows for a “separate written request” to incorporate materials from another Board proceeding into any proceeding. Petitioner correctly states that this provision provides a relatively lenient standard. However, it does require the request to be in writing and to include a filing of 4 copies of the materials to be incorporated as well as a demonstration that the material is authentic, credible and relevant to the proceeding. Illinois EPA does not dispute the authenticity or credibility, but it does dispute the relevance. In addition, Noveon is requesting incorporation of a transcript that was not available at the time the hearing was conducted in this matter or at the time the original motion was made. Noveon has not submitted 4 copies of the 2004 hearing transcript and in fact could not have done so.

Rule 101.306(a) also requires notice to all parties of a request to incorporate materials from another proceeding. The original motion to incorporate was filed on February 6, 2004. The Illinois EPA argues that an important foundation of the Hearing Officer’s denial of this motion was its lateness in the process. Petitioner had from May 2002 to submit this request to the Board and waited until there were only four State business days remaining until the hearing to submit its request. In light of this, the Agency has and continues to argue that it is prejudiced by incorporation of the material in its entirety. Tr. at 324.

As Noveon has pointed out, the Illinois EPA has argued that the basis for this request is not to assist the Board in its decision-making in this matter, but to attempt a de facto consolidation of the Permit Appeal proceeding with this Adjusted Standard case. Such a consolidation would be inappropriate under 35 Ill. Adm. Code 104.406 based on the different standard of review applicable to the Permit Appeal proceeding. Though Petitioner claims they are not trying to achieve a consolidation of these two proceedings, with regard to its argument

that Noveon's P.E. value was less than 50,000 prior to issuance of its most recent NPDES permit. Noveon states, "That argument will not be repeated here but is incorporated by reference." Pet. Br. at 13. While on page 34 footnote 7 of its Post-Hearing Brief, Noveon cites to testimony of Bob Mosher that the Board could "consider" if the transcript was incorporated even though Mr. Mosher was thoroughly cross-examined in this matter by Petitioner. The Illinois EPA believes the Board's decision-making in this matter will be aided by its attempts to limit the Record in this proceeding to the material relevant for the decision it is being asked to render on Noveon's Petitioner for Adjusted Standard.

#### **VI. CALCULATION OF NOVEON'S P.E.**

Petitioner has argued that its facility would not trigger the applicability threshold of 35 Ill. Adm. Code 304.122(a) if that provision were found to apply to its facility. Under subsection (a), Petitioner claims no effluent limit would attach based on the allegation that Noveon's influent has a P.E. of less than 50,000. Although the Illinois EPA did not deem a P.E. calculation necessary or appropriate for this industrial facility, when Noveon propounded Interrogatories upon the Illinois EPA in this matter, the Agency was asked for the first time to calculate Noveon's P.E. After many years of discussions and disputes between the parties regarding the applicability of 35 Ill. Adm. Code 304.122 to Noveon's facility, the parties realized for the first time that a factual dispute existed between the parties regarding the actual properly calculated P.E. value for Noveon's facility. While the Agency still maintains that a P.E. calculation is not necessary or meaningful for this facility (even in the permit appeal proceeding) and certainly not relevant to this proceeding which assumes Noveon would be subject to an ammonia effluent limit, the Agency still thinks it important to point out for the Board some inconsistencies in the

Record regarding attempts to calculate Noveon's P.E. with conflicting flow, BOD<sub>5</sub> (5-day biochemical oxygen demand) and TSS (total suspended solids) values.

P.E. is determined by calculating the P.E. value for flow, BOD and TSS pursuant to 35 Ill. Adm. Code 301.345 and taking the highest of these when determining the impact on a treatment works. In the case of impact on the receiving stream, it is the higher of the BOD and TSS P.E. values that controls.

Noveon has called the calculations made by Illinois EPA in response to discovery "inflated" and claimed values were obtained for flow P.E. of 916 and BOD P.E. of 19,412. Pet. Br. at 14. Noveon omits that the testimony at hearing identified that the flow P.E. contained a typographical error and was actually 9,160. Tr. at 425. This typographical error was repeated by Noveon's witness Mr. Flippin verbatim in his pre-filed testimony. Petitioner's Exhibit 7. This calls into question what flow P.E. Noveon thinks is the proper value as it relied entirely on the Agency's calculations, which it has called inflated. Noveon does not mention the results Illinois EPA obtained for TSS P.E. but instead repeats Mr. Flippin's conclusion of a TSS P.E. of 24,955. This Illinois EPA's calculations were based on the Baxter and Woodman Report and resulted in a TSS P.E. value of 265,000. Illinois EPA Ex. 5, Tr. at 316. This TSS P.E. calculation made was based upon the only influent TSS data provided by the Petitioner prior to the hearing in AS 02-05. This data was found on pages 3 through 7 of Illinois EPA's Exhibit 5. However, the flow diagram for Petitioner's wastewater treatment system contained in that report did not identify certain waste streams as being internal to the wastewater treatment system as identified by Petitioner subsequently. Pet. Br. at 14. The TSS figure used for Illinois EPA's calculation was 53,000 lbs/day. Exhibit 5 at 3. While the TSS figure used by Mr. Flippin was 4,991 lbs/day.

This leaves a difference of 48,009 lbs/day, which Petitioner claims can be accounted for, by the internal waste streams of filtrate from sludge dewatering, backwash from the tertiary filters and the intermittent occasions when primary sludge is not being dewatered. Pet. Br. at 14. If accurate, this would mean the capture efficiency of the sludge filter is only 10 percent of the total solids or that sludge is not filtered on a regular basis.

Noveon's TSS P.E. calculations are also suspect to the extent the flow values used to reach them are in dispute. For both TSS and BOD P.E., Noveon had to use flow values to convert BOD and TSS concentration values into BOD and TSS loadings. Noveon submitted additional information to the Board on April 15, 2004 to support Mr. Flippin's testimony regarding calculation of P.E. values for TSS. The average flow figures provided in the data submitted for PolyOne (consisting of PVC lift station discharge and what is referred to as the 213 manufacturing discharge) results in a flow value of 168 gallons per minute or 241,920 gallons per day. This flow value is lower than the average flow value Noveon has consistently maintained is being treated for PolyOne of 360,000 gallons per day (or 250 gallons per minute). Pet. at 9, Pet. Ex. 30. Similarly, for the influent flow from Noveon's treatment processes (identified as PC tank discharge plus C-18 tank discharge in the data submitted on April 15, 2004) an average value is provided of 97.6 gallons per minute (or 140,544 gallons per day). This flow value is much lower than that consistently provided by Noveon in its documentation for this adjusted standard for the Noveon processes of 180,000 gallons per day (or 125 gallons per minute). Pet. at 9, Pet. Ex. 30.

These deflated flow figures outlined above were utilized by Mr. Flippin to calculate a



TSS loading of 4,991 lbs/day.<sup>2</sup> With regard to TSS P.E. calculations Noveon states that “Because all wastestreams expected to have any significant levels of TSS were included Mr. Flippin testified that his calculation of population equivalents was accurate to within 25 percent. Tr. 486-88.” Pet. at 14-15. By this statement Petitioner admits that untreated wastestreams from Well number 3 and the Stormwater/Utility Pond discharges have been excluded from its calculation. Petitioner expects the Board to accept that this calculation might be off by no more than 25 percent based on its statement that “The TSS discharged by the combined Well No. 3 and Storm/Utility Pond discharges are less than 25 percent of the total influent wasteload as illustrated in the Baxter and Woodman Report.” Pet. Ex. 7 at 13. Review of Illinois EPA Exhibit 5 (the Baxter and Woodman Report) by the Agency has not resulted in finding the basis for this assumption in that document.

Other wastestreams not internal to the treatment process were excluded from Mr. Flippin’s calculations including the Parkson filter wastestream, which was identified to the Board as having a flow of 100,800 gallons per day (70 gallons per minute). Exhibit 30. Additionally, when asked by the Board to identify the components of the 800,000 gallons per day of total flow that were not attributable to Noveon and PolyOne process waters, the Petitioner included the 70 gallons per minute (100,800 gallons per day) from the filter backwash which is an internal wastestream and not a component of Noveon’s influent. Pet. Ex. 30 at 2. It is not clear where the Illinois EPA should look to find this additional 70 gallons per minutes and what impact this flow would have on Noveon’s P.E. values for TSS.

Another example of confusion over the proper flow values to be utilized in calculated

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<sup>2</sup> Only an estimated TSS concentration was supplied for the 213 process, not an actual measured value.

flow, BOD and TSS P.E. values can be found in Petitioner's Exhibit 5 where flow values totaling 145 gallons per minute are provided while Noveon claims the total flow from these segments of the wastestream are only 90 gallons per minute. Tr. at 48.

The Petitioner has used estimates, made omissions and apparently utilized non-representative flows to make their P.E. calculation for TSS. While the Agency does not dispute it is quite possible a proper P.E. value for Noveon's facility as a whole might be less than 50,000, that fact is not at all clear from the information presented to date. In addition, Petitioner has managed to make what both parties claim to be a simple calculation quite complicated and not comparable to the method typically utilized by POTWs or the Agency in deriving P.E. values. While there is a factual dispute in the Record regarding the actual P.E. value of Noveon's facility, there can be no dispute that when calculated that value does not correspond to the enormous ammonia loading Petitioner's facility is discharging to the Illinois River as would be represented by a P.E. value for a POTW.

## **VII. EFFORTS NECESSARY TO ACHIEVE COMPLIANCE AND ALTERNATIVES**

Noveon states in its Petition that "Noveon and its consultants have concluded, that the evidence presented in this proceeding will show, that none of the available treatment technologies are both economically reasonable and technically feasible for Noveon to significantly reduce the ammonia in the wastewater from the Henry Plant to levels that would achieve compliance with 35 Ill. Adm. Code 304.122(b)." Pet. at 4. The evidence presented at hearing clearly shows that there are technically feasible alternatives available for the treatment of ammonia at Noveon's facility. In addition, while some of these alternatives are very expensive, the Agency maintains that if viewed in terms of cost per pound of ammonia removed, the cost for

Noveon is not substantially different than the cost for other industries and municipalities of achieving nitrification.

Biological ammonia treatment is referred to as “nitrification” because treatment of ammonia involves oxidizing ammonia to nitrates. Noveon studied the nitrification ability of the existing plant and concluded 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. at 16. Noveon also determined that addition of nitrifier-rich bio-mass would not help because of “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. at 16.

Noveon analyzed the alternative compliance methods by looking at in-process reductions, pretreatment of the wastestream and post-treatment of the wastestream. Pet. at 17. Noveon has concluded that it is not willing to implement any alternatives to reduce the ammonia in its wastestream and has asked the Board to grant relief to allow its ammonia discharge to continue at (or even above) current levels. Noveon has offered that in return for receiving regulatory relief from 304.122 from the Board, “Noveon will agree to replace the current single-port diffuser with a multi-port diffuser as part of this proceeding.” Pet. at 15. This change is likely necessary to assure Noveon is in compliance with water quality standards and is not an effort to reduce its ammonia discharge.

Noveon presented testimony from Mr. Giffin regarding its efforts to reduce inhibitory and otherwise problematic compounds in its wastestream including morpholine and tertiary butyl amine (“TBA”) through in process reductions and pre-treatment alternatives. Pet. at 17, Exhibit

6. According to Noveon, none of these alternatives would result in compliance with 304.122 and many had resulting safety or environmental concerns.

Noveon did give several examples of successful efforts to remove compounds from its wastestreams. Pet. Br. at 18, Ex. 6. Noveon identified TBA as one of the compounds in its wastestream contributing to high levels of ammonia in its discharge and identified that it was able to recover 185,000 lbs/year of this compound by achieving a 5 percent recovery rate. Tr. at 50. Noveon could not testify as to how much of this problematic compound is utilized at the plant, but basic calculations would indicate that a 5 percent recovery of 185,000 lbs/year would equate to a reduction of 506 lbs/day. If 5 percent of the TBA used is 506 lbs/day then the total used would be approximately 10,000 lbs/day with approximately 9,500 of that going to the system. Although the process reductions presented by Mr. Giffin total 474,000 lbs/year of compounds prevented from entering final wastestream, there is no correlation made between the efforts and whether or not there has been any ammonia reduction as a result. Tr. at 48. The available evidence leads to the conclusion that these source reduction efforts were performed to assure compliance with BOD and TSS limitations in Noveon's NPDES permit and not to reduce ammonia levels. It is misleading to connect these efforts with an effort to reduce ammonia levels in Noveon's discharge. The only evidence presented by Noveon regarding efforts that reduced ammonia levels is that its treatment plant succeeds in removing some BOD and that without this BOD removal by the plant, ammonia concentrations in Noveon's discharge would be 20 mg/L higher than they would be with no treatment. Pet. Br. at 19.

#### **Evaluation of Ammonia Treatment Technologies**

Noveon has reviewed approximately eight potential post-treatment compliance options

prior to concluding that none of these are technologically feasible and economically reasonable. In its Recommendation, the Agency reviewed each of these options and where Noveon provided cost figures, the Illinois EPA analyzed those figures on a per pound reduced basis and compared them to municipal treatment plants that have recently installed nitrification technology as contemplated by 40 CFR 125.3(d)(2). Illinois EPA Recommendation (“Rec.”) at 14-17. Noveon included Operating and Maintenance (“O&M”) costs in its evaluation of alternatives and based those on a 10-year life of the equipment. Because figures available from POTWs did not include O&M costs, the Illinois EPA attempted to subtract those costs when comparing Noveon’s costs per pound of ammonia removed from three recent sewage treatment plant nitrification projects (Geneva, Batavia and St. Charles ) for comparison purposes. Each of these facilities chose to install a single stage facility similar to what Noveon proposes in the pretreatment and biological treatment option after evaluation of the most cost effective treatment alternatives. The Agency concluded that the capital costs presented by Noveon are not economically unreasonable based on the large amounts of ammonia being removed from the discharge.<sup>3</sup>

Noveon claims that its expert witness conducted “a thorough evaluation of the costs, feasibility, and effectiveness of all proven technologies for treatment of ammonia.” Pet. Br. at 19. The Illinois EPA did ask Noveon to conduct a more detailed review of the use of granular activated carbon instead of the powdered carbon that was evaluated by Mr. Flippin. Noveon’s response to this was that “Granular Activated Carbon was considered but quickly abandoned due to the large PAC (powdered activated carbon) dosing required and the certain fouling problems.” Pet. Br. at 28 (Exhibit 7 at 19). The Illinois EPA feels that its suggestion for further study was

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<sup>3</sup>The Agency also presented testimony at the hearing that the only increased O&M costs Noveon should experience that would not be required of a POTW is the additional chemical costs which amounted to 20 percent of the total

dismissed by Noveon's experts quickly.

Noveon has spent an enormous amount of time and money to study alternatives as evidence by the extensive list of alternatives presented. The Agency does not dispute that it would be expensive to reduce ammonia to the levels required by the 304.122. It is also often very expensive for municipal plants to install nitrification capabilities. Although the costs are high, the amounts of ammonia to be removed are also extreme and the Illinois EPA does not agree that the per pound ammonia removal cost is unreasonable.

Mr. Flippin admits there are many technically feasible treatments available to reduce ammonia at Noveon's plant. Tr. at 118. Among the alternatives evaluated that would achieve full compliance with 304.122(b) are effluent breakpoint chlorination (achieving 98 percent reduction for \$9.7 million); biological nitrification of combined wastewater (at a cost of \$11.7 million); ozonation (98 percent reduction at a very high cost of \$20.3 million); ion exchange (98 percent reduction at a cost of \$5.1 million); tertiary nitrification (at cost of \$11.4 million). Noveon complains that of the technically feasible alternatives that achieve full compliance with 304.122(b) biological nitrification of combined wastewater, ion exchange and tertiary nitrification achieve only inconsistent compliance due to reliability ratings of 6 or 7. While the Illinois EPA would always prefer consistent compliance, Noveon has never suggested it would be willing to implement any alternative with inconsistent or less than full compliance for the Illinois EPA or the Board to consider for approval.

Noveon does not explicitly state that some of the alternatives studied are economically reasonable, except to state that "For alternative 6 (nitrification of PVC tank wastewater), the

Henry plant would incur an incremental cost of \$329,000. This alternative is the only one of those considered that would not generate a negative return and [sic] on net plant, property and equipment.” Pet. Br. at 30.<sup>4</sup> Some of the costs summarized in Noveon’s brief seem to be reasonable even without looking at the per pound removal cost: Struvite precipitation costs \$5.1 million (only 24 percent reduction); Single-stage biological nitrification of non-PC wastewater costs only \$4.9 million (with 47 percent removal); and alkaline air stripping costs \$2.2 million (for only 14 percent reductions) but costs about \$14 million for 27 percent or 95 percent reductions. The Agency believes there are treatments available that could achieve at least partial compliance with 304.122(b) for an economically reasonable cost. However, it is not the role of the Illinois EPA or the Board to select Noveon’s treatment system.

#### **Noveon’s Cost Figures May be Inflated**

The Illinois EPA also raised several concerns at the hearing regarding whether or not Mr. Flippin’s cost calculations were inflated to make the cost of treatment appear economically unreasonable. Although Mr. Flippin testified he is not usually responsible for developing cost estimates and did not actually run the models that were used to determine the costs of each alternative, he testified as the expert on this issue. Tr. at 105-106.

With regard to use of present worth costs, Noveon utilized a 10 year life and has claimed in its brief that it did so to keep the costs down and that by using a larger 20 or 30 year life, the present worth costs for O&M would be higher. Pet. Br. at 20. This may be true, but it is also true that an increase in present worth O&M costs would be countered by a decrease in the present worth capital costs for equipment.

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<sup>4</sup>The term “considered” in this quote only refers to the three alternatives addressed in Ms. Shaw’s testimony.

Mr. Flippin used a contingency cost of 15 percent, which increases the cost estimates for each alternative by that amount. Tr. at 121. A cost of labor was used at a rate of \$40 per hour even though Noveon's documents indicated that its workers typically earn \$22 per hour. Tr. at 24. It seems unlikely that the cost of employee benefits or overtime would account for the entire disparity. Especially since Mr. Flippin testified that Noveon would not be hiring a full time employee to perform the additional workload but would be utilizing an existing staff person or a "portion of a person." Tr. at 127. Mr. Flippin also testified that he based his use of an 8 percent interest rate on what he "believed people could make on their money" at the time the cost analysis was conducted. Tr. at 128. Mr. Flippin admitted this figure might no longer be accurate if it was calculated based on the current economic situation. Tr. at 129. Although Mr. Flippin testified that salvage costs for wastewater treatment plants are not very high, it seems that to assume a 10 year life for this equipment with absolutely no salvage value serves to inflate the capital costs of these alternatives.

In order to counter the Agency's argument that Noveon's costs per pound of ammonia removed are comparable to costs of other plants Mr. Flippin attempts to compare his client's costs to a \$0.20 per pound surcharge used at one municipal facility for industrial users. Flippin at 29, Tr. at 115-116. Although documentation of this research was not submitted by Noveon, this comparison is suspect because municipality surcharges take into account a variety of factors including instituting a disincentive above usual cost of treatment to discourage compounds that might overload the plant or a desire to encourage local industry through provision of infrastructure services.

One of the most disturbing aspects of Noveon's economic argument is that it asks the



Board to consider the impact of each of these alternatives on the viability of the Henry Plant without taking into account that PolyOne typically contributes approximately 55 percent of the cost of operation of the wastewater treatment facility operated by Noveon. Tr. at 44. Since PolyOne also contributes to the high levels of ammonia in the final discharge and without Noveon's facility would be forced to construct its own treatment plant, it is unreasonable to ask the Board to assume that the former portion of the BF Goodrich plant now owned by a different corporate entity would not contribute significantly to these costs and thereby reduce the economic burden on Noveon.

Illinois EPA therefore disagrees with Noveon's conclusion that after substantial investigation, "None of these assessments resulted in discovery of any treatment alternative that was both technologically feasible and economically reasonable as a method to achieve compliance with 35 Ill. Adm. Code 204.122(b) [*sic*]." Pet. Br. at 17. Noveon did find alternatives that could achieve full compliance and at least one alternative it admits is economically reasonable. The Illinois EPA argues that before relief should be granted by the Board, Noveon should express a willingness to reduce ammonia to levels that would achieve the greatest reductions that would be economically reasonable in order to minimize its environmental impact. Instead, Noveon has taken an all or nothing approach to the relief requested. It is the Illinois EPA's responsibility to evaluate the relief requested in an Adjusted Standard proceeding. The Illinois EPA cannot pick an option for Noveon, but it is unwilling to accept that none of those evaluated are technical feasible and economically reasonable.

#### **VIII. ENVIRONMENTAL IMPACT AND MIXING ZONE CALCULATIONS**

Noveon claims that granting adjusted standard relief from 304.122 will not result in any

adverse environmental impacts. Pet. at 25. Noveon further claims that the acute ammonia water quality standard will be met at the edge of the zone of initial dilution ("ZID") and the chronic standard will be met at the edge of the mixing zone. The Illinois EPA disagrees that the relief requested will have no adverse environmental impacts. The Agency also disputes that Noveon is entitled to the mixing zone and ZID calculated by Mr. Corn.

Noveon attempts to use the status of the dissolved oxygen in the Illinois River as a basis for its claim that there will be no adverse environmental impact if the requested relief is granted. Noveon accurately points out that the impact of ammonia on dissolved oxygen sags was one aspect of water quality that was considered by the Board in adopting 304.122. However, at that time there was not an ammonia water quality standard to consider. Today there are fully developed ammonia water quality standards which Noveon must address its ability to comply with as well. As part of its argument regarding dissolved oxygen, Noveon alleges that the studies underlying the Board's rulemaking in 304.122 have proved faulty and implies the Board should not attempt to apply the rule as a result. The Agency does not agree with this conclusion and has consistently maintained that the proper forum for addressing problems with the science underlying a rule of general applicability is a rulemaking to amend the rule of general applicability. The Board has opened 304.122 twice since the adoption of subsections (a) through (c) and the Board never sought to update or alter the effluent ammonia standard at that time and the Illinois EPA must assume the Board still finds the rule valid and necessary to protect aquatic life.

With regard to the environmental impact of Noveon's discharge, the Agency presented testimony that Noveon's effluent is the single most toxic remaining discharge to the waters of the

State of Illinois. Tr. at 350. Now that other highly toxic dischargers in the State have improved the quality of their discharge, Noveon is the last remaining discharger to improve the toxicity of its effluent above the single digit LC50 level. Tr. at 350.

Noveon attempted to present evidence from Mr. Goodfellow to lessen the impact of the Agency's testimony regarding the toxicity of Noveon's discharge. Mr. Goodfellow presented evidence that in addition to ammonia, salinity is a component of the toxicity of Noveon's discharge. Cross-examination of Mr. Goodfellow and Mr. Mosher's testimony demonstrate that Noveon neither knows exactly how toxic its discharge is nor what components besides ammonia and salinity may be causing the lethality of Noveon's whole effluent to aquatic life. Tr. at 351-52.<sup>5</sup> Noveon's toxicity studies failed to dilute the whole effluent toxicity samples studied by Mr. Goodfellow sufficiently to reach a No Observed Effect Concentration ("NEOC") which would identify exactly how much dilution is required to remove the toxicity of its discharge. As Mr. Mosher testified, "When you do that kind of testing, you take the trouble to do a definitive test; you always bring the dilutions down to the level of disappearance of toxicity. In other words, you keep diluting the effluent until the organisms don't have an adverse effect to it any longer." Tr. at 351.<sup>6</sup> Noveon has performed no in stream studies which look at the actual impact of its discharge on the aquatic life downstream from its discharge, but nevertheless concluded there would be no adverse impact. Tr. at 354.

Another basis for Noveon's claim that there will be no adverse environmental impact

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<sup>5</sup> As identified by Noveon's consultants in the Baxter and Woodman Report "Although the final effluent BOD was consistently low (6 mg/L), the COD [chemical oxygen demand] and TOC [total organic carbon] concentrations remained relatively high (385 mg/L and 158 mg/L). The residual COD and TOC indicate that the wastewater still contains certain inorganic compounds and organic compounds which may be inhibitive and/or toxic to biological nitrification processes." Ex. 5 at 18-19.

<sup>6</sup> These undefinitive toxicity test results were later used by Mr. Corn to conclude that a 100:1 dilution ration would

beyond that considered by the Board in adoption of the regulation of general applicability is that use of a multi-port diffuser will assure compliance with the water quality standards. Installation of a multi-port diffuser is necessary for Noveon's existing discharge to meet the acute water quality standard for ammonia and is being proposed by Noveon as part of its request for adjusted standard relief. While the Agency welcomes the diffuser to improve mixing of Noveon's discharge, this is not a form of treatment. Additionally, the Illinois EPA disagrees with Petitioner's method of using the multi-port diffuser in calculation of a proposed mixing zone.

#### **The Board Should Not Designate a Mixing Zone for Noveon's Discharge**

Noveon presents a detailed discussion of what it terms Noveon's "actual" mixing zone. Pet. Br. at 32-34. This discussion includes a description of a dispute between the parties regarding whether aquatic life can live in the entire "jet entrainment zone" as that term is used by Noveon. Tr. at 376-77. The Illinois EPA is concerned this discussion confuses the reader in that the methods used by Noveon to calculate this "actual" mixing zone do not comply with the Board's regulations for calculating mixing zones (called "regulatory mixing zones" by Noveon).

The first issue to be addressed in determining the nature of the mixing zone available to Noveon is whether Best Degree of Treatment ("BDT") is being provided. Tr. at 337. Pursuant to the Board's mixing zone regulations in 302.102(a), a mixing zone is available "provided the discharger has made every effort to comply with the requirements of 304.102." The referenced provision 304.102 is the BDT requirement and the prohibition against using dilution to meet effluent standards. Further, this provision obligates dischargers to provide the best degree of treatment of wastewater consistent with technical feasibility and economic reasonableness and

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be adequate to address the toxicity issues in Noveon's effluent when calculating a mixing zone. Tr. at 353.

sound engineering judgment. With regard to ammonia treatment, Illinois EPA has consistently claimed BDT is not being met for ammonia at Noveon's plant as there is no ammonia treatment at the plant. The only way for a mixing zone to be available to Noveon to achieve compliance with the ammonia water quality standards in 302.212 is for Noveon to install ammonia treatment or for the Board to overrule the Agency's conclusion and find that Noveon is in fact currently meeting BDT even without an ammonia treatment technology in place. Noveon apparently wants the Board to declare as part of this proceeding that Noveon is already providing BDT for ammonia. Pet. Br. at 35.

If the Board finds that Noveon has implemented BDT, it would then be necessary to address Noveon's request that the Board calculate its mixing zone. The Agency does not agree that this step is necessary. If the Board found that Noveon has met BDT, the Illinois EPA will be able to grant Noveon a mixing zone in compliance with the Board's mixing zone regulations in Noveon's NPDES permit. Mr. Mosher testified that the acute water quality standard for ammonia would not be met currently at the edge of an appropriately calculated ZID with the existing single port diffuser. Tr. at 342. However, once Noveon has installed a multi-port diffuser, it is expected that the mixing zone available to Noveon with a high rate diffuser would be sufficiently large to achieve compliance with the ammonia nitrogen water quality standards in the Illinois River.

Noveon spent a great deal of time at hearing and in its Post-Hearing Brief arguing that the Board must craft a mixing zone for Noveon because it does not agree with Illinois EPA's interpretation of the Board's regulations as they relate to Noveon's *existing* ZID and mixing zone. While the Agency will attempt to explain this issue for the Board below, it seems

unnecessary for the Board to address the Agency's or Noveon's interpretation of the mixing zones regulations in an abstract, theoretical situation. Illinois EPA has never applied a mixing zone to Noveon's existing discharge because the Agency's mixing zone program post-dates Noveon's most recently issued NPDES permit. Since Noveon and the Agency agree that with adjusted standard relief and a multi-port diffuser Noveon would have an adequate mixing zone to achieve water quality standards, it seems inappropriate to ask the Board to overrule the Agency's interpretation of federal and state mixing zone regulations in the abstract.

The Agency's interpretation of the Board's mixing zone regulations and state and federal guidance has not been altered to deal with Noveon's discharge yet Noveon seems to call into question the Illinois EPA's mixing zone program as a whole. Noveon even goes so far as to state: "It is clear that Mr. Mosher simply does not like mixing zones, notwithstanding their permissibility in the regulations of U.S. EPA and in most states, including Illinois..." Noveon's disparagement of Mr. Mosher is inappropriate. Mr. Mosher testified clearly that "when a mixing zone and ZID are granted to an NPDES discharge, that means the standards won't be met. The standards are based on toxic effect to aquatic life, and that includes fish, that includes mussels and clams that live on the bottom. And when you allow those areas in the river to not meet the standards . . . there is an impact to that aquatic habitat." Tr. at 346. Mr. Mosher testified that there are important economic and social justifications for mixing zones and ZIDs, but the areas where water quality standards are not met must be limited to the level specified in the regulations in order to protect aquatic life.

Noveon states they have agreed to replace single-port diffuser with multi-port diffuser as part of this proceeding. Pet. at 7. Although Noveon could have undertaken this project at any

time to assure that sufficient mixing was occurring to meet water quality standards, they have not agreed to do so until an adjusted standard is granted by the Board. Noveon asks for a mixing zone of 5 acres that is 1,000 feet long and a ZID that is 66 feet long with the current diffuser. Pet. Br. at 36, Tr. at 341. The Agency has maintained that the current ZID is calculated at 22.5 feet. Tr. at 341. With regard to Noveon's mixing zone, Mr. Mosher testified that "Mr. Corn seems to be using a formula to arrive at the dimensions of the zone of initial dilution that, as far as I know, is unique to him. It's definitely not the formula that the Agency uses in determining the size of the ZID. We have been very consistent in our interpretation of what the size of the ZID can be for the last 12 years...when the U.S. EPA Technical Support Document was published." Tr. at 338. The Illinois EPA disagrees with Mr. Corn's conclusion that "In free-flowing streams . . . this length (of the ZID) is defined in the downstream flow direction or along the length where maximum plume concentrations occur. Pet. Ex. 16 at 8; Tr. at 477-79." Pet. Br. at 37. If adopted by the Board, the interpretation of the federal technical support document ("TSD") used by Noveon would allow for a larger ZID in a smaller river, while the Agency's method allows larger ZIDs in larger rivers and the smaller the river the smaller the ZID. Tr. at 339.

Noveon's ZID calculation also utilizes a figure of 8 mg/L for the City of Henry's ammonia discharge. This is based on Mr. Corn's estimate for small municipal POTWs, not from actual figures from that facility. Tr. at 321. The Agency presented testimony that 25 mg/L would be a more appropriate figure to use for the City of Henry's discharge. Tr. at 354. Noveon testified that such a change would reduce the effluent limit that would comply with water quality standards down to possibly 218 mg/L (even though Noveon has requested an adjusted standard of

225 mg/L). Tr. at 480. Noveon also incorrectly points to mixing zones granted by the Illinois EPA to high velocity diffusers for the conclusion that Illinois EPA's determination with regard to the appropriate calculation for Noveon's mixing and ZID while it still operates a low velocity diffuser is incorrect. Tr. at 477. These different types of diffusers are subject to different guidelines under the federal TSD for mixing zone calculations. Hearing Officer Ex. 1 at 71-73.

The Agency has made a preliminary calculation regarding the mixing zone that could be applied to Noveon's discharge if BDT is found and if the multi-port diffuser is properly constructed. However, this was only a preliminary recommendation and if such a mixing zone is granted to Noveon by the Board in an Adjusted Standard Opinion and Order, it will be impossible for the Agency to revisit that decision as conditions change when Noveon's NPDES permit is subject to review and renewal in the future. Tr. at 467. Noveon claims that "[w]ith an appropriately calculated zone of initial dilution ('ZID') and mixing zone, consistent with both Agency and U.S. EPA guidance on mixing zones, the discharge from the Henry Plant will meet the summer/winter acute and chronic limitations set for in the amended ammonia water quality standards." Pet. at 6. However, Petitioner nevertheless is asking the Board to go beyond granting adjusted standard relief from a technology based effluent limit of 304.122, to request a declaratory judgment that the Illinois EPA must accept the mixing zone and ZID calculated by Noveon and find that the water quality standards will be met.

#### **IX. PETITIONER'S JUSTIFICATION OF PROPOSED ADJUSTED STANDARD**

In requesting adjusted standard relief from the Board, a Petitioner has an obligation to first prove to the Board that "factors relating to the petitioner are substantially different from the factors relied upon by the Board in adopting the general regulation." 415 ILCS 28.1(c). Noveon



has claimed 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 28. Noveon has not proven that the technological factors or cost of reducing ammonia are substantially different than what was contemplated by the Board. Other industrial dischargers have made efforts to comply with this regulation and the costs of compliance for Noveon are not significantly different than the cost of installing nitrification capabilities at a conventional wastewater treatment plant. 40 CFR 125.3(d)(2) provides that the removal costs incurred by an industrial discharger may be compared to the costs incurred by a POTW in assessing economic reasonableness.

When first adopted by the Board, the provisions at issue in this proceeding were codified as Rule 406. On January 6, 1972, the Board adopted the language currently contained in subsection (a) of 304.122 in the combined dockets of R70-8, R71-14 and R71-20. It required that no effluents from dischargers to specified waterbodies, including the Illinois River, “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, after December 31, 1977.” 35 Ill. Adm. Code 304.122(a)(adopted as PCB Rule 406). In 1973, the Board adopted the language (proposed upon its own motion) currently found in 304.122(b) which requires dischargers to the same specified waterways “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.” 35 Ill. Adm. Code 304.122(b). *See* R 72-4 (June 28, 1973) and Opinion of the

Board dated November 8, 1973. Even though it was adopted after the language in the current 304.122(a), this provision had an effective date of December 31, 1974. One explanation given by the Board for including the additional language is found in another rulemaking opinion's discussion of the addition of the current 304.122(b) to Rule 406: "This amendment did nothing more than provide an additional clarification of the definition of a source subject to the effluent limitations of Rule 406; for either case, the threshold applicability of the rule is established by a discharge of 100 pounds per day of ammonia nitrogen, however calculated." In the Matter of: Proposed Final Amendment to Chapter 3, Water Pollution Regulations; Rule 402.1, An Exception to Rule 402 for Certain Ammonia Nitrogen Sources, R77-6 (March 30, 1978), slip. op. at 5.

The Board has been willing in the past to grant site-specific relief from 304.122(b) to other dischargers after those facilities have committed to reducing their effluent ammonia concentrations to more acceptable levels. Though the number of sources subject to these provisions is relatively small, except for Noveon, all affected dischargers have made efforts to reduce ammonia levels in their discharge (through process changes and/or controls) since these rules were implemented. In 35 Ill. Adm. Code 304.213, the Board granted a site-specific effluent standard for PDV Midwest Refining, LLC. for a ten year period after the Refinery engaged in a series of activities to reduce the ammonia in its effluent. Relief was granted from 304.122(b) and that facility is required to meet a monthly average effluent limit of 9.4 mg/L and a daily maximum of 26.0 mg/L. In 35 Ill. Adm. Code 304.214, similar relief from 304.122(b) is granted to Mobil Oil Refinery with the requirement that the facility meet monthly average effluent limits of 9.0 mg/L and daily maximum limitations of 23.0 mg/L. This relief was

ultimately supported by the Agency and granted by the Board only after Mobile engaged in several measures to conserve water, pre-treat and reduce ammonia in its discharge by 50 percent and agreed to a sunset provision for the relief granted.

Noveon outlines seven factors that make its circumstances different from other industries or POTWs: 1) few facilities produce similar wastestreams; 2) the presence of MBT as a pervasive, building block chemical in all its processes; 3) the need for pretreatment to achieve ammonia removal; 4) degradable organic nitrogen compounds such as TBA, morpholine and possibly others that reduce ammonia nitrogen when they decay; 5) unknown compounds in Noveon's wastestream make oxygen transfer half as efficient as municipal wastewaters; 6) the majority of alkalinity would have to be added to achieve nitrification at Noveon's facility while its already present in municipal plants; and 7) the hardship created by the need for additional electric power. Pet. Br. at 7-8. The Agency does not dispute that there are some factors that make Noveon's discharge more difficult to treat for ammonia than many other industries or POTWs. However, those distinctions do not justify the adjusted standard relief requested by Noveon to allow its facility to continue discharging ammonia at or even above current levels. The relief requested would grant Noveon an effluent ammonia concentration limit of 75 times that contained in the rule of general applicability.

Noveon claims that no measurable impact upon the environment or human health would result from the relief requested. Pet. at 29. In one sense Noveon is correct in this regard, since Noveon has never come into compliance with 304.122 since its adoption in 1972, the existing level of environmental impact would not change. However, Illinois EPA believes that the results of this existing situation are indeed substantially and significantly more adverse than

contemplated by the Board. Currently, Noveon's facility is not able to meet water quality standards for ammonia at the edge of a mixing zone or ZID. While this situation may change if a multi-port diffuser is constructed, Noveon will still be responsible for discharging enormous levels of ammonia nitrogen into the Illinois River – exactly the environmental impact 304.122 was designed to prevent. Illinois EPA maintains that Noveon's wastestream is exactly the type of discharge the Board had in mind when it adopted a separate section for wastestreams not comparable to municipal waste treatment plants.

Noveon rests its argument for adjusted standard relief on the premise that it is too expensive to implement the available treatment alternatives. Though Noveon's total cost for complete compliance would be quite high, the resulting total pounds of ammonia reduced would be even greater. Noveon has been unwilling to state a level of ammonia reduction it is willing or capable of achieving. Tr. at 54. As a result, the Illinois EPA feels Noveon has not justified the relief requested and must continue to ask the Board to deny Noveon's request.

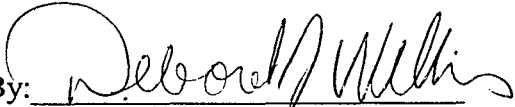
#### **X. CONSISTENCY WITH FEDERAL LAW**

The Illinois EPA agrees with Noveon's conclusion that the Board has authority to grant relief from 35 Ill. Adm. Code 304.122(b) without conflicting with any federal statutes or regulations. Noveon claims that it does not seek relief from water quality standards or mixing zone regulations and therefore the relief granted by the Board would not need U.S. EPA approval as a change in water quality standards. Noveon's requested relief *must* be limited to 304.122(a) and (b); however, to assure that relief is not granted from the requirement of 304.122(c) to comply with water quality standards. Otherwise U.S. EPA approval of relief granted by the Board would be necessary to remain consistent with federal law.

It is not at all clear what type of relief Noveon is requesting by asking the Board to “designate a mixing zone.” Pet. Br. at 43. The vague and unusual nature of this relief makes it unclear to the Illinois EPA whether this type of relief would be consistent with federal law. If Noveon is granted relief from the Board’s mixing zone regulations or an allowance to exceed water quality standards at the edge of the mixing zone or ZID then the relief would be inconsistent with federal law. U.S. EPA will also need to review any relief incorporated into Noveon’s NPDES permit if it is revised to incorporate the Board’s opinion in this matter to maintain consistency with federal law.

#### XI. CONCLUSION

WHEREFORE, for the reasons stated herein, the Illinois EPA recommends that the Pollution Control Board **DENY** the Adjusted Standard Petition of Noveon, Inc.

By:   
Deborah J. Williams  
Assistant Counsel  
Division of Legal Counsel

DATED: June 15, 2004

Illinois Environmental Protection Agency  
1021 N. Grand Ave. East  
P.O. Box 19276  
Springfield, Illinois 62794-9276  
217/782-5544

THIS FILING IS SUBMITTED  
ON RECYCLED PAPER

Illinois Permitting Guidance for Mixing Zones  
April 23, 1993

## Purpose

Mixing zone regulations promulgated by the Illinois Pollution Control Board (IPCB) are found at 35 Ill. Adm. Code 302.102. These regulations were amended on January 25, 1990 as part of the toxics control rulemaking wherein state standards were updated to comply with recent changes in the Federal Clean Water Act. This guidance document outlines the Agency's approach to implementing these rules specifically in regard to establishing limitations in National Pollutant Discharge Elimination System (NPDES) permits.

## Introduction

Illinois regulations require that discharges to waters of the state must meet water quality standards in addition to state effluent limits and appropriate federal categorical criteria. In certain cases it is appropriate to allow the mixing of effluent with the receiving water prior to the determination of compliance with these water quality standards. The Agency has the responsibility of establishing these mixing allowances in the form of mixing zones and zones of initial dilution. In the case of NPDES permits, these allowances are used to translate water quality requirements into discharge limits that are incorporated into the permit.

### Part A: Application of Mixing Zone Regulations

In order to implement Illinois mixing zone provisions the Agency must answer three basic regulatory questions:

- 1) When is it appropriate to allow a mixing zone?
- 2) What restrictions are placed on the size and location of mixing zones?
- 3) How will mixing zone allowances be incorporated in NPDES permits?

The following step-by-step procedure describes the Agency's procedure for application of mixing to a given situation. As stated in the regulation at Section 302.102(d-i), mixing zones are dealt with exclusively in NPDES permits.

#### 1. Determination of Reasonableness of Treatment

The opening paragraph of the mixing zone regulations (Section 302.102(a)) states that an opportunity for mixing shall be allowed provided that the stipulations concerning "best degree of treatment" found in 304.102 are met. Listed under the category of General Effluent Standards Section, this rule states that dischargers must provide the best degree of treatment to wastewater:

... it shall be the obligation of any person discharging contaminants of any kind into the waters of the State to provide the best degree of treatment of wastewater consistent with technological feasibility, economic reasonableness and sound engineering judgment. For making determinations as to what kind of treatment is the "best degree of treatment" within the meaning of this paragraph any person shall consider the following:

- 1) what degree of waste reduction can be achieved by process change, improved housekeeping and recovery of individual waste components for reuse; and
- 2) whether individual process wastewater streams should be segregated or combined.

Mixing zones are allowed only after best degree of treatment is provided. Each permit must be reviewed to assure that this level of treatment is reflected in permit limits. In addition to the construction of treatment plant hardware as discussed below, best degree of treatment also encompasses plant operations, housekeeping, raw material selection, etc., that will produce the best possible effluent. The following are to be used as guidelines in this determination and best degree of treatment will be assumed if appropriate demonstration is made for all regulated parameters:

- a. Compliance with State effluent standards.
- b. Compliance with Federal BAT categorical limits.
- c. A parameter specific determination by the Agency addressing the need for additional treatment, improved operations and maintenance, raw material selection or housekeeping improvements that are technically feasible and economically reasonable. The Agency may request additional information from the discharger to address this provision as necessary.

The review of best degree of treatment is an integral part of the permit issuance process for new facilities and those undergoing additional construction or equipment replacement. The best technically feasible and economically reasonable treatment processes must be included during these construction periods. The useful life of treatment facilities is an important factor in any subsequent best degree of treatment review, i.e., at permit renewal. In addition, the economic reasonableness of replacing an existing treatment facility or component that still holds useful life will be assessed using best professional judgement. It is not the intent of the Agency to reassess previous decisions that an existing treatment process is the best degree of treatment while the treatment component still retains useful life. However, existing treatment facilities may be deemed by the Agency not to be the best degree of treatment while still within useful life if water quality standards change or the mixing zone conditions are altered due to an increase in upstream concentrations. Evaluations concerning new water quality standards, parameters not previously evaluated, or other changes in the mixing zone will be made

routinely at permit renewal. In such cases, a new evaluation is necessary because the mixing zone may no longer be allowable. But if the mixing zone is still valid, i.e., meets the mixing zone provisions of the regulations, the requirement to improve a facility to the best degree of treatment may only be made during periods of construction undertaken to increase treatment capacity or to replace equipment which is past its useful life.

Another component of the demonstration of best degree of treatment is the evaluation of the mixing characteristics of the outfall structure. The mixing zone regulations at Section 302.102(b)(1) requires that the outfall be designed "... to attain optimal mixing efficiency of effluent and receiving waters." Furthermore, Section 302.102(b)(12) states that provision must be made to assure that the mixing zone is as small as practical given reasonable economic and technical constraints. If the area of mixing is in compliance with the other requirements of Section 302.102, the Agency will make its determination concerning compliance with this provision based on its best professional judgement.

## 2. Mixing Zone Size and Location Limitations

### A. The Mixing Zone Proper.

Limits on overall size are included in Section 302.102(b) 8 and 12:

- 1) 25% of cross-sectional area or volume of flow (whichever is more restrictive) for streams providing greater than or equal to 3:1 dilution under conditions of 7Q10 and design average discharge.
- 2) as small as possible and in no case have a surface area larger than 26 acres.

The 25% of cross sectional area or volume of flow establishes the extent of the zone of passage given at 35 Ill. Adm. Code 302.102(b)(6) for mixing situations where the upstream flow to effluent dilution ratio is 3:1 or greater. No directive for the size of the zone of passage for discharges to streams with less available dilution is specifically given but paragraph 10 of Section 302.102(b) states that no body of water may be used totally for mixing with a discharge outfall. For purposes of allowing mixing in these situations yet providing a zone of passage, the Agency will generally restrict allowable mixing to 50% of the upstream flow or 50% of the cross sectional area (whichever is more restrictive) at 7Q10. No mixing will be allowed in streams with a 7Q10 flow of zero.

Discharges to lakes which have no discernible and reliably predictable currents in the immediate vicinity of the discharge outfall must be assessed with dye studies conducted under critical effluent and water body conditions as outlined under Part B in order to receive mixing allowances.

Aside from overall size limitations, the rules provide additional length and location limits. Section 302.102(b), paragraphs 2, 3, 4, 5 and 7 prohibit mixing zones from adversely impacting aquatic life



habitats, public use areas or the waterbody as a whole. Before granting mixing in the permit, the Agency must have knowledge of the locality such that the following may be ensured:

- 1) Tributary stream entrances shall not be occluded by a mixing zone nor shall access by migrating aquatic life be impeded in either direction.
- 2) Mixing zones shall not infringe upon bathing beaches, bank fishing areas, boat ramps or dockages or any other public access area.
- 3) Mussel beds, endangered species habitat, fish spawning areas, areas of outstanding aquatic life habitat (e.g., riffle areas) or any other natural features vital to the well being of aquatic life shall not be threatened or impaired by a mixing zone.
- 4) Mixing zones shall not infringe upon intake structures of public or food processing water supplies, watering areas routinely accessed by wild or domestic animals, or points of irrigation withdrawal.

In instances where a new or relocated discharge is proposed the above information will be provided by the discharger in the form of a habitat survey report or as part of the formal application for a mixing zone. In cases of an existing outfall, Agency biologists will provide habitat and biological information from their direct knowledge of the receiving stream and facility. Their comments will provide a key portion of the permit writers mixing evaluation, i.e., are mixing zone regulations being met at this existing site or should the discharge be moved to a better site where no conflicts occur. Where Agency produced biological information is absent, the discharger may be required to supply this information (see Part B Additional Mixing Zone Demonstrations).

It will be the responsibility of all dischargers with existing or proposed effluent concentrations in excess of chronic water quality standards or criteria to provide the Agency with required documentation of the mixing characteristics of the discharge. This includes the chronic standards at 35 Ill. Adm. Code Section 302.208(d), the standards at (e), and any chronic derived water quality criterion obtained as a result of the application of Section 302.210. Such information will be submitted as part of NPDES permit application or as a permit requirement after issuance. At a minimum, a conservative "default mixing zone demonstration" as outlined below will be required. If the discharger believes that a more representative demonstration than the Agency's initial determination is necessary to characterize mixing, it will be his responsibility to provide the appropriate modeling and/or field data. These requirements are discussed in Part B and a comprehensive description of dispersion models and field investigation of mixing characteristics are contained in the Technical Support Document (TSD) (1).

The regulations also state that "No mixing is allowed where the water quality standard for the constituent in question is already violated in the receiving water." Normally, such a violation will be detected when upstream water quality data are examined for mass balance determinations (waste load allocations). If the upstream concentration is already at or over the standard, the determination of the allowable mixing zone would end and the permit would contain water quality standards as limits at the point of discharge. This procedure is described in detail in "Procedures for Determination of Water Quality Based Effluent Limits" and uses the following equation:

$$C_e = \frac{C_d(Q_u + Q_e) - C_u Q_u}{Q_e}$$

#### B. Zones of Initial Dilution

With the advent of acute water quality standards, there is a need for a mixing area that will protect waterbodies from short lived or limited area impacts yet still make provision for instream mixing opportunity where reasonable treatment to meet the standard does not exist. The regulations provide for this situation in subsections (c) and (e) of 302.102. Subsection (c) states that acute standards must be met within the area [and at all times] where mixing is allowed except where provided by subsection (e). Here the concept of the zone of initial dilution (ZID) is introduced.

The regulatory definition of a ZID uses the terms "rapid" and "immediate" to describe mixing in this area. The fact that the ZID may afford only a minimal area of exposure to aquatic life is stressed in these defined terms.

USEPA provides a detailed approach to defining the ZID in the second edition of the TSD that is compatible with Illinois regulations (2). USEPA's concept of the ZID is based on passage of organisms through the effluent plume without resulting lethality. USEPA uses the term criterion maximum concentration (CMC) to denote a protective concentration for a short-term (one hour) exposure. The equivalent terms in Illinois standards are the Acute Aquatic Toxicity Criterion (AATC) and the Acute Standard (AS). The CMC is considered protective for a one hour exposure period, hence any organism which would spend less than one hour passing through a ZID at or less than the CMC would be protected from lethal effects. Although Illinois regulations do not specify the one hour exposure, the AATC is computed virtually identically to the CMC and the TSD exposure concept can be applied to Illinois mixing zones. The spatial dimensions used in the TSD for defining ZIDs are, therefore, used in this document. However, one of the TSD alternatives which abandons set spatial dimensions in favor of an exposure area based on time of passage is rejected. In this option for allowed mixing a one hour travel time would be granted before standards must be met at the edge of a ZID. This concept is clearly in opposition to the language and intent of the regulation and is, therefore, rejected.

Any effluent exceeding the AATC or AS and discharged to an intermittent or very low flow stream or to a wetland or lake with poor dilution potential cannot be a candidate for a ZID because organisms could not be expected to avoid exposure. The AATC or AS must be met at the end-of-pipe in these situations.

The TSD offers three alternative ZID delineation methods providing criteria for areas where the AATC or AS may be exceeded in a given portion of the receiving water. The discharger may propose alternate approaches to defining the ZID. These will be reviewed on a case-by-case basis for consistency with the regulations. The two alternatives deemed suitable for use in Illinois will be utilized to define the maximum extent of the ZID. They are given in the TSD as follows:

1. A high velocity discharge may be utilized to ensure that the AATC or AS is met within a very short distance from the outfall and thereby allow only a few minutes of exposure to passing aquatic organisms. The initial velocity of the discharge must be at least three meters per second. Additionally, a spatial limitation in any direction from the discharge port(s) of 50 times the square root of the cross-sectional area of the port(s), i.e., single or multipoint diffuser, is imposed. When high velocity diffusers are used, a dye study will usually be required to verify predicted effluent dispersion at the edge of the allowed ZID. Permit limitations can be based on the above calculations but a provision for a field verification will be included in the permit.
2. The second alternative allows a discharger to utilize a lower velocity outfall. The most restrictive of the following must be met:
  - A. The AATC or AS must be met within 10% of the distance from the edge of the outfall structure to the edge of the regulatory mixing zone in any spatial direction;
  - B. each individual discharge port must cause the AATC to be met within a distance of 50 times the square root of the cross sectional area of the pipe flowing full at defined flow\* conditions; and
  - C. the AATC must be met within a distance of five times the local water depth. The local water depth is defined as the average of the depth of the water at the point of outfall (end-of-pipe or entrance of an effluent ditch) and the maximum depth within the area defined in A or B above. Since this is a more conservative approach than option A above, field verification may not be needed, however dye studies may be required where appropriate.

\*For municipal facilities the effluent discharge will be the average of the three consecutive lowest months flow for the past two years of record. Industrial effluents will generally utilize highest monthly average flow.

As a part of the permit review process, the Agency will complete a default initial mixing demonstration to characterize the mixing likely in the ZID. In some cases, the Agency may require the discharger to perform the necessary analysis or submit sufficient data to allow the Agency to complete the evaluation. The procedure for the default ZID mixing determination when applying an acute water quality standard from Section 302.208(d) or a derived criterion from Section 302.210 is taken from the TSD (2). A supplementary equation is provided for converting the flux averaged dilution factor (S) to an effluent limit.

$$S = 0.3 (x/d) \text{ where}$$

S = flux averaged dilution

x = distance from outlet where the acute standard or AATC must be met (ft)

x is determined from the most stringent of the three alternatives (A, B and C) of the second ZID delineation method (low velocity discharges) found on pages 6 and 7 of this document, slightly modified from the TSD.

d = diameter of outfall if it were flowing full through a pipe at design conditions (ft)

Obtain d by the following method:

- A. Determine design slope value,  $s_1$ , for the outfall sewer.
- B. Determine effluent flow,  $Q_e$ , in cfs. This is highest monthly average flow for industrial discharges and the average of the three lowest consecutive months of flow over the past two years of record for municipal dischargers.
- C. Use Manning's Equation based upon a roughness value of  $n = 0.13$  to determine pipe size, d, which will flow full corresponding to  $Q_e$  and  $s_1$  values.

The only field measurement normally required by the above procedure will be to determine average water depth. This is done by measuring depths in the allowable ZID and averaging the lowest and highest values obtained. More sophisticated methods to obtain the average may also be employed, however, all measurements must be taken at low water levels, e.g., river discharges of less than harmonic mean flow.

When the flux-averaged dilution (S) value is obtained, the following equation is utilized to calculate permit limits:

$$C_e = S(C_d - C_u) + C_u \quad \text{where,}$$

$C_e$  = the concentration of a substance in the effluent (effluent permit limit for daily maximum concentration)

Cd = the acute water quality standard or AATC for the substance

Cu = the upstream concentration of the substance

Cu may be obtained from a monitoring station maintained by the Agency or a monitoring requirement may be placed in the permit to obtain needed upstream data.

Dischargers not able to meet limits produced by this screening process (having met the best degree of treatment requirement) may seek to demonstrate mixing efficiency in the ZID by the more complex modeling or tracer studies described later in this section.

Mixing allowance will be granted on a parameter specific basis for both the mixing zone proper and the ZID. The resulting variably sized mixing zones and ZIDs possible at a single discharge outfall will thereby reflect the individual review of best degree of treatment and existing effluent quality (see #4 below). Monitoring activities designed to assess compliance with permit conditions will occur at the NPDES sampling point rather than at some point in the receiving water.

### 3. Toxicity Assessment

Toxic effluents must be further evaluated because of their potential to violate water quality standards. This entails either whole effluent toxicity (Sections 302.621 and 630) or numeric standards or criteria for substances that are not presently regulated in the NPDES permit and can be shown to be a potential problem to the receiving stream. The presence of substances producing whole effluent toxicity may not have been considered when review of steps 1 and 2 above was conducted.

The Agency generates whole effluent toxicity results for many dischargers. Planning Section will generate bioassay review sheets summarizing Agency bioassay results (collected 1 - 1-1/2 years before permit expiration) as well as results from prior biomonitoring plans, USEPA testing or bioassays required from the permittee at permit renewal. These reviews will be made a part of the permit writer's review notes and will remain in the appropriate facility file.

Where significant toxicity\* is encountered in an effluent, the permit writer will require further biomonitoring as a permit condition. A clause to perform a toxicity reduction evaluation (TRE) will accompany this requirement. If the effluent is typified as having a fairly consistent toxicity problem in this further testing, the TRE will attempt to identify the source and options for its elimination. In some cases, the identified toxicant will be already regulated by the permit with a stipulated mixing allowance. However, when unregulated toxic substances are discovered,

\*Significant toxicity may generally be defined as effluent toxicity exceeding the stipulations of 35 Ill. Adm. Code 302.621 for all discharges and, for dischargers to smaller streams displaying adverse downstream impacts as determined by an Agency biosurvey, exceeding the stipulations of Section 302.630.

analysis of best degree of treatment must be repeated. A detailed explanation of the Agency's biomonitoring policy is given in "Effluent Biomonitoring and Toxicity Assessment - Aquatic Life Concerns". The absence of acute effluent toxicity in discharge situations of greater than 100:1 dilution will usually eliminate the need for additional modeling or mixing demonstrations beyond that covered in this document up to this point.

#### 4. Existing Effluent Quality

When mixing is allowed, the permit writer must implement permit limits corresponding to existing effluent quality (EEQ). This procedure goes beyond the granting of State effluent standards or other indicators of best degree of treatment as default permit limits. When a discharger has demonstrated through the years that the treatment systems in place can exceed the performance dictated by the technology based permit limit, permit limits reflective of the existing abilities are in order. The TSD (1) provides a procedure for determining the maximum expected effluent concentrations expected given past plant performance:

In cases where effluent monitoring data is available for the parameters of interest, effluent limitations will be determined using a statistical approach at the 95% confidence level. The following statistical approach has two parts. The first part is a determination of the percentile ranking for the highest measured effluent concentration. The percentile ranking ( $P_n$ ) can be determined from the following formula:

$$P_n = (0.05)^{1/n}$$

Where n is the number of samples.

The second part of this statistical approach is a relationship between the above-determined percentile ranking and the appropriate upper bound percentile ranking for a lognormal effluent distribution. For determining permit limitations, the appropriate upper bounds are the 95th percentile for both daily maxima and monthly averages. The relationship for determining daily maxima is:

$$\frac{C_{95}}{C_{Zp}} = \frac{\exp(1.645 \sigma - 0.5\sigma^2)}{\exp(Z_p \sigma - 0.5\sigma^2)}$$

Where  $\sigma$  is determined from the coefficient of variation (CV) by  $\sigma^2 = \ln(CV^2 + 1)$  or  $\sigma = \sqrt{\ln(CV^2 + 1)}$  and  $Z_p$  is the Z-value of the percentile ranking  $p_n$ . CV will be assumed to be 0.6 unless the discharger has justified a different coefficient of variation.

The daily maximum permit limit is then determined by multiplying the highest daily maximum effluent concentration by  $C_{95}/C_{Zp}$ . The monthly average permit limit is determined by multiplying the highest recorded monthly average by  $C_{95}/C_{Zp}$  provided that at least two effluent samples were used to determine the "average". If only one sample per month or less was collected, the monthly average is calculated by multiplying the yearly mean effluent concentration by  $C_{95}/C_{Zp}$ . If the number of samples is 35 or less,  $C_{95}/C_{Zp}$  can be obtained from Appendix A. Samples larger than 35 will use a multiplier of 1.1. The Agency will disallow outlier values from these calculations.

Existing effluent quality will be used as a measure of best degree of treatment and will supercede the criteria set forth in the section entitled Determination of Reasonableness of Treatment except when the following conditions are met:

1. The resulting effluent limits are more stringent, and;
2. Such limits do not preclude reasonable increases in flow or pollutant load to the treatment plant up to the design capacity of the plant during the term of the permit. This determination will be based on the best professional judgement of the Agency based on available information. The Agency may ask the permittee to provide additional information necessary to make this determination.

If an increase of a plant's design capacity becomes necessary, the new treatment facilities shall be evaluated using the guidelines set forth in the section of this document entitled Determination of Reasonableness of Treatment. EEQ limits established for the previous treatment facilities will therefore not necessarily apply to the new permit. EEQ limits will be applied once sufficient effluent data is generated for the new plant. Best professional judgement will be utilized to set permit limits initially.

#### 5. Bioaccumulative Substances

Mixing zones for bioaccumulative substances\* will not be allowed if there is a current sport fish advisory for the waterbody reach involved. These advisories are published in the Illinois Water Quality Report (305(b)) on a biennial schedule and in an annual publication entitled "Guide to Eating Illinois Sport Fish". In addition to ensuring that water quality standards for bioaccumulative substances will be met outside of the mixing zone, the permit will require additional studies where the Agency determines that a significant amount of these substances will be discharged. Often, NPDES permits are written which regulate bioaccumulative substances but no documentation exists that levels above detection limits are actually discharged. A significant amount is therefore a measurable amount found with enough regularity as to represent what is believed to be a genuine release. Where it appears that a measurable discharge exists, the permittee will be required to perform body burden analyses on fish collected below the outfall to document that no actual impact will occur, i.e., fish body burdens approaching the action level or other applicable guideline. This requirement should be repeated in each succeeding permit. The Agency may also require caged fish or internal waste stream studies to determine the presence of bioaccumulative substances in an effluent where they are suspected but are non-measurable by other means.

\*Bioaccumulative substances for purposes of this document are those which have a more stringent human health or wildlife criterion than aquatic life criterion. This will be indicated in the permit writer's review notes file as part of the implementation of Subpart F narrative standards.

## Part B: Additional Mixing Zone Demonstrations

### 1. Existing Discharges

The default mixing zone and ZID delineation models described in Part A will not suffice when a discharge approaches the maximum limits set by these relatively simple analyses. The equation for the mixing zone proper assumes ideal mixing and, therefore, any discharge that contains concentrations of substances near the effluent limits calculated may in fact violate mixing zone standards if poor mixing is actually present. The equation predicting ZID dilution is more conservative but also may assume better mixing than actually occurs. Better models (requiring more sophisticated input data) may be adequate in some cases (see Holley and Jirka [2]). The discharger may demonstrate to the Agency that advanced models are adequate to document mixing and receive mixing zone allowances in the permit.

Where models cannot adequately describe mixing, rhodamine WT dye, conductivity, chloride or other tracers can be used in field work to identify a series of effluent residual contours. This should be done under both a seasonal low flow and a normal mean or median flow. The results from these two conditions can be utilized to extrapolate for 7Q10 and design average discharge. The various models given in the TSD (2) may be applied to predict effluent contours or extrapolate to different flow conditions using existing tracer study data. The decision to require a field study will lie with the Agency. For non-intermittent streams with a flow up to 50 cfs immediately downstream of the outfall and lakes under 3 feet maximum depth, vertical mixing can be assumed to be uniform. For streams with flow beyond 50 cfs and lakes with depth greater than 3 feet, and in instances where differences in ionic strengths or temperatures are of concern, the residual contours should be identified at the surface and selected depth intervals. Recommendations given in the TSD for tracer studies (pp. 74 and 75) should be followed where possible. The Agency will always reserve the right to review and approve mixing zone delineation study plans.

In some instances, the Agency may require biological monitoring to assess an effluent's compliance to the ecological provisions of the Board regulations. These may consist of studies of in-place communities of organisms such as mussel beds or artificial substrate devices to document the effects of water quality on benthic communities.

### 2. Proposed New or Relocated Discharges

Modeling will generally be used to predict mixing zone dimensions for proposed new discharges. Methods recommended in the TSD should be used unless site specific characteristics indicate that another model better fits the situation. The decision to require sophisticated modeling or dispersion studies will be based on the overall dilution ratio between effluents and receiving waters. Generally, such studies will be unnecessary when dilution ratios are greater than 1,000:1. If the system cannot be successfully modeled, it may be necessary to perform a dispersion study as discussed above with a temporary discharge of city water, groundwater or upstream river water and a tracer substance. The following points must be addressed if modeling is utilized.



- a) The type of modeling to be used for a given discharge shall be addressed in the application document. References, such as text books, technical papers, etc., for the modeling methods to be used shall be listed. Examples of methods and models are available in references listed in Appendix A.
- b) Data supplied for the modeling must be based on factors particular to a given system and should include:
  - 1) Stream and effluent flows.
  - 2) Stream geometry at 6 to 10 locations downstream from the outfall.
  - 3) Longitudinal and lateral boundaries of the mixing zone.
  - 4) Dispersion coefficient value(s) and other hydraulic characteristics of the stream.
- c) Predicted effluent residual concentration contours in a sketch of the proposed mixing zone.
- d) Biological and Habitat Characterization.
  - 1) Identify habitat types in the proposed mixing zone, e.g., substrate types, cover characteristics, etc.
  - 2) Delineate mussel beds within 1,000 feet of the proposed mixing zone.
  - 3) Research the likelihood for endangered or threatened species (state or federal) to inhabit the mixing zone.
  - 4) Identify any unique or highly valued (fish spawning or congregating areas, etc.) habitats within the proposed mixing zone.
- e) Verification by in situ methods will be required when the discharge commences.

The Agency may require a confirmatory dye study after a new discharge begins to verify the model. The results of these studies may indicate that refinements to the outfall design are necessary.

#### Part C: Application Information

##### Information Required

When the screening procedures outlined in Part A prove inadequate for mixing zone or ZID characterization, the following information must be submitted to the Agency as a mixing zone application.

- a) Facility Information.
  - 1) Design and operating data.

- A) NPDES permit number.
  - B) Treatment type.
  - C) Design average and maximum flow.
  - D) Monthly average flow for each of the last 24 months.
  - E) Physical and biological characteristics of the effluent.
  - F) Any proposed expansion or upgrading program.
- 2) Outfall data.
- A) Location.
  - B) Outfall modification considerations to induce rapid mixing (e.g. high rate diffusers).
  - C) Physical characteristics of the existing or modified outfall.
  - D) Any available toxicity data for the effluent.
  - E) Chemical components of the effluent.
- b) Receiving Waterbody Information
- 1) General Information
- A) Name of the receiving water body.
  - B) The location of the point of discharge by county and United States Geological Survey (USGS) coordinates. (This should be highlighted, along with the discharge points of any other known dischargers, on a copy of the most recent 7.5 or 15 minute USGS topographic map).
  - C) Distance in river miles from the facility's outfall to both the next downstream outfall and the next downstream tributary to the receiving stream.
- 2) Receiving stream hydraulic factors:
- A) Seven day ten year low flow (7Q10) immediately upstream of the outfall.
  - B) Stream velocity, depth and top width at 7Q10. (Stream velocity and depth should be measured at mid-channel).
  - C) Representative channel geometry.
- 3) Receiving stream water quality data and biological information:
- A) Any existing data for the last twelve months on the concentrations of water quality constituents, including pH and

temperature in the general vicinity of the outfall (upstream and downstream):

- B) Any existing data concerning the biological characteristics of the stream up and downstream of the outfall, including such items as habitat, benthic macroinvertebrates, fisheries, and algal blooms.
  - C) For new or modified discharge outfalls, determine unique habitat occurrence in any area likely to come under effluent impact that was unaffected prior to the change. Include information on mussel beds, fish nursery areas or any other habitat that differs from the usual habitat configuration of the receiving water.
- 4) Receiving stream morphological factors:
- A) Substrate type.
  - B) Variation of structure via natural meandering, pool and riffle sequence, proximity to side channels, backwater lakes, harbors, etc.
  - C) Degree of dredging, channelization or other alteration of natural stream character.
  - D) Accumulation of logjams and other naturally occurring vegetative debris, and presence of manmade habitats such as dikes, pilings, wing dams and riprap.
- 5) Receiving stream riparian habitat and land use description:
- A) Topography.
  - B) Land cover including forest, agricultural row crop, marsh, grass buffer strip, residential lawn, etc.
  - C) Land use, zoning classification and projected growth patterns in the vicinity of the outfall using the following classifications: residential, commercial, industrial, wetlands recreational, agricultural. A specific determination should be made regarding utilization and accessibility of the adjoining property and receiving water body within the proposed mixing zone.
- 6) Stream use related information:
- A) The present and anticipated uses of the receiving water body.
  - B) The existence of an impact upon any spawning or nursery areas of any indigenous aquatic species.
  - C) Any obstruction to migratory routes of any indigenous aquatic species.

- D) The synergistic effects of overlapping mixing zones or the aggregate effects of adjacent mixing zones.

c) Application Submittal, Review and Approval

- 1) A written application will consist of the following:
  - A) Review conducted in parts a and b of this Section.
  - B) Details of Methodology used in delineating the mixing zone.
  - C) Details of calculations made in delineating the mixing zone and, if applicable, the ZID.
  - D) A sketch of the proposed mixing zone showing length, width, and, if applicable, the ZID. If concentration lines are developed for the mixing zone, a concentration profile should also be shown.
- 2) Submittal shall be addressed to:

Illinois Environmental Protection Agency  
Planning Section  
Division of Water Pollution Control  
2200 Churchill Road  
P.O. Box 19276  
Springfield, Illinois 62794-9276

Upon receipt and approval of a completed mixing zone application, the location, dimensions and allowable dilution ratio of the mixing zone and, if applicable, Zone of Initial Dilution, will be designated in a written response to the applicant.

BM:jk/sp/3023n

## References

1. USEPA. March, 1991. Technical Support Document for Water Quality-Based Toxics Control. Office of Water. EPA/505/2-90-001. Washington, D.C.
2. Holley, E. R. and G. H. Jirka, 1986. Mixing in Rivers. Technical Report E-86-11, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

BM:jk/sp/3023n

Appendix A. Reasonable Potential Multiplying Factors: 95% Confidence Level and 95% Probability Basis

Number of Samples	Coefficient of Variation																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
1	1.4	1.9	2.6	3.6	4.7	6.2	8.0	10.1	12.6	15.5	18.7	22.4	26.4	30.8	35.6	40.7	46.3	52.2	58.4	65.0
2	1.3	1.6	2.0	2.5	3.1	3.8	4.6	5.4	6.4	7.4	8.5	9.7	11.0	12.3	13.6	15.1	16.5	18.0	19.6	21.2
3	1.2	1.5	1.8	2.1	2.6	3.0	3.5	4.0	4.6	5.2	5.8	6.5	7.2	7.9	8.6	9.3	10.1	10.8	11.6	12.4
4	1.2	1.4	1.7	1.9	2.2	2.6	3.0	3.3	3.7	4.2	4.6	5.1	5.5	6.0	6.4	6.9	7.4	7.9	8.3	8.8
5	1.2	1.4	1.6	1.8	2.1	2.3	2.6	2.9	3.2	3.6	3.9	4.2	4.5	4.9	5.2	5.6	5.9	6.2	6.6	6.9
6	1.1	1.3	1.5	1.7	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.2	5.5	5.7
7	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8	3.1	3.3	3.5	3.7	3.9	4.1	4.3	4.5	4.7	4.9
8	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.3	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.7	3.9	4.0	4.2	4.3
9	1.1	1.2	1.4	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.8	2.9	3.1	3.2	3.4	3.5	3.6	3.8	3.9
10	1.1	1.2	1.3	1.5	1.6	1.7	1.9	2.0	2.2	2.3	2.4	2.6	2.7	2.8	3.0	3.1	3.2	3.3	3.4	3.6
11	1.1	1.2	1.3	1.4	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.5	2.6	2.8	2.9	3.0	3.1	3.2	3.3
12	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.0
13	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.5	2.6	2.7	2.8	2.8
14	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.5	2.5	2.6	2.7
15	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.8	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.4	2.5	2.5
16	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.4	2.4
17	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.2	2.2	2.3	2.3
18	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2
19	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	1.9	2.0	2.0	2.1	2.1
20	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0
21	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9	2.0
22	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.9
23	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.7	1.8	1.8	1.8	1.9
24	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.8	1.8
25	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.7
26	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7
27	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.7
28	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6
29	1.0	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.6	1.6
30	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5
31	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5
32	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5
33	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4
34	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4
35	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4

STATE OF ILLINOIS

COUNTY OF SANGAMON

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**PROOF OF SERVICE**

I, the undersigned, on oath state that I have served the attached, **Post-Hearing Memorandum of the Illinois Environmental Protection Agency and Documentation of Mixing Zone Guidance Requested by the Board**, of the Illinois Environmental Protection Agency upon the person to whom it is directed, by **FACSIMILE** and by placing a copy in an envelope addressed to:

Dorothy M. Gunn, Clerk  
Illinois Pollution Control Board  
James R. Thompson Center  
100 West Randolph Street, Suite 11-500  
Chicago, Illinois 60601

Mark Latham  
Richard Kissel  
Sheila Deely  
Gardner, Carton and Douglas  
191 North Wacker Drive, Suite 3700  
Chicago, Illinois 60606

Bradley P. Halloran, Hearing Officer  
Illinois Pollution Control Board  
James R. Thompson Center  
100 West Randolph Street, Suite 11-500  
Chicago, Illinois 60601

and mailing it by First Class Mail from Springfield, Illinois on **June 15, 2004** with sufficient postage affixed.

*Cynthia L. Wolfe*

**SUBSCRIBED AND SWORN TO BEFORE ME**  
this 15th day of June 2004

*Cynthia L. Wolfe*  
Notary Public

