

ILLINOIS POLLUTION CONTROL BOARD
December 18, 2008

IN THE MATTER OF:)
)
PETITION OF CITGO PETROLEUM) AS 08-8
CORPORATION AND PDV MIDWEST) (Adjusted Standard - Water)
REFINING, L.L.C. FOR AN ADJUSTED)
STANDARD FROM AMMONIA)
NITROGEN DISCHARGE LEVELS AT 35)
ILL. ADM. CODE 304.122)

JEFFREY C. FORT and ARIEL J. TESHER APPEARED ON BEHALF OF PETITIONERS,
CITGO PETROLEUM CORPORATION and PDV MIDWEST REFINING, L.L.C.; and

JASON R. BOLTZ APPEARED ON BEHALF OF THE ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY.

OPINION AND ORDER OF THE BOARD (by A.S. Moore):

Petitioners Citgo Petroleum Corporation (Citgo) and PDV Midwest Refining, L.L.C. (PDV) (collectively, petitioners) request an adjusted standard from the Board's water pollution regulations at 35 Ill. Adm. Code 304.122(b) regarding the discharge of ammonia nitrogen. PDV owns and Citgo operates a petroleum refinery located at 135th Street and New Avenue in Lemont, Will County (Refinery). When a source whose untreated waste load cannot be computed on a population equivalent basis comparable to that used for municipal waste treatment plants discharges ammonia nitrogen in amounts exceeding 100 pounds per day, Section 304.122(b) limits the total ammonia nitrogen concentration of the source's effluent to 3.0 mg/L.

Petitioners propose a monthly average limitation for ammonia nitrogen of 6.93 mg/L whenever the monthly average discharge from the Refinery exceeds 100 pounds per day and a limit of 10.61 mg/L whenever the daily discharge exceeds 200 pounds. Petitioners also propose a number of conditions upon their requested relief. The Illinois Environmental Protection Agency (Agency or IEPA) recommends that the Board deny the request.

The Board today finds that petitioners have provided sufficient justification for an adjusted standard from Section 304.122(b) of the Board's water pollution regulations, subject to various conditions. For the reasons described in the following opinion, the Board grants the adjusted standard as set forth in its order below.

In this opinion, the Board first sets forth the legal framework within which the Board determines whether to issue adjusted standards under Section 28.1 of the Environmental Protection Act (Act) (415 ILCS 5/28.1 (2006)). Next, the Board provides the procedural history and the factual background of this case, including previous regulatory relief granted to the Refinery. The Board then describes the generally applicable standard, the current site-specific

rule applicable to the Refinery, and the petitioners' requested relief. After presenting the applicable standard of review, the Board examines the record regarding the four statutory factors petitioners must demonstrate. The Board then discusses those factors before reaching its conclusions on each of them. Finally, the Board issues its order granting the adjusted standard, subject to conditions.

LEGAL FRAMEWORK

The Act and Board rules provide that a petitioner may request, and the Board may grant, an environmental standard that is different from the generally applicable regulation that otherwise applies to that petitioner. *See* 415 ILCS 5/28.1(a) (2006); 35 Ill. Adm. Code 104.400(a), 104.402. This form of regulatory relief is called an adjusted standard.

The procedures that govern an adjusted standard proceeding are found in Section 28.1 of the Act and Part 104, Subpart D, of the Board's procedural rules. *See* 415 ILCS 5/28.1 (2006); 35 Ill. Adm. Code 104.400-428. The Board's procedural rules specify the required contents for the adjusted standard petition. *See* 35 Ill. Adm. Code 104.406, 104.416. Once a petition for an adjusted standard is filed, the Agency must file its recommendation with the Board. *See* 415 ILCS 5/28.1(d)(3) (2006); 35 Ill. Adm. Code 104.416. The adjusted standard proceeding is adjudicatory in nature and therefore is not subject to the rulemaking provisions of the Act or the Illinois Administrative Procedure Act (5 ILCS 100/1-1 *et seq.* (2006)). *See* 415 ILCS 5/28.1(a) (2006); 35 Ill. Adm. Code 101.202 (defining "adjudicatory proceeding").

Section 28.1(d)(1) of the Act (415 ILCS 5/28.1 (2006)) and Section 104.408(a) of the Board's procedural rules (35 Ill. Adm. Code 104.408(a) (quoting the Act)) require the adjusted standard petitioner to publish notice of the petition's filing by advertisement in a newspaper of general circulation in the area likely to be affected by the proposed adjusted standard. Under those provisions, publication must take place within 14 days after the petition is filed. The newspaper notice must indicate that any person may cause a public hearing to be held on the proposed adjusted standard by filing a hearing request with the Board within 21 days after publication. *See* 415 ILCS 5/28.1(d)(1) (2006); 35 Ill. Adm. Code 104.408(b).

The burden of proof in an adjusted standard proceeding is on the petitioner. *See* 415 ILCS 5/28.1(b), (c) (2006); 35 Ill. Adm. Code 104.426. Once granted, the adjusted standard, instead of the rule of general applicability, applies to the petitioner. *See* 415 ILCS 5/28.1(a) (2006); 35 Ill. Adm. Code 101.202, 104.400(a). In granting adjusted standards, the Board may impose conditions as may be necessary to accomplish the purposes of the Act. *See* 415 ILCS 5/28.1(a) (2006); 35 Ill. Adm. Code 104.428(a).

PROCEDURAL HISTORY

On March 18, 2008, petitioners filed a petition for an adjusted standard (Pet.). Petitioners attached two exhibits to their petition: a report entitled "Environmental Assessment & Effluent Limit Derivation Report for the Ammonia Discharge from the Citgo Lemont Refinery" dated February 2008 and prepared by Huff & Huff, Inc. and a report entitled "Technical Review of

Ammonia Treatment at the Wastewater Treatment Plant - Citgo Petroleum Corporation, Lemont Refinery” dated February 2008 and prepared by AWARE Environmental, Inc. (AEI).

On April 3, 2008, petitioners timely filed with the Board proof of publication indicating that GateHouse Media Suburban Newspapers in Lemont published notice of filing the petition on March 21, 2008. *See* 35 Ill. Adm. Code 104.410 (requiring filing of certificate of publication within 30 days after filing petition).

On May 7, 2008, the Agency filed a Motion for Extension of Time to File Recommendation. *See* 35 Ill. Adm. Code 104.416(a). Specifically, the Agency sought to extend by 30 days to June 5, 2008, the deadline by which to file its recommendation. In an order dated May 15, 2008, the Board accepted petitioners’ petition for hearing and granted the Agency’s motion for extension of time to file its recommendation. In the same order, the Board stated that, through orders of its own or the hearing officer, it may direct petitioners to provide additional information concerning the petition prior to or at hearing. In an order dated May 21, 2008, the hearing officer directed the petitioners to address issues set forth in an attachment to the order. The hearing officer directed petitioners to file their responses in the form of pre-filed testimony due 14 days prior to the hearing.

On May 30, 2008, the Agency filed a Motion for Extension of Time to File Recommendation. *See* 35 Ill. Adm. Code 104.416(a). Specifically, the Agency sought to extend by 14 days to June 20, 2008, the deadline to file its recommendation. In an order dated June 3, 2008, the hearing officer granted the Agency’s motion and extended the Agency’s deadline for filing its recommendation to June 20, 2008. On June 23, 2008, the Board received the Agency’s recommendation (Rec.).

In an order dated July 9, 2008, the hearing officer scheduled the hearing in this matter to take place on August 20, 2008. The same order directed petitioners to prefile testimony by August 1, 2008 and the Agency to file a response to that prefiled testimony by August 6, 2008. On August 1, 2008, petitioners prefiled the testimony of Brigitte Postel (Postel Test), James E. Huff (Huff Test.), and Robert M. Stein (Stein Test.). Ms. Postel’s pre-filed testimony included responses to a request for additional information by the hearing officer in an order dated May 21, 2008. Postel Test. at 2; *see id.* at Exhibit 1.

During a status conference with the hearing officer on August 7, 2008, the Agency indicated that it would not file a response to petitioners’ prefiled testimony but intended to have two witnesses testify on its behalf at hearing. On August 14, 2008, petitioners filed a “Motion to Exclude Un-Filed IEPA Testimony.” The hearing in this matter (Tr.) took place on August 20, 2008, in Bolingbrook. At the hearing, the hearing officer denied petitioners’ motion to exclude. Tr. at 8-11. Also at the hearing, the hearing officer admitted into the record 15 exhibits offered by petitioners:

- 1) Additional Information Requested by the Hearing Officer (Pet. Exh. 1);

- 2) Environmental Assessment & Effluent Limit Derivation Report for the Ammonia Discharge from the Citgo Lemont Refinery (dated February 2008) (Pet. Exh. 2);
- 3) Environmental Assessment of Wastewater Ammonia Discharge from the Uno-Ven Refinery Lemont, Illinois (dated December 1992) (Pet. Exh. 3);
- 4) Resume of James E. Huff, P.E. (Pet. Exh. 4);
- 5) Annual Average Influent Ammonia Concentration (Sanitary & Ship Canal) (Figure 1), Annual Average Effluent Ammonia Concentration (Lemont Refinery) (Figure 2), and Annual Average Ammonia Influent and Effluent Loading (Lemont Refinery) (Figure 3) (Pet. Exh. 5);
- 6) Description of Aware Environmental, Inc. (Pet. Exh. 6);
- 7) Resume of Robert M. Stein, P.E. (Pet. Exh. 7);
- 8) Resume of George P. Tyrian, P.E. (Pet. Exh. 8);
- 9) Technical Review of Ammonia Treatment at the Wastewater Treatment Plant – Citgo Petroleum Corporation, Lemont Refinery (dated February 2008) (Pet. Exh. 9);
- 10) Corrected Testimony of Robert M. Stein (Pet. Exh. 10) (*see* Tr. at 114-15, 122-23, 132);
- 11) PVD (sic) Midwest Refinery, L.L.C. [and] Citgo Petroleum Corp. v. Environmental Protection Agency, PV-2005-1 (Dec. 21, 2004) (granting provisional variance from monthly average ammonia limitation) (Pet. Exh. 11);
- 12) Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14 (Dec. 17, 1998) (adopting proposed amendments); *id.* (Sept. 17, 1998) (second notice of proposed amendments); *id.* (May 21, 1998) (first notice of proposed amendments) (Pet. Exh. 12);
- 13) Pre-Filed Testimony of Brigitte Postel (Pet. Exh. 13);
- 14) Pre-Filed Testimony of James E. Huff (Pet. Exh. 14); and
- 15) Pre-Filed Testimony of Robert M. Stein (Pet. Exh. 15).

At the conclusion of testimony on August 20, 2008, the hearing officer continued the hearing to September 5, 2008, in order to allow petitioners to review hearing exhibits proffered

by the Agency. On August 27, 2008, the Agency filed documents supplementing those it had submitted during the August 20, 2008, hearing. On September 4, 2008, the parties filed a joint stipulation for the purpose of admitting into the record of this proceeding 11 Agency exhibits without objection by petitioners:

- 1) Printout of ExxonMobil data (Agency Exh. 1);
- 2) Printout of Marathon data (Agency Exh. 2);
- 3) Printout of Citgo data (Agency Exh. 3);
- 4) Monthly average and daily maximum ammonia concentrations sampled from Outfall 001 at Citgo Petroleum Company (Agency Exh. 4);
- 5) Monthly average and daily maximum ammonia concentrations sampled from Outfall 001 at ExxonMobil Oil Corporation, Joliet (Agency Exh. 5);
- 6) Monthly maximum ammonia concentrations sampled from Outfall 001 at Marathon Petroleum Company (Agency Exh. 6);
- 7) One-page summary and explanation of printouts (Agency Exh. 7);
- 8) Printouts regarding ExxonMobil (Agency Exh. 8);
- 9) Printouts regarding Conoco Phillips (Agency Exh. 9);
- 10) Printouts regarding Citgo (Agency Exh. 10); and
- 11) Printouts regarding Marathon (Agency Exh. 11).

On September 22, 2008, petitioners filed their post-hearing brief (Pet. Brief). On October 10, 2008, the Agency filed its post-hearing brief (Agency Brief). On October 24, 2008, petitioners filed their reply brief (Reply).

FACTUAL BACKGROUND

Location and General Operations

PDV owns a petroleum refinery located on an 860-acre tract at 135th Street and New Avenue in Lemont, Will County. Pet. at 1 (¶1); Pet. Exh. 2, App. A (Refinery permit); *see* Pet. Exh. 2 at 4 (Figure 2-1 Site Location Map). The zoning classification of the Refinery is industrial. Tr. at 194 (Postel testimony). The Refinery was constructed between 1967 and 1970 and began operations in the late fall of 1969. Pet. at 5 (¶13). Union Oil Company of California had previously owned and operated the Refinery, which UNO-VEN Company subsequently operated. Pet. at 1-2 (¶1). PDV became the owner of the Refinery on May 1, 1997, and

contracted with Citgo to operate it. *Id.* at 2 (¶1). Approximately 530 persons work at the Refinery. Pet. at 5 (¶13).

The Refinery refines domestic and foreign crude oil to produce approximately 25 different products, “including gasolines, turbine fuels, diesel fuels, furnace oils, petroleum coke and various specialty naphthas which can be manufactured into many intermediate products, including antifreeze, Dacron, detergent, industrial alcohols, plastics and synthetic rubber.” Pet. at 5-6 (¶14); Pet. Exh. 2 at 3. However, gasolines, diesel fuels, home heating oils, and turbine fuels for use in Illinois and the Midwest account for ninety percent of the Refinery’s output. Pet. at 6 (¶14). The Refinery currently produces approximately 168,000 barrels per day. Pet. at 5 (¶13); *see* Pet. Exh. 9 at 8 (Table 3-1 Observed Maximum Monthly Production Rates).

The Refinery draws approximately 5.0 million gallons of water daily from the Chicago Sanitary and Ship Canal (Canal), which is a tributary of the Illinois River. Pet. at 2, 6 (¶¶3, 15). The Refinery also discharges approximately 4.5 million gallons of water daily to the Canal, with cooling tower evaporation and steam losses accounting for the difference. *Id.* at 6 (¶15); Pet. Exh. 13 at 4 (¶10). The Refinery discharges into the Canal at a point 5.5 miles upstream from the lock and dam at Lockport. Pet. at 7 (¶18), Pet. Exh. 2 at 3, 16; *see* Pet. Exh. 2 at 5 (Figure 2-2 The Chicago Waterway and Upper Illinois River System). Downstream from the dam, the Canal merges with the Des Plaines River, which then passes beneath Interstate Highway 55. Pet. at 7 (¶18). For 18.5 miles to Interstate Highway 55, the receiving waters are designated as Secondary Contact waters. *Id.* “Secondary Contact waterways are intended to protect the indigenous aquatic life and secondary contact uses.” Pet. Exh. 2 at 16. Beyond Interstate Highway 55, “the Des Plaines River is designated as General Use Water.” Pet. at 7 (¶18).

Wastewater effluent from the Refinery contains ammonia nitrogen, which is present in compounds removed from crude oil by various Refinery operations, and ammonia present in intake water from the Canal. Pet. at 6 (¶15); Pet. Exh. 13 at 4 (¶10). The Refinery operates under the terms of a National Pollutant Discharge Elimination System (NPDES) permit issued as modified by the Agency on June 22, 2007, which expires July 31, 2011. *Id.* at 6 (¶16); *see* Pet. Exh. 2, App. A (NPDES Permit No. IL0001589). “The NPDES permit includes outfall 001 at the Refinery at river mile 296.5 on the Canal (Latitude 41° 38'58", Longitude 88°03'31").” Pet. at 6 (¶16). The Refinery’s NPDES permit reflects ammonia nitrogen limits in effect under the site-specific rule now applicable to the Refinery. Pet. at 6 (¶16); *see* 35 Ill. Adm. Code 304.213; Pet. Exh. 2, App. A at 2 (effluent limitations).

Canal Description and Water Quality

In approximately 1900, the Canal was constructed “to transport human waste and industrial pollutants away from Lake Michigan.” Huff Test. at 4 (citing Chicago Area Waterway System Use Attainability Analysis, August 2007). The Canal’s width varies from 200 to 300 feet, and its depth varies from 27 to 50 feet. Huff Test. at 4. Its construction “includes vertical walls and steep embankments.” *Id.* The Canal receives treated wastewater from three major water reclamation plants and is also the site of three coal-fired power plants. Pet. Exh. 2 at 16, Huff Test. at 5. The Canal “is effluent dominated with over 70 percent of its flow on an annual basis from municipal effluents.” Huff Test. at 5 (citing Agency).

The Agency characterizes stream quality in terms of both physical attributes and stream use. Pet. Exh. 2 at 30. The Agency assesses water bodies on the degree to which they support both overall and individual uses. *Id.* “[I]ndividual uses include fish consumption and aquatic life, which apply to all water bodies within the State. Other uses include swimming, secondary contact, drinking, and industrial water supplies whose uses apply to defined water body segments.” *Id.* The Agency describes the degree to which a body of water supports a designated use in terms of the full support of that use: “full/threatened support, partial support, and non-support.” *Id.* “Overall stream use is designated as *non-support* for fish consumption and aquatic life.” Huff Test. at 4 (emphasis in original); Pet. Exh. 2 at 30.

The identified causes of impairment were polychlorinated biphenyls (PCBs), iron, oil and grease, D.O. [dissolved oxygen], total nitrogen, and total phosphorus. Sources included sewer overflows, urban runoff/storm sewers, impacts from hydrostructure flow regulations/modification, municipal point source discharges, and other unknown sources. Pet. Exh. 2 at 30.¹

“Ammonia concentrations were not identified as a source of impairment.” Huff. Test at 4 (emphasis in original). The Refinery is situated on a segment of the Canal for which the aquatic habitat “was rated as ‘poor to very poor.’” *Id.* (citing Agency). Factors limiting the Canal’s aquatic potential include silty substrates, poor substrate material, little instream cover, channelization, and no sinuosity. Huff Test. at 5 (citing Chicago Area Waterway System Use Attainability Analysis, August 2007).

The United States Geological Survey (USGS) once maintained a water quality station 5.3 miles downstream from the Refinery’s outfall. Pet. Exh. 2 at 17 (Station No. 05537000). Water quality data compiled from 1978 to 1996 showed that the water quality at the station failed to achieve the current unionized ammonia standards three times during that period, with the last exceedance occurring on May 4, 1994. *Id.* at 17-18. More recent data from this monitoring station is not available, as the USGS discontinued its operation. *Id.* at 18.

The USGS also maintains a water quality station three-tenths of a mile downstream from the Refinery’s outfall. Pet. Exh. 2 at 18 (Station No. 05536995). Water quality data compiled from 1987 to 1991 showed that the water quality at the station failed to achieve the unionized ammonia standard once during that period, with the exceedance occurring in August 1987. *Id.* The USGS also obtained ammonia water quality data at this station between 1999 and 2001. *See* Pet. Exh. 2, Appendix C. The station also produced water quality data on dissolved oxygen

¹ Petitioners report that the Agency recently completed Use Attainability Analyses [UAA] for the Lower Des Plaines River and the Chicago Area Waterways and made those analyses the basis of a proposed change in the Board’s water regulations. Pet. Exh. 2 at 30, citing Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303, and 304, R08-9 (Oct. 26, 2007) (proposed regulations and statement of reasons). Petitioners state that “[t]he refinery’s request for a site-specific ammonia limit is not impacted by the UAA, nor will it have any impact on the Agency’s proposal in R08-09.” Pet. Exh. 2 at 30.

concentrations from March 1999 to February 2001. “In 24 sampling events during this time period, three events produced D.O. concentrations below 4.0 mg/L, with the minimum reported as 3.2 mg/L.” Pet. Exh. 2 at 18; *see* Pet. Exh. 2, Appendix C.

In his testimony on behalf of petitioners, Mr. Huff states that “the total ammonia concentrations in the Ship Canal are generally low, below 1 mg/L.” Huff Test. at 5, citing Pet. Exh. 5, Figure 1 (influent concentrations); *see* Tr. at 187. In addition, the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) sampled the Chicago Waterway System for ammonia from January 2000 to July 2002 from four locations: “Lockport Forebay on the Ship Canal, Jefferson Street on the Des Plaines River, Empress Casino on the Des Plaines River, and the I-55 Bridge on the Des Plaines River.” Pet. Exh. 2 at 18. “Average total ammonia concentration declines from 0.65 mg/L on the Ship Canal to 0.34 mg/L at the I-55 Bridge on the Des Plaines River.” *Id.*; *see id.* at 19-22 (Table 4-1). “Unionized ammonia concentrations at all four locations consistently achieved the existing 0.1 mg/L standard throughout the data period.” *Id.* at 18; *see id.* at 23-26 (Table 4-2); *see also* Huff Test. at 5-6; Tr. at 188.

The MWRDGC during 2000 monitored dissolved oxygen on the Des Plaines River at the I-55 Bridge. Pet. Exh. 2 at 27. The minimum dissolved oxygen concentration during that period was 5.8 mg/L, recorded on August 10, 2000. *Id.* at 28 (Table 4-3). Between 2002 and 2006, the MWRDGC also collected hourly dissolved oxygen readings on the Canal at Route 83 upstream of the Refinery and at Jefferson Street on the Des Plaines River downstream from its convergence with the Canal. *Id.* at 27; *see id.* at Appendix C.

In addition, Midwest Generation EME, LLC between May and September monitors dissolved oxygen concentrations in the Des Plaines River at the I-55 Bridge. Pet. Exh. 2 at 27. Data from 2004, 2005, and 2006 reveal that only the month of June 2005 showed a monthly minimum concentration lower than 4.0 mg/L. *Id.*; *see id.* at 29 (Table 4-4).

Influent Quality

As its primary source of water, the Refinery withdraws from the Canal, with annual average intake varying between 4.5 million gallons per day (MGD) and 5.6 MGD from 1997 to 2006. Pet. Exh. 2 at 13. The intake is situated approximately 175 feet upstream from the wastewater treatment plant outfall. Huff Test. at 3; *see* Pet. Exh. 2 at 13. The influent flow rate exceeds the effluent flow rate as a result of evaporation from cooling towers. *Id.* From 1986 to 2008, the annual average influent ammonia concentration has declined from 3.68 mg/L to 0.55 mg/L. Pet. Exh. 5 (Figure 1).

Wastewater Treatment System

The Refinery has developed a system for the collection and treatment of wastewater at the Refinery. Pet. Exh. 9 at 19; *see id.* at 20 (Figure 3-1 Process Flow Diagram of Existing Wastewater Treatment Facilities); *see also id.* at 21 (Table 3-5 Process Design Summary Existing Wastewater Treatment Plan). That system collects process wastewaters separately from the north plant and south plant areas and can pretreat them “in separate corrugated plate interceptors (CPI) for removal of free oils and settleable solids.” Pet. Exh. 9 at 19; *see id.* at 20

(Figure 3-1). “Cyanide and non-cyanide sour waters are stripped separately and then combined with the south plant area process wastewaters upstream of the south plant CPI separators.” *Id.* at 19, 20.

The Refinery system pumps process wastewater from the north plant and south plant areas to two process wastewater storage tanks, TK485 and TK486, each of which has a capacity of 4.6 million gallons. Pet. Exh. 9 at 19, 21. The Refinery operates the tanks in parallel, allowing either of them to be shut down or serviced without disrupting the treatment process. *Id.* at 19. “The tanks are equipped with floating roofs with oil skimmers and provide removal of free oils and settleable solids.” *Id.*

The Refinery has installed an induced gas flotation (IGF) system to treat discharge from tanks 485 and 486. Pet. Exh. 9 at 19, 21 (Figure 3-1). That system induces gas bubbles into the process stream to provide for the flotation and removal of insoluble oil and organics and suspended solids. *Id.* Addition of this system in 2000 reduced wasteload to the Refinery’s sedimentation tank and its 250,000-gallon equalization tank, which nonetheless “still receives the cooling tower blow down, sanitary sewer discharge, supernatant from sludge thickeners and the Zeolite softener backwash.” *Id.* at 20, 22. During winter, the Refinery injects steam into the equalization tank in order to maintain “optimum conditions for ammonia nitrogen removal” during those months. *Id.* at 22.

In 1992, the Refinery segregated its stormwater basin from process wastewater. Pet. Exh. 2 at 6. The stormwater basin has a capacity of 52 million gallons and receives stormwater, hydrostatic test water, fire water, utility water, and boiler blowdown. *Id.*, Pet. Exh. 9 at 19, 21. The Refinery can pump stormwater from the stormwater basin to the equalization tank, where it is mixed with streams received there. *Id.* at 22. Stormwater can also bypass the equalization tank to be added directly to the aeration basins. *Id.*

The IGF system allows the wastewater stream to proceed from the two storage tanks to the activated sludge system, which provides secondary treatment. Pet. Exh. 9 at 19; Pet. Exh. 13 at 3-4 (¶8). The sludge treatment system includes three aeration basins operated in parallel to one another with a total volume of 1.92 million gallons. Pet. Exh. 9 at 20-22. The Refinery adds phosphorus to provide a nutrient for biological organisms in the aeration basins. *Id.* at 22. The Refinery also provides aeration through a fine-bubble diffused aeration system. *Id.* at 20, 22. Activated sludge then settles into one of two secondary clarifiers, each of which has a diameter of 100 feet. *Id.* at 20-22.

In October 2007, because of air pollution regulations, the Refinery began operating a scrubber on the boiler associated with the Fluid Catalytic Cracker (FCC) unit. Pet. Exh. 9 at 22; *see* Tr. at 130. A purge treatment unit (PTU) system handles the purge stream from this unit, and the Refinery installed a breakpoint chlorination-dechlorination system to treat ammonia nitrogen in the discharge. Pet. Exh. 9 at 22-24; *see* Tr. at 130. “The purge stream is inorganic and high in total dissolved solids and is not compatible with a biological treatment system.” Pet. Exh. 9 at 24. The stream from the PTU system “discharges to the treated water basin where it is combined with the discharge from the activated sludge system.” *Id.* at 20, 24; *see* Tr. at 130-35.

The Refinery's polishing lagoon or treated water basin (TWB) constitutes its tertiary treatment system. Pet. Exh. 9 at 24; Pet. Exh. 13 at 4 (¶9). The TWB has a capacity of 16 million gallons and is intended "to provide additional settling of any carryover solids from the secondary clarifier and provide further BOD₅ reduction." Pet. Exh. 9 at 21, 24. While water from the TWB can be recycled for fire protection at the Refinery, "[t]he treated effluent from the TWB is discharged to the Chicago Sanitary and Ship Canal." *Id.* at 24.

Wastewater Treatment Plant Improvements

When it adopted a site-specific rule applicable to the Refinery in 1987, the Board required the Refinery to continue efforts to reduce the concentration of ammonia nitrogen in its wastewaters. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 14 (Mar. 19, 1987) (adopting 35 Ill. Adm. Code 304.213(d)); *see* Pet. at 13 (¶37). After filing that petition for the site-specific rule, the Refinery performed the following improvements to increase ammonia oxidation, increase available dissolved oxygen, and increase hydraulic throughput at its wastewater treatment plant:

Added a third aeration basin, increasing the total aeration volume from 1.38 million gallons to 1.92 million gallons;

Upgraded the aeration system by replacing the existing mechanical surface aerators with a fine-bubble diffused aeration system; and

Added the second 100-ft. diameter secondary clarifier, doubling the secondary clarifier capacity. Pet. at 13 (¶37), Postel Test. at 7 (¶20); *see* Tr. at 199-200 (Huff testimony on secondary clarifier), 205-07 (Stein testimony on clarifiers).

After the Board adopted site-specific relief in 1993, "the Refinery continued its efforts to reduce the concentration of ammonia nitrogen in its wastewaters." Pet. at 13 (¶38); *see* In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 6 (Dec. 16, 1993) (adopting 35 Ill. Adm. Code 304.213(d)). Between 1992 and 1998, the Refinery performed the following improvements:

Installed a new chemical feed facility at the WWTP [wastewater treatment plant];

Eliminated discharge of process wastewater to the stormwater basin and provided tankage for equalization/oil separation of process wastewater;

Converted the WWTP control system to new DCS control;

Modified the sour water stripper charge tanks inlet line for better oil/water separation;

Performed a clean closure of the stormwater basin; and

Utilized Naclo dried bacteria and conducted nitrifier inhibition testing. Pet. at 13 (¶38), Postel Test. at 8 (¶21).

Since 1998, the Refinery has continued to improve its wastewater treatment system. Pet. at 13-14 (¶39), Postel Test. at 8 (¶22); *see In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213*, R98-14, slip op. at 7 (Dec. 17, 1998) (adopting 35 Ill. Adm. Code 304.213(d)). Specifically, the Refinery has undertaken the following measures:

In 2000, installed induced gas flotation system with polymer addition;

In 2003, added additional strippers in the sour water system for ammonia removal;

Also in 2003, upgraded diffused aerators to improve oxygen transfer;

In 2006, upgraded phosphoric acid feed system and the aerators to improve oxygen transfer;

In 2007, installed purge treatment unit to treat the discharge from the FCC scrubber; and

Also in 2007, upgraded diffused aerators to improve oxygen transfer. Pet. at 13-14 (¶39), Postel Test. at 8 (¶22).

BAT

Federal regulations include effluent limitation guidelines applicable to the petroleum refining industry. Pet. Exh. 9 at 3, citing 40 C.F.R. 419. Those USEPA guidelines provide effluent load-based limitations for conventional pollutants including BOD₅, TSS, oil and grease, and pH based upon Best Practicable Control Technology Currently Achievable (BPT). Pet. Exh. 9 at 3, citing 40 C.F.R. 419.22, Development Document for Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Industry (EPA 440/1-82/014) (1982). The guidelines also provide limitations for non-conventional pollutants including COD, ammonia nitrogen, sulfide, phenolic compounds, total chromium, and hexavalent chromium based on Best Available Technology Economically Achievable (BAT). Pet. Exh. 9 at 3, citing 40 C.F.R. 419.23, Development Document for Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Industry (EPA 440/1-82/014) (1982).

The guidelines calculate effluent limitations for each refining facility “based on the refining subcategory, the maximum feedstock processing rate and the process configuration.” Pet. Exh. 9 at 3. Those guidelines place the Refinery in the “Cracking Refinery” subcategory. *Id.* at 3-4, citing Development Document for Effluent Limitations Guidelines and Standards for the Petroleum Refining Point Source Category (EPA 440/1-82-014) (1982) at 64-65. “The effluent limitations are based on actual effluent flows and pollutant concentrations obtained by

refineries employing BAT and BPT treatment technologies.” Pet. Exh. 9 at 3. For the Refinery, “[t]he BAT limits for ammonia are 1,005.75 lbs/day monthly average and 2,212.65 lbs/day daily maximum, as contained in the facility’s NPDES permit.” Pet. Exh. 2 at 8; *see id.*, Appendix A at 3 (NPDES General Permit No. IL0001589). Between January 2006 and October 2007, the monthly average effluent ammonia from the Refinery ranged from a high of 403 lbs/day in February 2006 to a low of 15 lbs/day in August 2006 with an average discharge over this period of 122 lbs/day. Pet. Exh. 9 at 32 (Table 3-10), Pet. Exh. 10 at 11.

The “BAT guidelines are based on the implementation of in-plant water reuse/conservation measures to minimize the volume of wastewater discharge, and the use of sour water strippers to reduce ammonia and sulfide loads in the process wastewater.” Pet. Exh. 9 at 5; *see* Pet. Exh. 10 at 11. USEPA’s 1982 development document provides a model for wastewater treatment that includes the processes of flow equalization, initial removal of solids and oil through an API separator or baffle plate separator, additional removal of solids and oil through clarifiers or dissolved air flotation, biological treatment, and filtration or other final polishing steps. Pet. Exh. 9 at 5, 25 (Table 3-6); *see* Pet. Exh. 10 at 12.

Nitrification

Although there a number of treatment technologies that can remove ammonia, “[t]he most commonly used approach for ammonia nitrogen removal is biological nitrification.” Pet. Exh. 10 at 3. “[B]iological nitrification is a very sensitive process” affected by a number of parameters: food-to-mass (F/M) ratio, sludge age, aeration basin pH, aeration basin temperature, and aeration basin dissolved oxygen concentration. *Id.* at 4, 11, Pet. Exh. 9 at 35; *see* Pet. Exh. 10 at 13 (Table 2 Typical Operating Ranges for Nitrification), Pet. Exh. 9 at 36 (Table 3-11).

The F/M ratio is expressed in terms of pounds of BOD applied per day per pound of mixed liquor volatile suspended solids (lb BOD₅/lb MLVSS-day). Pet. Exh. 9 at 37. “The lower F/M ratios normally provide an improved environment for nitrification to occur,” and the optimum ratio is less than 0.3. *Id.* at 36-37 (Table 3-11), Tr. at 162. Based on monthly average data, “[t]he F/M [ratio] has been maintained at less than 0.16 lb BOD₅/lb MLVSS-day over the last ten years.” Pet. Exh. 9 at 36-37 (Table 3-11).

“Sludge age represents the average length of time the biomass remains in the treatment system.” Pet. Exh. 9 at 37. Increasing sludge age improves opportunities for nitrifying organisms to grow and for biological nitrification to occur. *Id.* “Sludge ages of 10 days or more are generally adequate for nitrification.” *Id.* at 36-37 (Table 3-11), Tr. at 162-63. The Refinery has “consistently” maintained a sludge age greater than 10 days and has maintained sludge age of up to 100 days. Pet. Exh. 9 at 36-37 (Table 3-11), Tr. at 163.

“Optimal nitrification performance occurs in the pH range between 7.2 and 9.0.” Pet. Exh. 9 at 38. The nitrification reaction consumes alkalinity in the form of calcium carbonate in the course of ammonia nitrogen removal. *Id.* “Inadequate alkalinity can result in sharp decreases in pH which can upset the treatment system.” *Id.* The Refinery adds supplementary alkalinity when needed, although it is available on a consistent basis in the influent. *Id.* Based

on monthly average data, the aeration basin pH has been maintained in a range from 7.1 to 8.0. *Id.* at 36 (Table 3-11).

Optimal nitrification performance occurs at temperatures between 68 and 100°F. Pet. Exh. 9 at 38; *see* Tr. at 192-93. The Refinery can add steam to the aeration basin in order to maintain a temperature above 70°F. Pet. Exh. 9 at 38; *see id.* at 20 (Figure 3-1 Process Flow Diagram). Based on monthly average data, the Refinery has maintained the aeration basin temperature between 73 and 98°F. *Id.* at 36 (Table 3-11). Specifically, “[t]he lowest monthly average temperature over the period evaluated was 73°F in November 2002 and over the last two (2) winters the average aeration basin temperatures has been 80°F or above.” *Id.* at 38.

“Nitrifying bacteria are extremely sensitive to D.O. concentrations,” and the optimum dissolved oxygen concentration for nitrification is an average of 2.0 mg/L with a minimum of 1.5 mg/L. Pet. Exh. 9 at 36, 37 (Table 3-11). The Refinery’s aeration system “includes ceramic fine bubble diffusers which are distributed uniformly over the entire aeration basin floor.” *Id.* at 37; *see* Tr. at 174-75. During the last three years, the average aeration basin dissolved oxygen concentration has exceeded 4.5 mg/L, with one exception attributed by the Refinery to a measurement problem. Pet. Exh. 9 at 36 n.3, 37.

Zone of Initial Dilution and Mixing Zone

From the Refinery, the Outfall 001 discharges through a pipe 15 inches in diameter in a downward direction from a point “15 feet below the low flow Ship Canal elevation.” Pet. Exh. 2 at 33, Huff Test. at 6. A 1992 study found the Zone of Initial Dilution (ZID) to occupy approximately 100 square feet and to provide 10:1 dilution. Pet. Exh. 3 at 55. “There are only 300 gallons of effluent within the ZID at any one time, with a mean retention time under 7 seconds.” Huff Test. at 6.

The same 1992 study revealed that the mixing zone achieved 40:1 dilution within 60 feet downstream. Pet. Exh. 3 at 55, Huff Test. at 6; *see* 35 Ill. Adm. Code 302.100 (defining “mixing zone”). The mixing zone occupied 2,200 square feet, or 0.05 acres. Pet. Exh. 3 at 55; *see* 35 Ill. Adm. Code 302.102. With a reduction in discretionary diversion from Lake Michigan, the 7-day, 10-year low flow in the Canal has decreased from 1,100 MGD in 1992 to 850 MGD. Pet. Exh. 2 at 32-33, Huff Test. at 6. With the Refinery’s design average flow of 5.79 MGD, “the mixing zone today achieves a 36.7:1 dilution within the same 0.05 acres.” Huff Test. at 6; *see* Pet. Exh. 2 at 33.

Effluent Quality and Net Ammonia Loading

A number of factors influence the concentration of ammonia nitrogen in the Refinery’s effluent: “nitrogen content in the crude oil; crude oil throughput; influent BOD₅, TSS, and oil loadings; and degree of nitrification being achieved in the wastewater treatment plant.” Pet. Exh. 2 at 10. From 1997 to 2006, the average annual flow rate for the Refinery’s wastewater treatment system has ranged from 3.5 MGD to 4.7 MGD. Pet. Exh. 2 at 10. Between 2003 and 2006, effluent flow ranged from 4.3 MGD to 4.7 MGD. *Id.* From 1995 until 2005, the Refinery’s annual average effluent ammonia concentration fell below 3.0 mg/L. Huff. Test. at 3;

see Pet. Exh. 5 (Figure 2), Pet. Exh. 2 at 11 (Figure 3-1). Although the concentration in 2005 increased to 3.63 mg/L, it has since fallen to 3.50 mg/L in 2006, 2.45 mg/L in 2007, and 0.39 mg/L in the first six months of 2008. Huff. Test. at 3; *see* Pet. Exh. 5 (Figure 2), Pet. Exh. 2 at 11 (Figure 3-1).

Ammonia loading from the Refinery's discharge is a function of ammonia concentration and effluent flow rate. Huff. Test. at 10. On an annual basis the Refinery has since 1997 discharged less than 140 pounds per day. *Id.* at 10, 12 (Figure 3-2). In "over 70 percent of the months the Lemont Refinery has discharged less than 100 pounds per day of ammonia, so the 3 mg/L effluent limit would not apply during these months, if the site specific standard were not in place." *Id.* at 10.

Petitioners also evaluated the annual average mass of ammonia removed from the Canal compared with the mass discharged. Huff Test. at 3. "The net discharge (effluent less influent) over the past decade has averaged less than 43 pounds per day." *Id.* at 3-4, Pet. Exh. 5 (Figure 3), Pet. Exh. 2 at 15 (Figure 3-4). Specifically, "[s]ince 1997 Lemont Refinery has withdrawn an average of 32.8 lbs/day ammonia from the Ship Canal compared to an average of 72.5 lbs/day discharged." Pet. Exh. 2 at 13, 15 (Figure 3-4). To date in 2008, the Refinery has removed 29 pounds per day from the Canal while discharging an average of 17 pounds per day. Huff Test. at 4, Pet. Exh. 5 (Figure 3).

Impact of Proposed Relief on Canal

As noted above under "Influent Quality," the annual average influent ammonia concentration at the Refinery has declined from 3.68 mg/L to 0.55 mg/L from 1986 to 2008. Pet. Exh. 5 (Figure 1). From January 2000 to July 2002, the concentration of total ammonia in the Canal at the Lockport Forebay averaged 0.65 mg/L. Pet. Exh. 2 at 19-22 (Table 4-1). During the same period at the same location, the concentration of unionized ammonia averaged 0.005 mg/L. Pet. Exh. 2 at 23-26 (Table 4-2); *see* Huff Test. at 7.

A 2008 report determined that, at the proposed ammonia monthly limit of 6.9 mg/L, ammonia levels in the Canal at the edge of the mixing zone would be 0.805 mg/L. Pet. Exh. 2 at 33; *see* Pet. at 9 (¶24). The same report also determined that ammonia levels in the Canal after complete mixing would be 0.676 mg/L. Pet. Exh. 2 at 33. Noting that the Refinery's influent has had a recent average ammonia concentration of 0.634 mg/L, the report found that the Refinery would cause a 6.6 percent change in total ammonia at the monthly average limit of 6.9 mg/L and the 7-day, 10-year low flow. *Id.* The report also predicts a similar percentage change in the unionized ammonia concentration immediately downstream. *Id.* The report stated that the Canal does not now experience ammonia water quality violations and the Petitioners' proposed limits will reduce ammonia loading. *Id.* The report concluded that "no water quality violations will be associated with this request." *Id.*

Also, a 1992 report sought to model the Refinery's contribution to dissolved oxygen changes in the Canal. Pet. Exh. 3 at 108-19; *see* Huff Test. at 8. At a daily maximum loading of 744 lbs/day, "the maximum D.O. decline was 0.03 mg/L." Huff Test. at 8; Pet. Exh. 3 at 112, 114 (Figure 6-4 Dissolved Oxygen Concentrations Downstream)

Previous Regulatory Relief for the Refinery

Petitioners claim that, in spite of various improvements, the Refinery's wastewater treatment system is not able consistently to meet the Board ammonia nitrogen effluent standards. Pet. at 2 (¶2); see 35 Ill Adm. Code 304.122 (b). "From 1977 through 1984, Union operated the refinery under several variances from the Board for the ammonia nitrogen discharge." Pet. Exh. 13 at 5 (¶15). Petitioners further state that "[t]he general ammonia nitrogen discharge rule would apply to the Refinery, but for site specific rule changes granted in 1987, 1993, and 1998." Pet. at 2 (¶2). The Board below briefly summarizes the regulatory relief from the ammonia nitrogen standards that it has granted to the refinery.

Union Oil Company of California v. Environmental Protection Agency, PCB 77-163

On June 17, 1977, Union Oil Company of California (Union), the former owner and operator of the Refinery, filed a petition for a variance. Union Oil Company of California v. Environmental Protection Agency, PCB 77-163, slip op. at 1-2 (Sept. 29, 1977). Union sought relief from the requirements of Rule 406 of the Board's water regulations, which provided an effluent standard for ammonia nitrogen. *Id.*; see In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, slip op. at 6, 25 (Jan. 6, 1972) (adopting Rule 406). The Agency recommended that the Board grant the requested variance subject to specified conditions. Union Oil Company of California v. Environmental Protection Agency, PCB 77-163, slip op. at 1 (Sept. 29, 1977).

In its opinion and order, the Board noted that, "[e]ver since Petitioner's wastewater treatment system began operation, it has failed to produce an effluent of 3.0 mg/L ammonia nitrogen as required by Rule 406 even though the system was designed to meet a limit of 2.5 mg/L. The concentration of ammonia nitrogen in Petitioner's effluent has ranged from 3.2 to 37.6 mg/L on the basis of monthly averages from June, 1976 through May 1977." Union Oil Company of California v. Environmental Protection Agency, PCB 77-163, slip op. at 1 (Sept. 29, 1977).

The Board granted Union a one-year variance and required Union to limit its ammonia nitrogen discharge to a daily average of 575 pounds and a daily maximum of 1,260 pounds, based upon federal standards for best practicable technology. Union Oil Company of California v. Environmental Protection Agency, PCB 77-163, slip op. at 2-3 (Sept. 29, 1977). The Board noted that, with the Refinery discharging approximately 3.5 million gallons of process wastewater per day, these pound limitations would result in an ammonia concentration of approximately 19.7 mg/L. *Id.* at 2. As a condition of granting the variance, the Board also required that Union "shall make a good faith effort to develop a program which will enable it to comply with Rule 406. In developing this program Petitioner shall conduct research on alternative treatment techniques. This research shall include an analysis of biological nitrification in various formats." *Id.* at 3. In addition, the Board provided that Union "will submit bi-monthly reports on its research efforts, detailing with particularity what methods or systems are being tried or considered, to the Agency." *Id.*

In its opinion, the Board stated that a one-year variance “will not have a significant adverse environmental impact on the Chicago Sanitary and Ship Canal since Petitioner will be contributing only 0.057 mg/L over the ammonia levels reported upstream.” *Id.* at 2. The Board noted Union’s claim that no demonstrated technology would bring the Refinery into compliance but emphasized that the claim “cannot cloud the fact that Petitioner must eventually comply with Rule 406.” *Id.* at 1 (emphasis in original).

Union Oil Company of California v. Environmental Protection Agency, PCB 78-168

In 1978, Union sought an extension of the one-year variance from the requirements of Rule 406 granted by the Board in 1977. Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 1 (Sept. 21, 1978); *see* Union Oil Company of California v. Environmental Protection Agency, PCB 77-163 (Sept. 29, 1977). Specifically, Union sought a variance of three years, during which it would continue to limit its ammonia discharges to a daily average of 575 pounds and a daily maximum of 1,260 pounds and would develop a program for compliance with Rule 406. Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 1 (Sept. 21, 1978). Again, the Agency recommended that the Board grant a one-year variance subject to specified conditions. *Id.* at 1, 2.

In its opinion and order, the Board noted that approximately two-thirds of the crude oil processed at the Refinery by Union was characterized as “sour” and high in nitrogen. Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 1 (Sept. 21, 1978). The Board also noted that Union had undertaken a number of ammonia control measures: installing sour water strippers; eliminating once-through barometric condenser water; segregating sewers; eliminating once-through cooling water; and installing “a waste water treatment system consisting of equalization and storm water diversion, API separators, primary and final clarifiers with a bottom settling tank, activated sludge and oxidation ponds, and a polishing pond.” *Id.* During 1977, the monthly average ammonia concentration of Union’s effluent was 16.0 mg/L, and Union attributed its noncompliance to “emergency operational problems, severe cold weather and a major fire caused by lightning.” *Id.* Union proposed a program of ammonia reduction including identifying and controlling its sources, improving removal, and independent research. *Id.* The Board stated, however, that this program did not include reducing the Refinery’s dependence on sour crude oil. *Id.*

Stating that a three-year extension was not warranted in the absence of a firm compliance plan, the Board extended the variance for two years, subject to conditions. Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 2-3 (Sept. 21, 1978). First, the Board maintained ammonia nitrogen discharge limits of a daily average of 575 pounds and a daily maximum of 1,260 pounds. *Id.* at 2. The Board also required Union to continue good faith efforts to develop a program for compliance with Rule 406 and to submit bi-monthly progress reports to the Agency. *Id.* at 2-3. The Board also provided that Union “shall, no later than September 29, 1980, provide the Agency with a written technical proposal and time schedule for compliance with Rule 406.” *Id.* at 3.

Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 80-124

In 1980, Union sought a second extension of its variance from the requirements of Rule 406. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 80-124, slip op. at 1 (Sept. 4, 1980); *see* Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 2-3 (Sept. 21, 1978). Specifically, Union sought a two-year extension of its variance with ammonia discharge limits of a daily average of 688 pounds and a daily maximum of 1,261 pounds. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 80-124, slip op. at 1 (Sept. 4, 1980). The Agency recommended that the Board grant the variance, subject to specified conditions. *Id.*

The Board noted that Union “had progressed toward compliance with the state standard and has demonstrated an ability to maintain effluent limits at or below 567 lbs/day average and 1002 lbs/day maximum.” *Id.* at 2. The Board therefore found that ammonia effluent limits of 570 lbs/day average and 1010 lbs/day maximum were appropriate. *Id.* The Board concluded that a variance with these effluent limits would increase the ammonia concentration in the Canal by no more than 0.024 mg/L, characterizing that environmental impact as “small.” *Id.*

The Board expressed reluctance to extend the variance “without receipt of even a tentative compliance plan and schedule.” Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 2 (Sept. 4, 1980). However, the Board noted that Union, in spite of its “apparent good faith efforts to develop such a plan and to come into compliance,” had experienced technical difficulties and needed additional research. *Id.* The Board also noted that, during the term of the expiring variance, Union “spent \$728,000 attempting to sustain nitrification through source control, upgrading and optimizing existing facilities, and applied research on treatment techniques.” *Id.* The Board identified other action on the part of Union.

Sources of high ammonia bearing sour water have been identified and equipment installed to divert them to the sour water strippers for ammonia removal. Steam/charge ratio controllers were installed for optimum stripping rates. A cross-connection has been installed to decant oil from sour water to improve stripping performance. Nitrification has been achieved periodically with good results, but Union Oil has been unable as yet to develop a consistently functioning system. *Id.*

The Board granted an extension of Union’s variance from Rule 406 for two years or to full implementation of a compliance plan, whichever occurred first. Union Oil Company of California v. Environmental Protection Agency, PCB 78-168, slip op. at 3 (Sept. 4, 1980). The Board required Union to continue efforts to develop a program for compliance with Rule 406 and to submit quarterly progress reports to the Agency. *Id.* at 3. The Board further provided that Union “shall, no later than July 1, 1981, submit in writing to the Agency a preliminary technical proposal and time schedule for compliance with Rule 406.” *Id.* The Board also required a final proposal and compliance schedule no later than January 1, 1982. *Id.* The Board also included the condition that, “[u]pon Agency approval of a proposed compliance plan and schedule, and

upon timely application for and receipt of all necessary permits, the Petitioner shall promptly implement its compliance plan.” *Id.*

Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 82-87

On June 28, 1982, Union filed a petition for a two-year extension of its current variance from the requirements of Rule 406. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 82-87, slip op. at 1 (Oct. 5, 1982) (noting recodification of Rule 406 as 35 Ill. Adm. Code 304.122(b)). The Agency recommended that the Board grant the variance, subject to certain conditions. *Id.*

The Board noted that, during the current variance period, Union’s daily average discharge of ammonia nitrogen ranged from 146 pounds in October 1981 to 547 pounds in February 1982, with a minimum of 24 pounds and a maximum of 1,001 pounds. *Id.* at 2. Although Union achieved a reduction of 4.6 mg/L from influent levels, the lowest average monthly discharge concentration was 6.0 mg/L, which exceeded the applicable standard. *Id.*

The Board stated that Union had dedicated considerable time and effort in good faith toward compliance with the ammonia nitrogen standard. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 82-87, slip op. at 2 (Oct. 5, 1982). “Its wastewater plant is currently valued at over 32 million dollars and the present operating cost is 1.8 million dollars per year. It has achieved a 72% reduction in the ammonia nitrogen concentration of its treated effluent water since 1973 through source control, upgrading facilities and applied research on treatment techniques.” *Id.* Although Union intended to continue various ammonia control projects, the Board noted Union’s claim that existing technology did not allow it to set a schedule for compliance. *Id.*

The Board noted that the parties did not disagree that the impact of extending the variance would be a “minimal” increase of less than two percent of the ammonia nitrogen concentration in the Canal. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 82-87, slip op. at 2 (Oct. 5, 1982). Relying upon discharge data from the Refinery, the Board extended the variance to September 29, 1984, and set ammonia discharge limits of 550 pounds per day as a monthly average and 1,010 pounds per day maximum. *Id.* at 3. The Board again required Union to continue efforts to develop a program for compliance with the ammonia nitrogen standard and to submit quarterly progress reports to the Agency. *Id.*

The Board noted in its opinion and order that, over a five-year period, Union had operated under four variances without presenting a compliance plan. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 82-87, slip op. at 3 (Oct. 5, 1982). Although the Board stated that existing technology did not reasonably attain compliance, the Board stated that “*seriatim* variances are not intended to act as substitutes for a site-specific regulation.” Accordingly, the Board provided that Union “shall, by May 1, 1984, provide the Agency with a written technical proposal and time schedule for compliance with Section 304.122(b).” *Id.* (Condition 4). The Board stated that, “[i]f no such plan is feasible by then,

Union should consider the proposal of a site-specific regulatory change.” *Id.*; see Pet. Exh. 13. at 5 (¶15).

Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 84-66

On May 31, 1984, Union filed a petition for an extension of its variance from the requirements of 35 Ill. Adm. Code 304.122(b) for two years or until final action on its then-pending proposal for a site-specific rule, whichever occurred sooner. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 84-66, slip op. at 1 (Feb. 20, 1985); see In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13 (Mar. 19, 1987) (adopting Section 304.213).

The Board noted Union’s compliance efforts during the period of the last variance: “use of a sulfide removing chemical to enhance nitrification, full scale trial addition of Sybron/biochemical mutant bacteria to establish a nitrifier population, and the installation of permanent dissolved oxygen analyzers in the aeration basin.” Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 84-66, slip op. at 4 (Feb. 20, 1985). The Board further noted that Union’s design projects included both the addition of hydrogen peroxide to the wastewater treatment plant and modifications to the final clarifier. *Id.* The Board referred to a report by Union’s technical consultant on alternative systems for meeting the ammonia nitrogen standard. *Id.* The consultant concluded that those alternatives were either technically infeasible, unable consistently to meet the standard, or would result in formation of potentially toxic chlorinated hydrocarbons. *Id.*

The Board extended Union’s variance to April 25, 1987, or until a final decision on Union’s proposal for a site-specific rule, whichever occurred first. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 84-66, slip op. at 5 (Feb. 20, 1985). To allow for increased discharges expected from new and expanded facilities at the Refinery, the Board increased the ammonia nitrogen effluent limits to a monthly average of 625 pounds per day and a daily maximum of 1,160 pounds per day. The Board found that the extended variance would have a “minimal” environmental impact. *Id.* at 4, 5.

Among the conditions it imposed, the Board required Union to monitor and report discharges as provided in its NPDES permit. Union Oil Company of California v. Illinois Environmental Protection Agency, PCB 84-66, slip op. at 5 (Feb. 20, 1985) (Condition 3). The Board also required Union to sample and monitor flows from new and expanded facilities to determine their effects on ammonia loading and effluent quantity and quality. *Id.* (Condition 4). Based on a technical report incorporated into the record of the variance proceeding, the Board concluded that it was not necessary for Union to study additional ammonia nitrogen removal systems. *Id.* The Board did require that Union “shall continue its research to identify means of further reducing its discharge of ammonia nitrogen.” *Id.*

In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13

On April 25, 1984, Union filed a proposal seeking relief from the 3.0 mg/L ammonia nitrogen effluent standard. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 1 (Mar. 19, 1987), citing 35 Ill. Adm. Code 304.122(b). Union requested that it be required instead to satisfy the federal BAT limitations. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 1 (Mar. 19, 1987), citing 40 C.F.R. 419.23 (1985). Union calculated that BAT ammonia nitrogen limits would be 775 pounds per day as a monthly average and 1,705 pounds per day daily maximum. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 1 (Mar. 19, 1987). Discharge of 775 pounds per day represents a concentration of approximately 29 mg/L. *Id.*

The Agency recommended that the Board deny Union's requested relief. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 1 (Mar. 19, 1987). The Agency argued that BAT limitation were less stringent than state standards, that Union "should have spent more effort" in attempting to reduce its ammonia nitrogen discharges, and that lower discharges from a nearby refinery demonstrated "that Union could do a much better job of removing ammonia." *Id.* at 4-5.

The Board found that the record included no technically feasible and economically reasonable alternative allowing Union consistently to meet the 3 mg/L ammonia nitrogen effluent standard. In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 9 (Mar. 19, 1987). The Board also characterized the impact of Union's discharge on the Canal as "minimal." *Id.* The Board granted relief from the ammonia nitrogen effluent standard and required Union to meet the federal BAT limitations. *Id.*, citing 40 C.F.R. 419.23, 35 Ill. Adm. Code 304.122(b); *see* Pet. Exh. 13 at 5 (¶15). The Board also required that "Union shall continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters." In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 14 (Mar. 19, 1987). The Board provided that Union's site-specific rule would terminate on December 31, 1993. *Id.* at 11-12, 14 (Mar. 19, 1987). The Board expressed the belief that setting this termination date instead of granting permanent relief would maintain incentives for Union to improve the quality of its effluent. *Id.* at 11-12.

In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8

On January 28, 1993, Uno-Ven, which succeeded Union as owner of the Refinery, filed a petition requesting amendments to the site-specific rule granted by the Board on March 19, 1987. In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 1 (Dec. 16, 1993); *see* 35 Ill. Adm. Code 304.213, In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13, slip op. at 13-14 (Mar. 19, 1987).

The Board noted that the original site-specific rule "required the refinery to continue its effort to reduce the concentration of ammonia nitrogen in its wastewaters." In the Matter of:

Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 2 (Dec. 16, 1993). The Board stated that the Refinery had complied with this requirement by spending more than \$4.2 million since 1987 to improve its wastewater treatment plant. *Id.*; see Pet. Exh. 13. at 7 (¶20) (listing improvements). In spite of factors including greater crude oil throughput, higher nitrogen content in the crude oil, and decreased wastewater volume, the Board stated that, from 1986 to 1991, the Refinery had reduced its annual average ammonia concentration from 22.2 mg/L to 2.4 mg/L, an 89% reduction. In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 2 (Dec. 16, 1993).

The Board noted that Uno-Ven and the Agency had concurred in recommending changes to the proposal originally filed by Uno-Ven. In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 2 (Dec. 16, 1993). Ultimately, the Board adopted the amendments proposed in Uno-Ven's petition as modified by the agreement between the Agency and Uno-Ven. *Id.* at 3. The Board established an ammonia nitrogen daily maximum limit of 26.0 mg/L and 30-day monthly average limit of 9.4 mg/L. *Id.* at 2-6. The Board also provided that "Uno-Ven shall continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters." *Id.* at 6; see Pet. Exh. 13. at 8 (¶21) (listing improvements from 1992 to 1998). The Board also terminated the site-specific rule on December 31, 1999. In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, slip op. at 3, 7 (Dec. 16, 1993).

In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14

On October 17, 1997, PDV, which succeeded Uno-Ven as owner of the Refinery, filed a petition requesting amendments to and renewal of the site-specific rule addressing the Refinery's ammonia nitrogen discharges. In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14, slip op. at 1 (Dec. 17, 1998); see 35 Ill. Adm. Code 304.213. While the Agency did not object to PDV's petition, it recommended that an amended rule include a termination date. *Id.* at 3. Ultimately, the Board maintained an ammonia nitrogen daily maximum limit of 26.0 mg/L and 30-day monthly average limit of 9.4 mg/L, maintained language requiring PDV to continue efforts to reduce the ammonia nitrogen concentration in its wastewaters, and set a termination date of December 31, 2008. *Id.* at 6-7; see 35 Ill. Adm. Code 304.213; Pet. Exh. 13 at 5-6 (¶15); see also Pet. Exh. 13 at 8 (¶22) (listing wastewater treatment improvements since 1998).

PVD (sic) Midwest Refinery, L.L.C. [and] Citgo Petroleum Corp. v. Environmental Protection Agency, PV-2005-1 (Dec. 21, 2004)

Through faxes dated December 8, 2004, and December 10, 2004, petitioners sought a provisional variance from their monthly average ammonia concentration limit of 9.4 mg/L. Pet. Exh. 11 at 1. "On November 2, 2004, there was a malfunction in the treatment system at the Lemont Refinery. One of the effects of the malfunction was that the microorganisms in the treatment plant that biodegrade the ammonia were killed." *Id.*, Tr. at 117 (Postel testimony). Consequently, the Refinery was unable to meet the ammonia concentration limit, and petitioners

sought a provisional variance until they reestablished the nitrification process in the wastewater treatment plant. Pet. Exh. 11 at 1, Tr. at 117.

After reviewing petitioners' request, the Agency concluded that

1. The environmental impact from the proposed activity should be minimal;
2. No other reasonable alternative appears available;
3. No public water supplies should be affected;
4. No federal regulations will preclude the granting of this request; and
5. The Petitioners will face an arbitrary and unreasonable hardship if the request is not granted. Pet. Exh. 11 at 1-2.

The Agency granted the requested provisional variance for a 45-day period beginning December 8, 2004, subject to conditions. *Id.* at 2, Tr. at 117. Among those conditions, the Agency required that "[t]he monthly average ammonia limitation shall not exceed 15 mg/L." Pet. Exh. 11 at 2.

CURRENT GENERALLY APPLICABLE STANDARD AND SITE-SPECIFIC RULE

Section 304.122 of the Board's water pollution regulations provides in its entirety that

- a) No effluent from any source which discharges to the Illinois River, the Des Plaines River downstream of its confluence with the Chicago River System or the Calumet River System, and whose untreated waste load is 50,000 or more population equivalents shall contain more than 2.5 mg/L of total ammonia nitrogen as N during the months of April through October, or 4 mg/L at other times.
- b) Sources discharging to any of the above waters and whose untreated waste load cannot be computed on a population equivalent basis comparable to that used for municipal waste treatment plants and whose total ammonia nitrogen as N discharge exceeds 45.4 kg/day (100 pounds per day) shall not discharge an effluent of more than 3.0 mg/L of total ammonia nitrogen as N.
- c) In addition to the effluent standards set forth in subsections (a) and (b) of this Section, all sources are subject to Section 304.105. 35 Ill. Adm. Code 304.122.

Section 304.213, petitioners' current site-specific rule, provides in its entirety that

- a) This Section applies to discharges from the PDV Midwest Refining, L.L.C. (PDVMR) Refinery, located in Lemont into the Chicago Sanitary and Ship Canal.

- b) The requirements of Section 304.122(b) shall not apply to the discharge. Instead PDVMR must meet applicable Best Available Technology Economically Achievable (BAT) limitations pursuant to 40 CFR 419.23 (1992) incorporated by reference in subsection (c). PDVMR shall also meet a monthly average limitation for ammonia nitrogen of 9.4 mg/l and a daily maximum limitation of 26.0 mg/l.
- c) The Board incorporates by reference 40 CFR 419.23 (1992) only as it relates to ammonia nitrogen as N. This incorporation includes no subsequent amendments or editions.
- d) PDVMR shall continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters.
- e) PDVMR shall monitor the nitrogen concentration of its oil feedstocks and report on an annual basis such concentrations to the Agency.
- f) PDVMR shall submit the reports described in subsection (e) no later than 60 days after the end of a calendar year.
- g) The provisions of this Section shall terminate on December 31, 2008. 35 Ill. Adm. Code 304.213.

PETITIONERS' PROPOSED ADJUSTED STANDARD

In their petition, petitioners originally proposed that the Board adopt the following adjusted standard:

- a) This standard applies to discharges from PDV Midwest Refining, L.L.C. Refinery ("The Refinery"), located in Lemont into the Chicago Sanitary and Ship Canal;
- b) The requirements of Section 304.122(b) shall not apply to the discharge. The Refinery shall meet applicable Best Available Technology Economically Achievable (BAT) limitations pursuant to 40 CFR 419.23 (2003), incorporated by reference in subsection (d);
- c) The Refinery shall also meet a monthly average limitation for ammonia nitrogen of 6.93 mg/L whenever the monthly average discharge exceeds 100 lbs per day and 10.61 mg/L whenever the daily discharge exceeds 200 pounds of ammonia;
- d) The Board incorporates by reference 40 CFR 419.23 (2003) only as it relates to ammonia nitrogen as N. This incorporation includes no subsequent amendments of editions;

- e) The Refinery shall continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters;
- f) The Refinery shall monitor the nitrogen concentration of its oil feedstocks and report on an annual basis such concentrations to the Agency;
- g) The refinery shall continue its efforts to control and manage solids from its crude oil supply with respect to its wastewater treatment system;
- h) The Refinery shall submit the reports described in subsection "f" no later than 60 days after the end of the calendar year; and
- i) The provisions of this Section with respect to Ammonia Nitrogen shall terminate on December 31, 2013. Pet. at 2-3 (¶4).

In their post-hearing brief, petitioners requested that the Board grant a revised adjusted standard. Pet. Brief at 16, citing Pet. Brief, Att. C (Proposed Adjusted Standard Provisions). Specifically, petitioners requested that the Board adopt the following language:

- a) This standard applies to discharges from PDV Midwest Refining, L.L.C. Refinery ("The Refinery"), located in Lemont into the Chicago Sanitary and Ship Canal;
- b) The requirements of Section 304.122(b) shall not apply to the discharge. The Refinery shall meet applicable Best Available Technology Economically Achievable (BAT) limitations pursuant to 40 CFR 419.23 (2003), incorporated by reference in subsection (d);
- c) The Refinery shall also meet a monthly average limitation for ammonia nitrogen of 6.93 mg/l whenever the monthly average discharge exceeds 100 lbs per day and 10.61 mg/l whenever the daily discharge exceeds 200 pounds of ammonia;
- d) The Board incorporates by reference 40 CFR 419.23 (2003) only as it relates to ammonia nitrogen as N. This incorporation includes no subsequent amendments or editions;
- e) The Refinery shall continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters;
- f) The Refinery shall monitor the nitrogen concentration of its oil feedstocks and report on an annual basis such concentrations to the Agency;
- g) The Refinery shall continue its efforts to control and manage solids from its crude oil supply with respect to its wastewater treatment system;

- h) The Refinery shall submit the reports described in subsection "f" no later than 60 days after the end of a calendar year;
- i) The Lemont Refinery will provide an additional 2MM gallons of wastewater storage capacity. This additional storage tank capacity shall be included in a construction permit application within three months of the adoption of this adjusted standard;
- j) The Lemont Refinery will continue to participate with the Petroleum Environmental Research forum on "Reducing Desalter Environmental Impacts", and shall provide an annual progress update on the technologies researched, potential for feasibility at the Refinery, and a time line for bench scale application, if appropriate;
- k) CITGO and the Agency shall develop an appropriate malfunction/upset definition condition for inclusion in the NPDES permit. The upset condition shall address mechanical malfunctions in the production process or in the wastewater treatment plant ("WWTP"), and situations in which the organic loading to the WWTP exceeds the aeration capabilities or a wastewater stream is inhibitory to nitrification; and
- l) The provisions of subsections (c) to (j) shall terminate on December 31, 2013, provided that the malfunction/upset condition required by subsection (k) is in full force and effect by that time. Pet Brief, Att. C.

Derivation of Proposed Effluent Limits

Petitioners derived proposed ammonia effluent limits using ammonia effluent data obtained from June 2002 through May 2007 and USEPA's Technical Support Document for Water Quality Based Toxics Control. Pet. Exh. 2 at 31; Huff Test. at 13, 15; Tr. at 126-27 (citing USEPA document No. 440/4-85-032 (Sept. 1985)). Under the USEPA document, "[t]he limits for monthly and daily effluent concentrations are based on a statistical analysis using the 95th percentile values of the ammonia distribution. The methodology uses a multiplying factor based upon the coefficient of variation and number of data points." Pet. Exh. 2 at 31; *see id.*, Appendix D (95th Percentile Effluent Calculations), Tr. at 126-27.

Applying the 95th percentile, the USEPA document calculates an average monthly ammonia effluent limit of 6.9 mg/L. Pet. Exh. 2 at 32; *id.*, Appendix D; Huff Test. at 13. It also calculates a daily maximum ammonia effluent limit of 10.6 mg/L. Pet. Exh. 2 at 32; *id.*, Appendix D; Huff Test. at 13.

STANDARD OF REVIEW

The regulations of general applicability at issue here do not specify a level of justification required to qualify for an adjusted standard. *See* 415 ILCS 5/28.1(c) (2006); 35 Ill. Adm. Code

104.406(c); *see also* Pet. at 20, Rec. at 6 (¶14). Accordingly, under Section 28.1(c) of the Act, a petitioner must demonstrate that:

- 1) factors relating to that petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to 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. 415 ILCS 5/28.1(c) (2006); *see* 35 Ill. Adm. Code 104.426(a); *see also* Pet. at 20, Rec. at 6.

Further, Section 28.1(a) of the Act provides that the Board may grant an adjusted standard “for persons who can justify such an adjustment consistent with subsection (a) of Section 27 of this Act.” 415 ILCS 5/28.1(a) (2006). Section 27(a) is a rulemaking provision that requires the Board to “take into account,” among other things, “the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution.” 415 ILCS 5/27(a) (2006).

SUBSTANTIALLY DIFFERENT FACTORS

Petitioners

Petitioners argue that several factors relating to them “are substantially and significantly different from the factors relied on by the Board in adopting the water quality standards cited here.” Pet. at 19 (¶52); *see* 415 ILCS 5/28.1(c)(1) (2006). First, petitioners claim that “[t]he Board has already found the situation for ammonia nitrogen treatment at the Refinery to be unique and site-specific relief justified.” Pet. at 19 (¶52(a)), citing Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14 (Dec. 17, 1998); In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8 (Dec. 16, 1993).

Second, petitioners claim that, when the Board adopted the generally applicable regulation, the Refinery had just been constructed was not known as a source of ammonia discharge into the Des Plaines River. Pet. at 19 (¶52(b)); *see* In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, slip op. at 6, 25 (Jan. 6, 1972) (adopting Rule 406). Specifically, petitioners argue that “[t]he Board did not then consider the costs of treatment for ammonia in a refinery wastewater discharge and certainly did not anticipate that treatment would require the kind of massive investment that would be required to meet the ammonia nitrogen rule.” Pet. at 19 (¶52(b)).

Third, petitioners claim that “[t]he discharge from the Refinery that will occur does not pose any threat to human health or the environment and is not significantly greater than the environmental impact that the Board was trying to control when it adopted the ammonia nitrogen rule.” Pet. at 19 (¶52(c)); *see In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14)*, R70-8, 71-14, 71-20, slip op. at 6, 25 (Jan. 6, 1972) (adopting Rule 406). Petitioners further claim that recent discharges have, in terms of mass, been “less than the ‘allowable’ discharge were the Refinery discharging at its design flow.” Pet. at 19 (¶52(c)).

In his testimony on behalf of petitioners, Mr. Huff claims that the Board adopted ammonia effluent limits more than 36 years ago “solely because of the elevated ammonia/low dissolved oxygen in the Illinois River.” Huff Test. at 11. Stating that these standards do not apply to any other large water body, he claims that “[t]he conditions that lead to these unique Illinois River Basin effluent standards no longer exist today.” *Id.* Mr. Huff argues that petitioners require site-specific relief from “the unique Illinois River Basin regulations that were based on river conditions that existed in the early 1970s, but no longer exist today.” *Id.* at 14. Specifically, he claims that an overall decline in ammonia loading to the river and the occurrence of nitrification with higher dissolved oxygen levels in the Canal “have virtually eliminated unionized ammonia exceedances downstream of the Lemont refinery.” *Id.* at 15.

Fourth, petitioners argue that the Refinery does not differ from other Illinois refineries in their wastewater treatment technologies, although “there are differences in specific design details.” Pet. at 19 (¶52(d)); *see* Pet. Exh. 10 at 14-15 (Table 3). Petitioners claim that, although the Refinery can achieve biological nitrification, “it cannot do so on a consistent basis.” Pet. at 19 (¶52(d)). Petitioners also claim that “the Refinery continues to undertake investigations and studies to determine how to be able to consistently provide nitrification.” *Id.*

Agency Recommendation

In its recommendation, the Agency addressed petitioners’ claim that factors relating to the Refinery are “substantially and significantly different from the factors relied upon by the Board in adopting the general regulation. . . .” Rec. at 6-11; *see* 415 ILCS 5/28.1(c)(1) (2006). Generally, the Agency argues that, in adopting ammonia regulations in 1972, the Board had before it “extensive testimony as to the availability of methods for reducing ammonia in effluent.” Rec. at 7 (¶15), citing *In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14)*, R70-8, 71-14, 71-20, slip op. at 6, 25 (Jan. 6, 1972) (adopting Rule 406). The Agency further argues that, in adopting the regulation, the Board determined that “nitrification can be satisfactorily accomplished for a reasonable price by a second stage of biological treatment.” Rec. at 7 (¶15), citing *In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14)*, R70-8, 71-14, 71-20, slip op. at 6 (Jan. 6, 1972). The Agency also argues that the Board reached the following conclusion:

[t]he evidence is clear that for too long the oxygen demand exerted by ammonia in domestic wastes has been overlooked in the emphasis on reduction of five-day BOD. The State Water Survey has conclusively shown that reduction of ammonia from the larger sources feeding the Illinois River is necessary if existing standards for dissolved oxygen, essential to an adequate fish population, are to be met. Rec. at 7 (¶15), citing In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, slip op. at 6 (Jan. 6, 1972).

The Agency claims that, by adopting this effluent requirement, the Board intended “to provide a uniform baseline of treatment technology to be employed by all facilities discharging into waters of the State.” Rec. at 7 (¶15). The Agency further claims that petitioners are the only refinery discharging to the Canal that fails to meet the generally applicable ammonia nitrogen standard. *Id.*, see 35 Ill. Adm. Code 304.122(b).

Next, the Agency addressed petitioners’ claim that “[t]he Board has already found the situation for ammonia nitrogen treatment at the Refinery to be unique and site-specific relief justified.” Rec. at 7-8 (¶16), *see* Pet. at 19 (¶52(a)). The Agency claims that, although the Board has granted relief, its opinions did not reach these specific findings. The Agency also claims that the Board emphasized ongoing efforts to reduce ammonia nitrogen concentrations in the Refinery’s wastewater. Rec. at 8 (¶16), citing Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14, slip op. at 4 (Dec. 17, 1998).

The Agency also addressed petitioners’ claim that the Board did not consider the costs of treatment for ammonia in a refinery’s wastewater discharge. Rec. at 8 (¶17); *see* Pet. at 19 (¶52(b)). The Agency claims that the Board considered the cost of that treatment to be reasonable. Rec. at 8 (¶17). The Agency further claims that the Board was specifically “convinced that nitrification can be satisfactorily accomplished at a reasonable price. . . .” *Id.*, citing In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, slip op. at 6 (Jan. 6, 1972).

The Agency then responds to petitioners’ claim that “[t]he discharge from the Refinery that will occur does not pose any threat to human health or the environment and is not significantly greater than the environmental impact that the Board was trying to control when it adopted the ammonia nitrogen rule.” Rec. at 8 (¶18); *see* Pet. at 19 (¶52(c)). Specifically, the Agency claims that, because the generally applicable regulation is technology-based and not a water quality standard, petitioner’s “assertion is irrelevant to the issue at hand as there exist removal technologies that are economically reasonable and technically feasible.” Rec. at 8 (¶18).

Finally, the Agency responds to petitioners’ claim that the Refinery does not differ from other Illinois refineries in their wastewater treatment technologies, although “there are differences in specific design details.” Rec. at 8-9 (¶19); *see* Pet. at 19 (¶52(d)). The Agency notes that Petitioner’s Exhibit 9 describes wastewater treatment at the Refinery and at three other

sites in the state: Conoco Phillips in Roxana, Exxon Mobil in Joliet, and Marathon in Robinson. Rec. at 8 (¶19); *see* Pet. Exh. 9 at 57-58 (Table 4-6). The Agency argues that these other three refineries are capable of meeting the Board’s ammonia nitrogen limits. Rec. at 9 (¶19), citing 35 Ill. Adm. Code 304.122(b). The Agency expresses the view that the refinery may need “to investigate whether its equipment is properly sized and operated for the current needs of the facility” and whether it maintains adequate residence time in its aeration basins to ensure consistent nitrification. Rec. at 9-10 (¶20). The Agency also expresses doubt that the Refinery’s difficulty with maintaining sufficient nitrification stems from use of heavy crude oil. Rec. at 10-11 (¶22), citing Pet. at 3, Pet. Exh. 9 at 30, 33. The Agency argues that other Illinois refineries rely on the same crude oil supply while having “no difficulty meeting the applicable ammonia limitations.” Rec. at 11 (¶22).

Petitioner’s Response

Petitioners’ testimony addresses arguments raised in the Agency’s recommendation. First, Mr. Stein counters the Agency’s claim that the Board had “extensive testimony” on reducing effluent ammonia concentrations and that a second stage of biological treatment would achieve satisfactory nitrification at a reasonable cost. Pet. Exh. 10 at 7-8, citing Rec. at 7 (¶15). Mr. Stein emphasizes that the Board’s opinion adopting the ammonia nitrogen regulation referred to the role of ammonia in domestic waste. Pet. Exh. 10 at 8; *see In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14)*, R70-8, 71-14, 71-20, slip op. at 6 (Jan. 6, 1972). Mr. Stein cites two USEPA documents from 1974 and 1982 in support of his argument that treatment of domestic wastewater differs fundamentally from treating refinery effluents. Rec. at 8 (citations omitted).

Petitioners also address the Agency’s claim that the Refinery can achieve nitrification at a reasonable price. In his testimony, Mr. Stein states that, between January 2006 and October 2007, the average ammonia concentration in the effluent was 122 lbs/day. Pet. Exh. 10 at 8, citing Pet. Exh. 9 at 32 (Table 3-10). Mr. Stein further states that, with average daily flow of 7.13 million gallons and an ammonia nitrogen concentration limit of 3.0 mg/L, the Refinery could daily discharge 178 pounds of ammonia. Pet. Exh. 10 at 8-9. Mr. Stein argues that there is only “questionable” technical and economic justification to require the expenditure of more than \$3 million to achieve little additional removal and without the expectation of consistently meeting the 3.0 mg/L standard. *Id.*

Petitioners also address the Agency’s claim regarding the environmental effect of the requested relief. In his testimony, Mr. Huff notes that the Agency since the late 1980s has supported relief from the Board’s ammonia nitrogen regulation “in part based on the absence of environmental impact.” Huff Test. at 9. Mr. Huff also states that the Refinery “continues to make progress in reducing its ammonia discharge.” *Id.* at 10. He argues that “[t]he requested relief will *reduce* the permitted daily maximum by 59 percent.” *Id.* (emphasis in original).

Finally, petitioners confront the Agency’s arguments regarding other Illinois refineries. Mr. Stein disputes the Agency’s claim that those other refineries meet the ammonia limit. He states that, “[b]ased on a review of the available NPDES data, the Conoco Phillips Refinery is

only in compliance with the 3 mg/L limit approximately 90% of the time and the Exxon Mobil Refinery has been in compliance only since 2005.” Pet. Exh. 10 at 9. Mr. Stein also challenges the Agency’s emphasis on retention time as a factor in nitrification. He indicates that, even in a properly designed and operated wastewater treatment plant, a number of factors influences the performance and the ability to achieve nitrification. *Id.*

EFFORTS TO ACHIEVE COMPLIANCE AND ALTERNATIVES

Petitioners

Petitioners argue that, as noted above, the Refinery has since 1984 undertaken a number of efforts to reduce the concentration of ammonia nitrogen in its wastewaters. Pet. at 13-14 (¶¶37-39); *see supra* at 10 - 11 (Wastewater Treatment Plant Improvements). In addition, Ms. Postel testified that the Refinery in the 12 to 18 months preceding the hearing took a number of steps to improve its nitrification. Specifically, she testified that the Refinery had begun to segregate the desalter water from other process wastewaters; continuously remove solids from the process water tanks; use operational checks to conduct management of monoethylene amine (MEA), which is used to scrub refinery gases and waters; and add an antifoam to the MEA system. Tr. at 119.

In her testimony, Ms. Postel claimed that petitioners and their predecessors had spent nearly \$75 million to improve the Refinery’s wastewater treatment facilities, with nearly \$45 million of those expenditures in the last ten years. Postel Test. at 7 (¶19). While Ms. Postel acknowledges that “some of that was not done for the specific purpose of improving nitrification, approximately one quarter of that investment had, as a substantial component, improving the ability of the wastewater treatment process to provide nitrification.” *Id.* She further claims that some improvements that were not intended chiefly to improve nitrification nonetheless improved that process. *Id.* She cites as one example the Purge Treatment Unit (PTU), which the Refinery installed as a component of a consent decree “in large part to ensure consistent ammonia nitrogen removal.” *Id.*, citing Pet. Exh. 10 at 7.

Petitioners claim that the Refinery processes an increasing proportion of heavy crude oils and expects that trend to continue. Pet. at 3 (¶6), Postel Test. at 6 (¶18). Petitioners further claim that, despite reliance on heavier crude oils, higher crude oil throughput, and decreased volumes of wastewater, the Refinery has improved the performance of its ammonia removal. Pet. at 15 (¶42), Postel Test. at 6 (¶16). Nonetheless, petitioners conclude that “the Refinery cannot continuously meet the 3 mg/L limitation.” Pet. at 15 (¶44). Petitioners examined alternatives to the Refinery’s current wastewater treatment process. *See* Pet. at 15-17 (¶¶45-47); Pet. Exh. 9 at 40-60 (Section 4.0 Analysis of Alternatives).

On behalf of petitioners, AEI analyzed a number of technologies to determine whether one or more might remove ammonia to an extent that would consistently comply with the 3 mg/L standard. Pet. at 14 (¶40), Pet. Exh. 9 at 40. “AEI conducted an analysis of these treatment technologies for application at the refinery based on technical and economic feasibility.” *Id.* Of the technologies reported to be applicable to ammonia removal, AEI deemed the following to be appropriate for evaluation for the Refinery:

1. Biological Treatment Technologies/Adaptations
 - a. Single-stage activated sludge.
 - b. Single-stage activated sludge with the supplement of specialized bacteria.
 - c. Single-stage activated sludge with a powdered activated carbon supplement.
 - d. Single-stage activated sludge membrane bioreactor.
 - e. Two-stage activated sludge.
 - f. Two-stage biological treatment using activated sludge for the first stage and a fixed media system for the first stage and a fixed media system for the second stage.
2. Land Treatment
3. Wetlands Polishing
4. Physical – Chemical Technologies
 - a. Ion exchange.
 - b. Air stripping.
 - c. Steam Stripping.
 - d. Breakpoint Chlorination. Pet. Exh. 9 at 40-41, Pet. Exh. 10 at 16.

After reviewing available literature, previous studies on the Refinery’s wastewater, and its own experience with similar wastewaters, AEI specifically considered four technologies having “the greatest potential for achieving the Illinois 3.0 mg/L ammonia nitrogen standard on a consistent basis.” *Id.* at 41; *see* Pet. Exh. 10 at 5-6. These four are:

1. Activated sludge with powdered activated carbon addition (PACT);
2. Activated sludge with a fixed media system;
3. Activated sludge with membrane bioreactor; and
4. Activated sludge with breakpoint chlorination and dechlorination. Pet. Exh. 9 at 41; *see* Pet. Exh. 10 at 6, 16-17.

AEI analyzed each of these technologies as additions designed to improve the capability for nitrification at the existing wastewater treatment system. Pet. Exh. 9 at 41. Specifically, AEI developed process designs including “the actual design parameters, the required modifications to the treatment system to implement these technologies, and a comparative cost estimate for each design alternative.” *Id.*

First, AEI examined activated sludge with powdered activated carbon addition. Pet. Exh. 9 at 43-46. This technology adds powdered activated carbon to the aeration basin mixed liquor and “includes a wet air oxidation process which allows for recovery of the powdered activated carbon (PAC).” *Id.* at 43. This alternative also requires “construction of a third secondary clarifier to handle both the additional solids loading from the powdered carbon and the slower settling nitrifying bacteria.” *Id.*; *see id.* at 44 (Table 4-2 design summary), 45 (Figure 4-1

process flow diagram). This technology enhances the existing treatment system by “providing removal of biologically resistant organics.” *Id.* at 43. “The mechanism for powdered activated carbon to enhance biological nitrification appears to be through removal of inhibitory compounds rather than enhanced nitrifier growth on the surface of suspended solids.” *Id.*; *see* Pet. Exh. 10 at 5.

In estimating the costs of implementing this option, AEI included facilities for carbon regeneration and the disposal of sludge containing PAC. Pet. Exh. 9 at 43, 46. “Construction of the new facilities will cost approximately \$14,800,000, with an annual operating cost of \$1,424,000.” *Id.* at 46. With a capital recovery factor for 10 years at an interest rate of eight percent, “[t]he annualized cost for this alternative is \$3,630,000 per year.” *Id.*

AEI cautions that, while it anticipates that this technology can improve biological nitrification, “[t]he powdered activated carbon may not be able to adsorb the compounds which limit nitrification at the Lemont Refinery, and there is the possibility that compounds adsorbed onto the activated carbon can desorb, under certain conditions.” Pet. Exh. 9 at 46. AEI also cautions that addition of carbon may also result in increased production of sludge, higher operating costs, and abrasion of mechanical equipment. *Id.* AEI concludes that “[o]verall, there is no proven process reliability that the technology will achieve continuous compliance with the 3.0 mg/L ammonia nitrogen effluent criteria.” *Id.*

Second, AEI examined activated sludge with a fixed media system as a means of improving biological nitrification. Pet. Exh. 9 at 46-49; *see* Pet. Exh. 10 at 6. “In this process, the activated sludge system provides a suspended growth biological system for removal of the organic components in the wastewater. This is then followed by a fixed media rotating biological contactor (RBC),” closely-spaced discs mounted on a horizontal shaft and submerged and rotating in the wastewater. Pet. Exh. 9 at 46, *see id.* at 48 (Table 4-3 design summary), 49 (Figure 4-2 process flow diagram). “The surface of the discs provides an ideal mechanism for nitrifying organisms to grow.” Pet. Exh. 9 at 46.; *see* Pet. Exh. 10 at 6, Tr. at 211-12 (Stein testimony). AEI states that this alternative would require a tertiary clarifier, “since there will be some sludge sloughing and additional solids discharging into the RBC system.” Pet. Exh. 9 at 47.

AEI estimates that the total cost of installing an RBC system at the Refinery would be approximately \$13,500,000. Pet. Exh. 9 at 47. With estimated annual operation and maintenance expenses of approximately \$1,220,000, AEI provides a total annual cost for this alternative of \$3,220,000. *Id.*; *see* Pet. at 17 (¶48), Pet. Exh. 10 at 17.

AEI cautions that this alternative may have drawbacks. Pet. Exh. 9 at 47. “RBC units have been plagued with shaft failure problems caused by structural design problems, metal fatigue and excessive biomass accumulation.” *Id.* Also, failure of the RBC media can result from chemical incompatibility with the Refinery’s wastewater. *Id.* AEI concludes that, “[b]ecause of these problems there is no assurance that this technology can consistently comply with the 3.0 mg/L ammonia nitrogen criteria.” *Id.*

Third, AEI examined activated sludge with membrane bioreactor, a relatively new technology. Pet. Exh. 9 at 47, 50-53, Pet. Exh. 10 at 5-6. This system “couples the activated sludge process with membrane separation of the treated effluent from the mixed liquor.” Pet. Exh. 9 at 47. With the membrane added directly to the aeration basins, the basins can maintain high MLVSS levels and sludge ages. *Id.* at 50; *see id.* at 51 (Table 4-4 process design), 52 (Figure 4-3 process flow diagram). “[E]xisting secondary clarifiers would be converted to sludge thickeners.” *Id.* at 50.

AEI estimates the total capital cost of this alternative to be \$54,700,000. Pet. Exh. 9 at 50. With an annual operating cost of \$3,280,000, “[t]he total annualized cost for the membrane bioreactor alternative is \$11,400,000. *Id.*

AEI cautions that, while this system allows good control of sludge age, “there is limited experience in applying this technology to the petroleum refining industry for nitrogen removal.” Pet. Exh. 9 at 50; *see* Pet. Exh. 10 at 5-6. AEI states that the system may accumulate a concentration of compounds that inhibit nitrification. *Id.* In addition, existing systems have experienced foaming and fouling of membranes, which requires costly cleaning and replacement. *Id.* at 50-51. AEI also notes this alternative requires high capital costs. *Id.* at 51. Finally, AEI concludes by stating that “the process may not be able to provide consistent compliance with the 3.0 mg/L ammonia nitrogen criteria.” *Id.*

Fourth, AEI examined activated sludge with breakpoint chlorination/dechlorination. Pet. Exh. 9 at 53-57. “Breakpoint chlorination provides chemical destruction of the ammonia nitrogen.” *Id.* at 53. Specifically, wastewater is chlorinated following the activated sludge system to generate a free chlorine residual. *Id.* “Dechlorination is accomplished by adding sulfur dioxide after the chlorine reaction is completed.” *Id.*; *see id.* at 54 (Table 4-5 design summary), 55 (Figure 4-4 flow diagram).

AEI estimates the capital costs of this alternative to be \$1,400,000. Pet. Exh. 9 at 56. With an annual operating cost of \$3,332,000, “[t]he estimated total annualized cost is \$3,640,000 for the chlorination/dechlorination system.” *Id.*

Although AEI characterizes this technology as “the simplest of the proposed alternatives in terms of operation and equipment requirements,” it also emphasizes its disadvantages. Pet. Exh. 9 at 53. AEI states that, while dechlorination removes residual chlorine, it does not remove chlorinated organic by-products. *Id.* at 56. AEI claims that regulatory authorities have sought to prohibit the treatment of organic wastewaters with chlorine and chlorine-containing compounds “because of the toxicity of the chlorinated organic by-products.” *Id.* Based on these issues, AEI argues that this alternative “is not a justifiable treatment technology on organic containing wastestreams for Lemont Refinery.” *Id.* at 56-57.

In his testimony on behalf of petitioners, Mr. Huff addressed the cost effectiveness of these alternatives. Huff Test. at 12. He claims that, over the last decade, the Refinery has made a net contribution of 43 pounds per day of ammonia to the Canal. *Id.*, citing Pet. Exh. 5 at Figure 3 (Annual Average Ammonia Influent and Effluent Loading). Assuming that the lowest cost of the four alternatives discussed in the preceding paragraphs would remove that 43 pounds per day

contribution, the annualized cost of \$3,220,000 would translate to a cost of \$205 per additional pound removed. Huff Test. at 12. Petitioners also examined this by using effluent data from June 2002 through July 2007. Pet. at 17 (¶48). “[A]ssuming the fixed media system would yield an effluent of 0.5 mg/L, an additional 28,250 pounds of ammonia would be removed from the Canal per year.” *Id.* With a \$3,220,000 annualized cost of that system, petitioners argue that removal costs would be \$113.30 per pound. *Id.*

Petitioners also look to other entities to review the cost effectiveness of their ammonia removal. Petitioners argue that, after adjusting its figures for inflation, a 1983 analysis shows that the Calumet Water Reclamation Plant removes ammonia at a cost of approximately \$3.00 per pound. Pet. at 17 (¶48) (citation omitted), Huff Test. at 13. Petitioners also claim that the Metropolitan Water Reclamation District of Great Chicago (MWRDGC) has spent \$39 million installing five side-stream aeration facilities along the Chicago Waterway. Pet. at 17-18 (¶49). They argue that, by increasing dissolved oxygen concentrations, these facilities “address the same problem as limits on ammonia concentration in effluent.” *Id.* By adding enough dissolved oxygen to compensate for 720,000 pounds of ammonia per year, the MWRDGC’s installation costs translate to a cost of approximately \$7-10 per pound of ammonia oxidized. *Compare id. and* Pet. Exh. 10 at 13 (citing 1983 Huff & Huff assessment of Refinery discharge).

Petitioners further argue that, if the Board denies this request for an adjusted standard, the Refinery would increase its carbon emissions. Huff Test. at 12. Assuming that the additional wastewater treatment equipment would require 144 operating horsepower derived from coal, “the additional pounds per year of carbon dioxide emitted will be 1,976,000.” *Id.*, Tr. at 128-19. Petitioners claim that this translates into 126 pounds of carbon dioxide emissions for every additional pound of ammonia oxidized. Huff Test. at 13. Petitioners further claim “that ammonia oxidation occurs naturally within the receiving stream, without carbon dioxide generation.” *Id.*

In addition to reviewing alternative wastewater treatment technologies that might improve ammonia removal at the Refinery, petitioners also reviewed the performance of technologies employed by the following other refineries in Illinois: Conoco Phillips in Roxana, Exxon Mobil in Joliet, and Marathon in Robinson. Pet. Exh. 9 at 57; *see* Pet. at 18 (¶50), Postel Test at 9 (¶25). That review concluded that “[t]he treatment process at the Lemont Refinery is similar to that at the other Illinois refineries. All of the refineries employ the activated sludge process for nitrogen removal.” Pet. Exh. 9 at 57. AEI found the activated sludge retention time to be the only difference among the four treatment systems. *Id.* “The Conoco Phillips and Marathon refineries have a longer retention time than the Lemont Refinery. The Exxon Mobil and Lemont Refinery have similar activated sludge retention times.” *Id.* Petitioners argue that none of the other three Illinois refineries “were using the technologies investigated by Aware [AEI] as possible additions to the Lemont Refinery.” Pet. at 18 (¶50).

In testimony on behalf of petitioners, witnesses elaborated on these comparisons of the Refinery with the other three Illinois refineries. With regard to Exxon Mobil, Mr. Huff expressed the understanding that its refinery is constructing a PTU and intends to send the stream from that unit into its biological wastewater treatment plant instead of bypassing that plant. Tr. at 135. Mr. Huff characterizes this as “a higher risk approach,” as it requires an increased air

supply in the activated sludge unit, decreases separations of solids, and can produce filamentous growth in the clarifiers. *Id.* at 130-31, *see also id.* at 133, 135-36 (Stein testimony). Mr. Huff expresses the belief that this approach could have short-term negative effects on the system's ability to nitrify. *Id.* at 132-33. Mr. Stein agreed that, if an existing wastewater treatment plant achieving nitrification begins to receive PTU discharge from an air pollution control device such as an FCC, it may not be able to continue achieving nitrification. *Id.* at 134. Mr. Stein opined that, under these circumstances, Exxon Mobil "very well could experience problems" and may not "be able to handle and achieve nitrification with that PTU discharge going into the regular plant." *Id.* at 136. While the Exxon Mobil refinery is discharging under the terms of a site-specific rule, the Agency understands that Exxon Mobil does not seek to extend that site-specific rule to apply during the operation of the PTU. Tr. at 242-43; *see* Tr. at 150-51.

Mr. Huff also compared the Refinery with the Conoco Phillips refinery. Specifically, he responded to the Agency's claim that "Conoco Phillips does not have water quality based limits due to its location on the Mississippi River, however nitrification is known to occur on a regular basis given the ammonia levels measured in the effluent and the results on whole effluent toxicity testing." *See* Rec. at 9 (¶19), Tr. at 225-26 (Le Crone testimony). Examining Conoco Phillips' 2002-07 ammonia effluent levels, Mr. Huff argues that "[i]t is clear that Conoco Phillips does not meet a 3.0 mg/L monthly average or a 6.0 mg/L daily maximum all the time." Huff Test. at 10; *see* Tr. at 137-38, Pet. Exh. 10 at 9 (finding approximately 90% compliance). He further argues that, because Conoco Phillips' intake is groundwater, its average ammonia discharge of 67 pounds per day can be considered a net discharge exceeding the Refinery's net discharge of 43 pounds per day. *Id.*; *see* Tr. at 138-39. Mr. Huff claims that, because of differing water conservation practices, newer refineries such as the petitioners' may "discharge less water per barrel of crude processed than older refineries," making it misleading simply to compare the concentrations discharged. Huff Test. at 10. Mr. Huff concludes by stating that "[t]he Lemont Refinery nitrifies a high percentage of the time and its effluent also passes the whole effluent toxicity testing." *Id.* He argues that Conoco Phillips' discharge is "very similar to" and "totally consistent with the Lemont Refinery's performance." *Id.*; *see* Tr. at 138.

Petitioners also sought to distinguish the Refinery from Marathon. At hearing, Mr. Stein acknowledged that, while using an activated sludge system similar to the Refinery's, Marathon achieved low ammonia nitrogen concentrations in its effluent. Tr. at 152-53. The Agency acknowledged, however, that Marathon was not subject to the ammonia nitrogen concentration limit of 3.0 mg/L. Tr. at 235 (Le Crone testimony). Under the terms of a current permit dated 1989, Marathon was subject to mass-based limits with a daily average of 763 pound of ammonia and a daily maximum of 1,679 pounds. Tr. at 235-36. In addition, the Agency expressed the belief that Marathon relied on off-site treatment of the waste stream from its PTU. Tr. at 233-34.

AEI states that, while an addition such as a fixed media biological treatment unit at the Refinery may remove more ammonia, it does so at significant expense. Pet. Exh. 9 at 59. AEI also concludes that "it is uncertain that the upgraded system would achieve consistent compliance with the 3.0 mg/L ammonia nitrogen standard." *Id.* AEI concludes that "upgrading the treatment system with additional treatment technologies for ammonia removal is not justified." *Id.*; *see* Pet. at 16 (¶46), Postel Test. at 8-9 (¶23), Pet. Exh. 10 at 6, 17.

AEI notes that the Refinery has participated in various studies and programs to address wastewater treatment and that it expects “to improve treatment plant performance based on research through the Petroleum Environmental Research Forum.” Pet. Exh. 9 at 59. Although stressing that nitrification may be affected by “the inherent variability in refinery wastes,” AEI expects optimization of the existing system to yield improved performance of the treatment system. *Id.* AEI’s analysis includes the recommendation:

that Lemont Refinery continue its ongoing research studies and projects designed to optimize the existing wastewater treatment improvement system. These efforts should be directed toward obtaining the maximum possible ammonia removal on a consistent basis. Continued development of operational data under the varying conditions inherent with refinery wastes will help to improve the performance of the system, and will allow the maximum ammonia removal capability of the system to be achieved. *Id.* at iii (Executive Summary).

Based in part on AEI’s report and conclusions, petitioners commit to “continue to investigate improvements to its existing wastewater treatment system.” Pet. at 18 (¶51), Postel Test. at 10 (¶26). Specifically, petitioners state that

[i]t is believed that focusing on better solids handling from the desalter holds the greatest promise for achieving improved wastewater treatment performance on a consistent basis. The options that will be investigated include: an *in situ* solid removal system, increased tankage to allow brine segregation, amine management, and adjusting chemical usage to reduce emulsification in the primary treatment units. Pet. at 18 (¶51), Postel Test. at 10 (¶26); *see* Tr. at 212-14 (timing of investigations).

Agency Recommendation

In its recommendation, the Agency first addresses petitioners’ list of improvements made since 1987 at the Refinery. *See* Pet. at 13-14 (¶¶37-39). Although the Agency acknowledges that some of those listed improvements were installed to remove ammonia, it states that others appear not to be directly related to ammonia removal and that some other provide multiple benefits. Rec. at 5 (¶13). The Agency specifically cites the Refinery’s installation of a PTU, stating that it “is unrelated to historic ammonia removal issues as it was installed specifically to treat wastewater from the new FCC scrubber.” *Id.* The Agency argues that the \$75 million of wastewater treatment improvements claimed by petitioners are not itemized and explained and are not entirely relevant to the issue of ammonia removal. *Id.* at 5-6, citing Pet. at 4 (¶8).

Mr. Stein addressed these claims in his testimony. He argues that many of the treatment improvements listed by petitioners “were implemented to improve the overall treatment plant performance and the overall treatment plant performance allowed the treatment plant to provide increased biological nitrification.” Pet. Exh. 10 at 7. Specifically, he claims that gas flotation removes oils and solids before they enter the activated sludge system, where they can inhibit nitrification. *Id.* He further argues that cost of the PTU stemmed largely from the need to provide consistent ammonia removal. *Id.*

The Agency's recommendation also addresses the issue of detention times in the Refinery's aeration basins. The Agency notes that, while petitioners claim the operating parameters for biological treatment are within proper ranges for providing nitrification, the Refinery cannot consistently meet the ammonia nitrogen standard. Rec. at 9 (¶20). In this regard, the Agency states that the Refinery's "aeration basins have the lowest detention time of the four refineries in Illinois." *Id.*, citing Pet. Exh. 9 at 58. The Agency claims that "[t]hese longer detention times may be at least partially responsible for the more effective and more consistent nitrification achieved at these facilities." Rec. at 9-10 (¶20). The Agency argues that petitioners need "to investigate whether its equipment is properly sized and operated for the current needs of the facility, " as they have not addressed "the adequacy of residence time in the aeration basins to ensure that consistent nitrification is occurring." *Id.* at 9 (¶20). The Agency further argues that, while petitioners evaluated various treatment improvements, they "did not consider the construction of an additional aeration basin and/or an associated additional clarifier to provide a longer detention time, more in line with other refineries." *Id.* at 9-10 (¶20); *see* Tr. at 249-51 (Le Crone testimony).

After reviewing petitioners' consideration of four specific treatment technologies, the Agency notes that AEI has concluded that it is uncertain whether an upgraded system can consistently achieve the 3.0 mg/L ammonia nitrogen standard. Rec. at 15-16 (¶¶31-36), citing Pet. Exh. 9 at 59. The Agency disputes petitioners' claim 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)." Rec. at 16 (¶37), citing Pet. at 16. The Agency argues that other Illinois refineries have successfully used these technologies to achieve consistent compliance with the ammonia nitrogen standard. Rec. at 16 (¶37). The Agency cites Exxon Mobil, which will construct additional clarifiers to increase detention time and intends to meet the ammonia nitrogen concentration limits at 35 Ill. Adm. Code 304.122 (b). Rec. at 10 (¶21). The Agency suggests that "this upgrade may be at least partially responsible for meeting the applicable ammonia limits." *Id.*

The Agency suggest that petitioners have been vague in proposing to monitor the nitrogen content of its feedstock, to continue efforts to reduce ammonia, and to control and manage solids from its crude oil supply. Rec. at 17 (¶39), citing Pet. at 11. The Agency argues that petitioners "should perhaps duplicate technology designs of one of the other refineries, such as Exxon Mobil, so that it can also comply with the applicable standard." Rec. at 17 (¶39). Specifically, the Agency claims that petitioners should "focus on the performance efficiencies of its biological treatment process, and improvements to the solids handling process and the desalter." *Id.*

Petitioners' Brief

In their post-hearing brief, petitioners argue that, in spite of the Canal's poor habitat and lack of support for fish consumption, aquatic life, and human recreational activities, "ammonia concentrations in the Canal are quite low, below 1 mg/L." Pet. Brief at 7, citing Tr. at 55-57 (Huff Test. at 4-6). Petitioners further argue that "the unionized concentrations have been consistently below 0.010 mg/L." Pet. Brief at 7, citing Tr. at 58 (Huff Test. at 5-6). Petitioners

emphasize that they have derived proposed ammonia nitrogen limits based on a statistical analysis using the 95th percentile of the standard deviation and relying on last five years of effluent data. Pet. Brief at 7. Petitioners claim that the proposed daily limits represent a reduction of 59 percent compared with the current limits and that the proposed monthly limit represents a reduction of 27 percent. *Id.*, citing Tr. at 38 (Postel Test. at 6).

Petitioners claim that they and their predecessors have spent a significant amount of money improving the Refinery's wastewater treatment system: a total of nearly \$75 million and approximately \$45 million in the last ten years. Pet. Brief at 11, citing Tr. at 39-40 (Postel Test. at 7). Petitioners itemize 15 improvements, most of which they characterize as a direct improvement to nitrification. Pet. Brief at 11-12, citing Tr. at 40-43 (Postel Test. at 7-8). Petitioners claim that they will continue those efforts with compliance measures they propose. Pet. Brief at 12. Claiming that the Refinery's wastewater treatment system already exceeds BAT requirements, petitioners claim that "[n]o technology can assure that the Refinery will meet the ammonia nitrogen limits of 3 mg/L/day monthly average and 6 mg/L/day maximum." Pet. Brief at 9. Petitioners note AEI's conclusion that upgrading the Refinery's treatment technology is not justified. *Id.*, citing Tr. at 91, 111 (Stein testimony); *see* Pet. Exh. 9 at 59.

Petitioners strenuously dispute the Agency's claim that other Illinois refineries "are able to guarantee compliance" with a monthly average ammonia concentration limit of 3.0 mg/L and a daily maximum limit of 6.0 mg/L." Pet. Brief at 14. Petitioners stress that the Marathon refinery "does not send its scrubber effluent to its wastewater stream." *Id.* at 5, 14, citing Tr. at 233-34 (LeCrone testimony). Petitioners argue that, "[d]espite the fact that Southern Illinois has warmer weather, and the avoidance of scrubber effluents, Marathon still has effluent of similar qualities to CITGO." Pet. Brief at 14. With regard to Conoco Phillips, petitioners argue that the Agency has not provided persuasive evidence about its effluent and cannot support the argument that it complies with the generally applicable standard. *Id.* at 5, 14. With regard to Exxon Mobil, petitioners argue that it has not begun operating its FCC unit or adding effluent from that unit to its wastewater treatment system. Under these circumstances, petitioners claim that Exxon Mobil's apparent decision to delay a request for regulatory relief constitutes "a risk." *Id.*

Petitioners state that the Refinery is poised to take steps to improve nitrification. Pet. Brief at 15. Specifically petitioners state that the Refinery plans to do the following:

- 1) maintain an additional 2MM gallons of wastewater storage capacity; 2) participate with the Petroleum Environmental Research Forum on "Reducing Desalter Environmental Impacts," including an annual progress report to the Board regarding the technologies researched, potential for feasibility at the Refinery, and a time line for bench scale application; and 3) work with the Agency to develop a malfunction/upset definition for inclusion in the next NPDES permit to address disruptions in nitrification. Pet. Brief at 15.

Petitioners stress that they have incorporated these plans into their proposed adjusted standard. Pet. Brief at 5-6; *see id.*, Attachment C (proposed conditions i, j, and k). Petitioners emphasize that the nature of petroleum refining may upset the nitrification process. Pet. Brief at 5. Petitioners argue that additional treatment technologies will not eliminate the risk of these upsets,

although specific steps can make the nitrification process more reliable and reduce the impact of any upsets on wastewater treatment. *Id.* at 5-6. Petitioners conclude that “[t]he steps being pursued by the Refinery are, without question, the appropriate measures to pursue.” *Id.* at 16.

Agency Brief

The Agency argues that, in granting the Refinery’s previous petitions for site-specific rules, the Board has required continuing effort to meet the generally-applicable rule and has set a date on which the regulatory relief expires. Agency Brief at 5 (¶14), citing In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14, In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13. The Agency suggests that technical limitations prevented the Refinery from complying with the generally-applicable rule and that it was therefore appropriate for the Board to extend the expiration date from one site-specific rule to another. *See* Agency Brief at 5-6 (¶¶15-17). The Agency further suggests that, because those technical limitations no longer apply, the Refinery must now comply with the 3.0 mg/L ammonia nitrogen concentration limit on or before December 31, 2008, the expiration of the current site-specific rule. *See id.*; *see also* In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14.

The Agency argues that petitioners acknowledge all four refineries in Illinois use wastewater treatment technologies that are very similar to one another. Pet. Brief at 6 (¶18), citing Postel Test. at 9 (¶25), Pet. Exh. 10 at 14. The Agency further argues that the three refineries other than petitioners’ “have demonstrated that the goals and expectations of Section 304.122(b) can be met and *are technically feasible*.” Pet. Brief at 6 (¶19) (emphasis in original); *see* 35 Ill. Adm. Code 304.122(b). The Agency claims that, since 2005, Exxon Mobil has complied with that standard. Agency Brief at 6-7 (¶19(a)), citing Agency Exh. 5. The Agency also claims that, since at least April of 2004, Marathon has also complied with that standard. Agency Brief at 7 (¶19(b)), citing Agency Exh. 6. The Agency states that Conoco Phillips is not required to comply with Section 304.122(b). Agency Brief at 7 (¶21). The Agency argues that “CITGO is the *only* oil refinery in the State of Illinois that would otherwise be required to comply with Section 304.122(b) that has *yet to agree* to meet this general rule of applicability.” Pet. Brief at 7 (¶20) (emphasis in original).

The Agency emphasizes its observation that longer detention times for the activated sludge at the other refineries in Illinois “may contribute” to their compliance with the rule of general applicability. Agency Brief at 8 (¶22), citing Rec. at 9 (¶20), Pet. Exh. 10 at 15 (Table 3), Pet. Exh. 9 at 58 (Table 4-6). The Agency notes Mr. Stein’s agreement that, among the treatment systems at the four refineries, retention time appears to be the only difference. Agency Brief at 8 (¶23), citing Pet. Exh. 10 at 14. The Agency also notes that, while Mr. Stein referred to a comparison of food to micro-organism ratios as a “more realistic evaluation,” he had not performed such a study. Agency Brief at 8 (¶24). The Agency argues that petitioners have failed to demonstrate that compliance with the Board’s ammonia nitrogen standards is not

technically feasible at the Refinery. *See* Agency Brief at 10 (¶29). The Agency concludes by requesting that the Board deny petitioners' request for relief. *Id.* (¶31).

Petitioners' Reply

In response to the Agency's arguments about the expiration of regulatory relief (*see* Agency Brief at 5-6), petitioners state that "[t]he sunset provision in R84-13 did not preclude the Board's order in R93-8. The sunset provision in R93-8 did not preclude an even longer-lasting Order in R98-14." Reply at 3; citing In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14, In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13. Petitioners argue that they have proposed an adjusted standard with only half of the duration of the relief granted by the Board in R98-14. Reply at 3, citing In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14. Petitioner further argue that no previous order granting regulatory relief to the Refinery has the Board ever indicated that it was the final relief the Board would grant. Reply at 5. Petitioners also argue that "[n]owhere in the record of the 1998 rulemaking did the Agency argue 'this is it.'" *Id.*

Petitioners also dispute the Agency's claim regarding the technical feasibility of complying with the generally applicable rule. Petitioners first emphasize that, while the four Illinois refineries use similar wastewater treatment technologies, "they do not all utilize similar *air control methods, complete* on-site wastewater treatment, or identical configuration of wastewater treatment technologies." Reply at 5 (emphasis on original). Petitioners argue that Exxon Mobil has not yet added its PTU discharge to its general wastewater treatment, an addition which may jeopardize its ability to achieve nitrification. *Id.*, citing Tr. at 137, 210-11, 244 (Stein and Huff testimony). Petitioners further argue that "Marathon does not discharge all of its ammonia-nitrogen bearing waste stream through its wastewater treatment facilities" and that warmer weather at its location is more conducive to nitrification. Reply at 5. Petitioners also note that Conoco Phillips is not subject to the requirements of 35 Ill. Adm. Code 304.122(b). *Id.* Petitioners conclude by arguing that, in spite of its own efforts to reduce its ammonia discharge, neither it nor any other Illinois refinery has yet demonstrated a consistent ability to comply with that standard. *Id.* at 6.

Petitioners express astonishment that the Agency's response brief emphasizes detention time as a means of reducing ammonia discharges from the Refinery. Reply at 8; *see* Agency Brief at 8. Petitioners argue that the Agency failed to claim persuasively in its recommendation or its testimony at hearing that increased detention time would improve nitrification. Reply at 8. Petitioners also claim that the Agency has overlooked testimony by Mr. Stein and Mr. Huff that increased detention time would not solve the Refinery's discharge issues. *Id.*, citing Tr. at 138. Specifically, petitioners argue that Mr. Stein testified that "increased detention time may actually harm nitrification because it also leads to greater cooling." Reply at 8, citing Tr. at 253-54. Petitioners also note that the Agency has criticized Mr. Stein for failing compare the four refineries' food-to-microorganism ratios when those data are not publicly available and may constitute trade secrets. *Id.* at 8-9.

Finally, petitioners argue that they have addressed all of the issues set forth in the Board's procedural rules and have met their burden of proof as set forth in the Act. Reply at 9, citing 415 ILCS 5/27(a) (2006), 35 Ill. Adm. Code 104.406. Suggesting that the Agency has not successfully disputed their evidence, petitioners state that the Agency does not "present a cognizable reason to deny the regulatory relief that Petitioner has so thoroughly demonstrated it deserves." Reply at 10.

IMPACT ON THE ENVIRONMENT

Petitioners

Petitioners argue that their requested relief "will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rules of general applicability for ammonia nitrogen." Pet. at 6 (¶17); see 415 ILCS 5/28.1(c)(3) (2006). Petitioners claim that, over the last five years, the annual average discharge to the Canal has been 102.4 pounds per day. Pet. at 6-7 (¶17). Petitioners further claim that, with an estimated average of 26.2 pounds per day in the influent, the Refinery's net average discharge is 76.2 pounds per day. *Id.* Accordingly, "about 25 percent of the ammonia nitrogen currently discharged is due to background conditions in the Canal." *Id.* at 7, Postel Test. at 10 (¶27). Petitioners also argue that at a concentration of 3 mg/L, "the allowable discharge of ammonia nitrogen from the Refinery is 145 pounds at the design average flow." Pet. at 6 (¶17). Petitioners claim on these bases that "[n]o adverse environmental impact, including harm to aquatic life, will result from the granting of the requested adjusted standard." *Id.* at 6.

Agency Recommendation

In its recommendation, the Agency "disagrees that the relief from the ammonia nitrogen standard would not have any adverse environmental impacts." Rec. at 11 (¶24). The Agency argues that the requested relief would result in "much higher ammonia concentrations" in the Canal. *Id.* The Agency further argues that this will render an area of the Canal "effectively unavailable as habitat for sensitive forms of aquatic life." *Id.* The Agency claims that requiring the Refinery to meet the generally applicable standard would reduce the size of that area and "help to improve the dissolved oxygen conditions in the Ship Canal." *Id.*

Petitioners' Brief

In their brief, petitioners emphasize that they have proposed ammonia nitrogen concentration limits that reduce the current daily limit by 59 percent and the monthly average by 27 percent. Pet. Brief at 7, citing Tr. at 38 (Postel testimony). Petitioners further emphasize that ammonia concentrations in the Canal generally fall below 1.0 mg/L. Pet. Brief at 7. Although petitioners note that ammonia levels at the edge of the mixing zone are projected to be 0.805 mg/L, they claim that the Refinery is generally able to nitrify and achieve lower concentrations after mixing. *Id.* at 8. Petitioner further stress that unionized ammonia concentrations consistently fall below 0.010 mg/L with a recent maximum of 0.079 mg/L. *Id.* at 7, 8. Finally,

petitioners claim that “the Refinery’s impact on dissolved oxygen is so minimal that it is within the margin of error of the sampling method.” Pet. Brief at 9, citing Tr. at 189 (Huff testimony).

Petitioners’ Reply

In their reply, petitioners look to regulatory relief previously granted by the Board and argue that “the current environmental conditions are even more supportive of there being an adjusted standard for the Refinery.” Reply at 3. Petitioners note the level of ammonia nitrogen in the Refinery’s influent to claim that the Canal is a body of water dominated by effluent. *Id.* at 4. Petitioners claim, however, that the Canal now meets that ammonia nitrogen water quality standard proposed in the Agency’s use attainability analysis. *Id.* Petitioners thus argue that “there appears to be no environmental justification for any further reductions in ammonia nitrogen discharges from the Refinery. *Id.*, citing Tr. at 188 (Huff testimony). Petitioners further argue that improved nitrification by municipal wastewater treatment plants “has achieved the environmental result the Board sought in adopting 35 Ill. Adm. Code § 304.122(b).” Reply at 4. Petitioners conclude by arguing that “[t]here is then no environmental basis for denying the adjusted standard as requested by the Refinery.” *Id.*

CONSISTENCY WITH FEDERAL LAW

Petitioners

Petitioners state that the Clean Water Act (CWA) “requires states to identify impaired waterways and the causes of impairment and then develop what is essentially a waste load allocation for addressing the impairment.” Pet. at 9 (¶25) (citing Section 303(d) of the CWA). Petitioners further states that Illinois in 1998 identified 738 segments as impaired waterways and developed a priority list for addressing them. Pet. at 9 (¶25). Petitioners claim that the Agency’s 2006 water quality report lists the Canal as impaired for a variety of reasons, none of which is ammonia nitrogen. *Id.* at 9-10.

Petitioners argue that USEPA has adopted categorical limits applicable to industries including petroleum refining. Pet. at 10 (¶28). Petitioners further argue that these regulations “are less stringent than the limits in the existing site-specific rule.” *Id.*, citing 40 C.F.R 419; *see* 35 Ill. Adm. Code 304.213, Postel Test. at 5 (¶13). Petitioners also claim that the Board has found that the Refinery’s wastewater treatment system exceeds BAT requirements. Pet. at 10 (¶28).

Petitioners state that USEPA has also “established effluent guidelines for wastewater discharges by industry category. Pet. at 10 (¶29). On the basis of its processes and production, the Refinery is classified as a cracking refinery with effluent limits based on production and calculated on the basis of pounds per day. *Id.*; *see also* Postel Test. at 4-5 (¶12).

Petitioners also note that Illinois regulations limit the size of an allowable mixing zone to 25 percent of stream flow and require meeting water quality standards at the edge of that mixing zone. Pet. at 10 (¶27); *see* 35 Ill. Adm. Code 302.102. Petitioners argue that the requested monthly average concentration of 6.9 mg/L as the projected discharge and 25 percent of the

Canal's low flow yield "an incremental change of 0.17 mg/L at the edge of the mixing zone." Pet. at 10 (¶27); *see* Pet. Exh. 2 at 33. After noting that the Refinery has operated under a number of variances and site-specific rules granted by the Board, petitioners argue that "the relief here requested is not inconsistent with the effluent standards and area-wide planning criteria under the Clean Water Act." Pet. at 11 (¶32).

Agency Recommendation

In its recommendation, the Agency also notes that the CWA requires the state to identify impaired waters, the pollutants causing impairment, and a priority ranking for developing a Total Maximum Daily Load (TMDL). Rec. at 12 (¶25), citing 33 U.S.C. §1313(d). The Agency's 2006 water quality report lists the Canal as impaired for indigenous aquatic life, with causes including dissolved oxygen, polychlorinated biphenyls (PCBs), iron, oil, grease, total nitrogen, and total phosphorus. Rec. at 12 (¶25). While the Agency acknowledges that ammonia nitrogen is not one of the listed causes, it characterizes ammonia as an oxygen demanding substance. *Id.* The Agency argues that requiring petitioners "to reduce the ammonia to levels required by Section 304.122 would ensure that a source of oxygen demanding waste to the Ship Canal has been eliminated." *Id.* The Agency further argues that higher ammonia discharge levels would delay attainment of the dissolved oxygen standard, a direct conflict with the requirements of the CWA. *Id.*

Petitioners' Response

Petitioner's testimony addresses the Agency's arguments on consistency with federal law. Mr. Stein notes that "the long term ammonia discharge from the refinery in 2006-2007 was 122 lbs/day." Pet. Exh. 10 at 10. He claims that this discharge "is actually significantly less on a long term basis than the proposed permitting levels." *Id.* Mr. Stein also expresses doubt that the Refinery's ammonia discharge would affect dissolved oxygen concentrations in the Canal. *Id.* He states that, "on a long term average the ammonia discharge is less than would be permitted under the 3 mg/L regulation." *Id.*

BOARD DISCUSSION AND DETERMINATION

In the following subsections, the Board discusses each of the statutory factors that petitioners must demonstrate in order to justify their requested adjusted standard and reaches its findings on them.

Substantially Different Factors

Petitioners' Position

Petitioners argue that several factors relating to them "are substantially and significantly different from the factors relied on by the Board in adopting the water quality standards cited here." Pet. at 19. First, petitioners assert that "[t]he Board has already found the situation for ammonia nitrogen treatment at the Refinery to be unique and site-specific relief justified." *Id.* Second, petitioners claim that, when the Board adopted the generally applicable regulation, the

Refinery had just been constructed and was not known as a source of ammonia discharge into the Des Plaines River. *Id.* In this regard, petitioners argue that the Board did not consider the costs of treatment for ammonia in a refinery wastewater discharge nor did it anticipate that treatment to meet the ammonia nitrogen rule would require massive investment by the refineries. *Id.*

Third, petitioners claim that “[t]he discharge from the Refinery that will occur does not pose any threat to human health or the environment and is not significantly greater than the environmental impact that the Board was trying to control when it adopted the ammonia nitrogen rule.” Pet. at 19. Petitioners further claim that recent discharges have, in terms of mass, been “less than the ‘allowable’ discharge were the Refinery discharging at its design flow.” *Id.*

In his testimony on behalf of petitioners, Mr. Huff claims that the Board adopted ammonia effluent limits more than 36 years ago “solely because of the elevated ammonia/low dissolved oxygen in the Illinois River.” Huff Test. at 11. Stating that these standards do not apply to any other large water body, he claims that “[t]he conditions that lead to these unique Illinois River Basin effluent standards no longer exist today.” *Id.* Mr. Huff argues that petitioners require site-specific relief from “the unique Illinois River Basin regulations that were based on river conditions that existed in the early 1970s, but no longer exist today.” *Id.* at 14. Specifically, he claims that an overall decline in ammonia loading to the river and the occurrence of nitrification with higher dissolved oxygen levels in the Canal “have virtually eliminated unionized ammonia exceedances downstream of the Lemont refinery.” *Id.* at 15.

Fourth, petitioners argue that the Refinery does not differ from other Illinois refineries in their wastewater treatment technologies, although “there are differences in specific design details.” Pet. at 19 (¶52(d)); *see* Pet. Exh. 10 at 14-15 (Table 3). Petitioners claim that, although the Refinery can achieve biological nitrification, “it cannot do so on a consistent basis.” Pet. at 19 (¶52(d)). Petitioners also claim “the Refinery continues to undertake investigations and studies to determine how to be able to consistently provide nitrification.” *Id.*

Agency’s Position

The Agency asserts that petitioners have not provided adequate proof to demonstrate that the factors relating to its Lemont Refinery are substantially and significantly different from the factors relied upon by the Board in adopting the general regulations, as required by Section 28.1(c) of the Act. Rec. at 6, 18. The Agency notes that the Board adopted the generally applicable ammonia nitrogen effluent standard at Section 304.122(b), from which petitioners seek relief, in 1973. Rec. at 7. The Agency maintains that the Board intended this ammonia nitrogen effluent standard to provide a uniform baseline of treatment technology for all facilities having a waste load that could not be computed on a population equivalent basis. *Id.* The Agency claims “Citgo is the only refinery discharging to the Ship Canal that has yet to meet the ammonia nitrogen standard at 35 Ill. Adm. Code 304.122(b).” *Id.*

According to the Agency, all refineries in the state with the exception of petitioners’ are capable of meeting the ammonia nitrogen effluent standard specified at Section 304.122(b). Rec. at 9. The Agency notes that: Marathon Oil refinery regularly meets its permit limits, which are based on the lower water quality based limits; Conoco Phillips Refinery achieves nitrification on

a regular basis, even though it is not subject to effluent limits because it discharges to the Mississippi River; and ExxonMobil will not be seeking an extension of its current site-specific ammonia nitrogen effluent standard and will be subject to permit limits based on Section 304.122(b) in its next renewed permit. *Id.* at 9-10.

The Agency states that the wastewater treatment systems for the four refineries are similar. They have preliminary oil separation, which is followed by an additional oil-water separator using a gas floatation process, and the secondary treatment is provided by an activated sludge system. *Rec.* at 9. Further, the Agency notes that, according to petitioners, the operating parameters of their activated sludge system, including sludge age, food to microorganism ratio, aeration levels, pH and temperature, are all within the appropriate ranges for providing nitrification. *Id.* However, the Agency questions petitioners' assertions regarding the operating parameters of the activated sludge system. Specifically, the Agency notes that petitioners' activated sludge treatment process has the lowest detention time when compared to the treatment systems at the other refineries in the state. The Agency notes that detention time of petitioners' aeration basin is 7.7 hours as compared to the detention times of 19.4 hours at ExxonMobil with the upgraded aeration basin, 1.31 days at Conoco-Phillips and 1.54 days at Marathon. *Id.*, citing *Pet. Exh. 9* at 58.

The Agency contends that the petition does not address the issue of adequacy of detention. *Rec.* at 9. The Agency states the "longer detention may be at least partially responsible for the more effective and more consistent nitrification achieved at these facilities." *Id.* at 9-10. The Agency asserts that, while petitioners considered a number of options for increasing the biological treatment capacity, petitioners did not consider the option of increasing detention time by constructing an additional aeration basin and/or an associated additional clarifier. *Id.* at 10. The Agency illustrates its concerns regarding petitioners' request by providing a detailed comparison of petitioners' situation with that of ExxonMobil.

The Agency notes that ExxonMobil is subject to the same ammonia nitrogen standard set forth at Section 304.122(b) and has previously received relief from that standard. *Rec.* at 10. However, the Agency states that "ExxonMobil is now forgoing further Board relief and will have Section 304.122(b) permit limits in their next renewed permit." *Id.* According to the Agency, ExxonMobil's process water treatment system consist of two API separators, air floatation units, activated sludge system, and polishing pond for tertiary treatment. Further, the Agency states that it has issued a construction permit that allows ExxonMobil to add additional clarifiers to the existing treatment plant. The new clarifiers will increase the detention time of the activated sludge system to 19.4 hours². *Id.* at 9. The Agency maintains that petitioners did not adequately address the issue of longer detention time at hearing. *Agency Brief* at 8.

Finally, regarding petitioners' contention that maintaining adequate nitrification is difficult because of a higher percentage of heavy crude in the recent years, the Agency notes that petitioners receive crude oil from the same pipeline system that feeds the other refineries. *Rec.* at 10-11. Based on the information from the other refineries in the state, the Agency concludes that refineries other than petitioners' "have or are making changes to process higher amounts of

² According to AEI's Report, the detention prior to upgrade is 10.9 hours. *Pet. Exh. 9* at 58.

heavy crude. Further, these refineries have no difficulty meeting the applicable ammonia limitations.” *Id.* at 11.

Petitioners’ Response

Petitioners address arguments raised in the Agency’s recommendation in their hearing testimony, posthearing brief, and posthearing reply brief. First, regarding the Agency’s position that Board intended the ammonia nitrogen effluent standard to provide a uniform baseline of treatment technology for all facilities, Mr. Stein testifying on behalf of petitioners emphasizes that the Board’s opinion adopting the effluent standard referred to the role of ammonia in domestic waste. Pet. Exh. 10 at 8; *see* In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, slip op. at 6 (Jan. 6, 1972). Mr. Stein cites two USEPA documents from 1974 and 1982 in support of his argument that treatment of domestic wastewater differs fundamentally from treating refinery effluents. Rec. at 8.

Regarding the Agency’s contention that other refineries in the state are capable of meeting the ammonia nitrogen effluent standard, petitioners argue that the Agency has not provided reliable evidence to support its contention. Petitioners note that, according to the Agency’s testimony, Marathon and Conoco-Phillips do not have concentration limits for ammonia nitrogen. Pet. Br. at 13, citing Tr. at 222-224 (LeCrone testimony). Further, petitioners note that the data provided by the Agency for ExxonMobil reflect ammonia nitrogen concentration limits of “nine and twenty-three, for average and maximum concentration limits.” *Id.* Mr. Stein testified on behalf of petitioners that, “[b]ased on a review of the available NPDES data, the Conoco Phillips Refinery is only in compliance with the 3 mg/L limit approximately 90% of the time and the Exxon Mobil Refinery has been in compliance only since 2005.” Pet. Exh. 10 at 9.

Additionally, petitioners argue that compliance issues facing the Lemont refinery are unique when compared to other refineries in the state. Petitioners note that the Lemont Refinery is the only refinery in the state that “has actually implemented the compliance measures under the Clean Air Act to reduce nitrogen and sulfur oxide emissions and is now discharging those waste streams to a water of the state.” Pet. Br. at 5. Petitioners note that the Marathon refinery does not treat its air pollution control wastewater in its treatment plant. Instead, Marathon hauls its scrubber effluent offsite for treatment and disposal. *Id.* at 5, 14. Further, petitioners state that the ExxonMobil refinery has not begun discharging its air pollution control waste stream to its treatment plant. Petitioners maintain that, while ExxonMobil is not seeking an extension of its site-specific rule, it is taking the risk of not meeting the ammonia nitrogen effluent limit on a consistent basis when the air pollution control system becomes operational. *Id.* at 14-15. Thus, petitioners maintain that no other refinery is discharging an increased level of ammonia nitrogen resulting from Clean Air Act (CAA) compliance measures and consistently meeting the effluent standard at Section 304.122(b). *Id.*

Regarding the Agency’s concerns about the adequacy of the hydraulic detention time of petitioners’ activated sludge system, petitioners maintain that detention time in the aeration basin is not a solution in assuring compliance. Reply at 8. Petitioners cite to testimony of Mr. Stein

and Mr. Huff to support their contention regarding the adequacy of detention time. Mr. Stein testified that, since the overflow rate in the clarification system is lower than in the Exxon Mobil and Conoco Philips refineries, additional clarification would not necessarily make any significant improvement. Tr. at 99. He maintains that, in a properly designed and operated wastewater treatment plant, the performance and the ability to achieve nitrification are influenced by a number of factors. Tr. at 98. Mr. Huff testified that detention time does not equate to better performance. Tr. at 138. He argued that the food to microorganism ratio was a better factor to assess the performance of a biological wastewater treatment plant. *Id.* Regarding the Agency's assertions in its posthearing brief that petitioners did not evaluate the food to microorganism (F/M) ratio, petitioners state that F/M ratio data for refinery treatment plants are not publicly available. Petitioners claim that the Agency "may be the only body with access to private cross-refinery data on food-to-microorganism ratio." Reply at 8-9.

Discussion

The Board adopted the ammonia effluent standard at Section 304.122(a) on January 6, 1972, as Rule 406 to address the impact of ammonia nitrogen in municipal wastewater on dissolved oxygen demand in the receiving stream. *See In the Matter of: Effluent Criteria, In the Matter of: Water Quality Standards Revisions, In the Matter of Water Quality Standards Revisions for Intrastate Waters (SWB-14), R70-8, 71-14, 71-20, (Jan. 6, 1972).* Section 304.122(b) was adopted as an amendment to Rule 406 on June 28, 1973 in Docket R72-4. *See In the Matter of: Water Quality Standards Revisions, R72-4, slip op. at 1 (Nov. 8, 1973).* This amendment extended the ammonia nitrogen effluent limit of 3 mg/L to non-municipal wastewater dischargers, mainly industrial dischargers. The Board did not address the issue of available treatment technologies for various industrial dischargers, other than to state, "present technology is capable of meeting this limit and should result in the removal of much ammonia nitrification oxygen demand (NOD) from these stressed waterways. Ammonia removal from such industrial wastes, when compared with removal from domestic wastes is rather easily applied." *See id.*

The Board agrees with petitioners that the long history of variances and site-specific regulations granted to petitioners and their predecessors over the past 30 years establishes the unique nature of ammonia nitrogen treatment in the refinery's wastewater. However, it is also clear from the record in the previous site-specific rulemaking proceedings that the Board expected the Refinery to investigate alternatives to improve its effluent quality in order to achieve compliance with the generally applicable effluent standard. To this end, the Board specifically included a sunset provision in the site-specific rules applicable to the Lemont Refinery. The most recent site-specific rule adopted in Docket R98-3 expires on December 31, 2008.

The Board notes that the sunset provision in the site-specific rules intended to provide a means of periodic evaluation of the Refinery's progress in improving its effluent quality and to determine whether compliance with the generally applicable effluent standard is technically feasible and economically reasonable. As summarized above under the factual background, petitioners have submitted extensive information regarding their efforts to achieve compliance. This information indicates that petitioners have made significant improvements to their

wastewater treatment plant during the last 10 years. While some of the upgrades are indirectly related to ammonia nitrogen treatment, the Board notes that upgrades to petitioners' activated sludge system improve the nitrification capability of the system. These upgrades include the addition of a third aeration basin, the replacement of the existing mechanical surface aerators with fine-bubble diffused air system, and the addition of a second secondary clarifier. The Board believes that petitioners' efforts to control ammonia nitrogen discharge have resulted in improvement in effluent quality. Although petitioners are unable consistently to meet the generally applicable ammonia nitrogen effluent limits, petitioners have proposed site-specific ammonia nitrogen effluent limits that represent a reduction in the daily limit of 59 percent and in the monthly limit of 27 percent when compared to the current site-specific limits.

While petitioners have taken significant strides in improving their effluent quality, petitioners maintain that they continue to face unique challenges in their efforts to achieve compliance. Petitioners note that the additional ammonia nitrogen loading from their air pollution control system and processing a higher percentage of heavy crude in recent years affect consistent compliance with the generally applicable effluent limits. The additional ammonia nitrogen loading results from petitioners' compliance with the CAA requirements to control sulfur and nitrogen oxide emissions. The Board notes that at present the Lemont Refinery is the only refinery in the state with ammonia nitrogen effluent concentration based limits that treats and discharges air pollution control wastewater. Marathon hauls its air pollution control discharge offsite, Conoco-Phillips does not have compliance issues since it is subject BAT mass limits instead of concentration-based limits, and ExxonMobil's air pollution control system is still not operational. While ExxonMobil is not seeking an extension of its site-specific rule and may become subject to the generally applicable effluent limits, petitioners predict that ExxonMobil may face compliance issues once the air pollution control system becomes operational.

Petitioners assert that the Board should account for uncertainty associated with processing heavy crude and its impact on wastewater treatment. However, the Agency argues that uncertainty associated with heavy crude is not significant since the other refineries receiving crude from the same pipeline have no difficulty meeting the applicable ammonia limitation. Again, the Board notes that the record indicates that all refineries in the state are not subject to ammonia nitrogen concentration limits. Further, the Agency has not provided sufficient data to determine whether the other refineries are capable of meeting the generally applicable ammonia nitrogen effluent standards.

As noted above, the Board has previously found that the Lemont Refinery wastewater has unique characteristics that affect its treatability to comply with the 3 mg/L ammonia nitrogen effluent standard. The Board discussed the issues concerning the high ammonia nitrogen content and inhibitory effects on the nitrifying bacteria of refinery wastewater in the initial site-specific rulemaking. *See In the Matter of: Union Oil Company of California to Amend Water Quality Standards Regulations*, R84-13 (Mar. 19, 1987). In the subsequent site-specific rulemakings pertaining to the Lemont Refinery, the Board noted that, while the Refinery substantially reduced the ammonia nitrogen discharges, the refinery was still unable to achieve compliance on a consistent basis. *See In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213*, R98-14 (Dec. 17, 1998); *In the*

Matter of: Petition of UNO-VEN to amend Regulations Pertaining to Water Pollution, R93-8 (Dec. 16, 1993). Further, the record in the instant rulemaking indicates that petitioners continue to face unique issues when it comes to achieving compliance with the ammonia nitrogen effluent limits. Finally, petitioners' evaluation of compliance alternatives, which are discussed below, indicate that none of the alternatives are technically feasible or able to provide better control of ammonia nitrogen than currently achieved by the Refinery.

Board Finding

As noted earlier, the Board adopted ammonia nitrogen effluent standards under Section 304.122(b) without addressing the availability of treatment technologies for various types of industrial dischargers, particularly refinery wastewater. The Board did not anticipate the issues concerning the treatability of the Lemont Refinery wastewater when it promulgated the ammonia effluent limit at Section 304.122(b). In light of this, the Board finds that factors relating to petitioners are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to petitioners.

Impact on the Environment

Petitioners' Position

Petitioners assert that the requested relief "will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rules of general applicability for ammonia nitrogen." Pet. at 6. Petitioners claim that, during the last five years, the annual average discharge to the Canal has been 102.4 pounds per day. Pet. at 6-7. Petitioners further claim that, with an estimated average of 26.2 pounds per day in the influent, the Refinery's net average discharge is 76.2 pounds per day. *Id.* Accordingly, "about 25 percent of the ammonia nitrogen currently discharged is due to background conditions in the Canal. *Id.* at 7, Postel Test. at 10. Petitioners also argue that, at a concentration of 3 mg/L, "the allowable discharge of ammonia nitrogen from the Refinery is 145 pounds at the design average flow." Pet. at 6.

Based on a 1992 study, petitioners claim that the refinery effluent is dispersed to a 10:1 dilution plume in an area 15 feet long by 8 feet wide in approximately 7 seconds, which is considered as rapid and immediate under the Board regulations at 35 Ill. Adm. Code 302.102. Pet. Brief at 8. According to that study, the overall mixing zone was determined to provide a dilution ratio of 40:1. *Id.* Under current conditions with a lower 7-day 10-year flow in the Canal, petitioners state that the mixing zone dilution ratio is 36.1:1. The ammonia level in the Canal at the edge of the mixing zone was calculated to be 0.805 mg/L. Petitioners claim the actual level will be much lower since the Refinery will be able to nitrify. *Id.*

Further, petitioners note that the ammonia concentrations in the Canal are below 1 mg/L and that unionized ammonia concentrations have been consistently below 0.010 mg/L. This concentration is below the proposed change reflected in the ongoing Chicago Area Waterway System rulemaking in Docket R08-9. Pet. Brief at 7. Finally, petitioners state that "the refinery's impact on dissolved oxygen [concentrations in the Canal] is so minimal that it is

within the margin of error of the sampling method.” *Id.* at 9. In sum, petitioners claim that “[n]o adverse environmental impact, including harm to aquatic life, will result from the granting of the requested adjusted standard.” Pet. at 6.

Agency’s Position

In its recommendation, the Agency “disagrees that the relief from the ammonia nitrogen standard would not have any adverse environmental impacts.” Rec. at 11. The Agency argues that the requested relief would result in “much higher ammonia concentrations” in the Canal. *Id.* The Agency further argues that this will render an area of the Canal “effectively unavailable as habitat for sensitive forms of aquatic life.” *Id.* The Agency claims that requiring the Refinery to meet the generally applicable standard would reduce the size of that area and “help to improve the dissolved oxygen conditions in the Ship Canal.” *Id.* The Agency maintains that requiring petitioners to meet the generally applicable ammonia nitrogen effluent limit would also help in improving the dissolved oxygen conditions in the Canal. Agency Brief at 11.

Petitioners’ Response

In their reply, petitioners look to regulatory relief previously granted by the Board and argue that “the current environmental conditions are even more supportive of there being an adjusted standard for the Refinery.” Reply at 3. Petitioners note the level of ammonia nitrogen in the Refinery’s influent to claim that the Canal is a body of water dominated by effluent. *Id.* at 4. Petitioners claim, however, that the Canal now meets the ammonia nitrogen water quality standard proposed in the Agency’s use attainability analysis. *Id.* Petitioners thus argue that “there appears to be no environmental justification for any further reductions in ammonia nitrogen discharges from the Refinery.” *Id.*, citing Tr. at 188 (Huff testimony). Petitioners maintain that improved nitrification by municipal wastewater treatment plants “has achieved the environmental result the Board sought in adopting 35 Ill. Adm. Code § 304.122(b).” Reply at 4. Petitioners conclude that “[t]here is then no environmental basis for denying the adjusted standard as requested by the Refinery.” *Id.*

Petitioners also address the Agency’s claim regarding the environmental effect of the requested relief. In his testimony, Mr. Huff notes that the Agency since the late 1980s has supported relief from the Board’s ammonia nitrogen regulation “in part based on the absence of environmental impact.” Huff Test. at 9. Mr. Huff also states that the Refinery “continues to make progress in reducing its ammonia discharge.” *Id.* at 10. He argues that “[t]he requested relief will *reduce* the permitted daily maximum by 59 percent.” *Id.* (emphasis in original).

Discussion

The environmental impact of the refinery’s wastewater on the receiving stream has been evaluated since the refinery was first granted relief in the form of a site-specific rule in 1987. At that time, the Canal was violating both ammonia nitrogen and dissolved oxygen water quality standards. These violations were expected to decline once the Metropolitan Water Reclamation District’s (MWRD) Calumet plant achieved compliance with its ammonia nitrogen and BOD effluent standards. See In the Matter of: Union Oil Company of California to Amend Water

Quality Standards Regulations, R84-13 (Mar. 19, 1987). In 1993, the Board noted that studies performed for UNO-VEN, petitioners' predecessor, show that the Refinery's discharge has no substantial impact on dissolved oxygen levels. Further, the Refinery maintained that compliance with the generally applicable effluent limit would not result in a measurable improvement of the Illinois River System. *See In the Matter of: Petition of UNO-VEN to amend Regulations Pertaining to Water Pollution, R93-8* (Dec. 16, 1993). The Board notes that issues pertaining to environmental impact were not raised during the adoption of a recent site-specific rule. *See id.*

The Board notes that the water quality of the Canal in terms of ammonia nitrogen has improved significantly since the adoption of the initial site-specific rule for the Lemont Refinery. As indicated by the water quality information provided by petitioners, the Canal meets the ammonia nitrogen standard at the edge of the mixing zone. While a small portion of the Canal within the mixing zone would be subject to higher ammonia levels, the Board notes that the concept of mixing as a means of compliance is an integral part of the Board's water quality regulations. As long as mixing zone is established in accordance with the Board regulations, mixing would have minimal impact on aquatic life. The Board also notes that the data on ammonia nitrogen loading on the receiving stream indicate that the average mass loading during the last five years is significantly lower than the maximum loading that would be allowed under the generally applicable effluent limit of 3 mg/L.

Board Finding

The Board finds that the Lemont Refinery's discharge does not have an adverse environmental impact on the receiving stream. The water quality information submitted by petitioners provides assurance that, even under the existing site-specific ammonia nitrogen effluent limits, the Lemont Refinery does not adversely impact the Canal. In addition, the improvement in the refinery's effluent quality and the proposed reduction of the existing ammonia nitrogen limits will have a positive impact on the receiving stream. However, the Board expects petitioners to continue their efforts to further reduce their ammonia nitrogen discharge and achieve full compliance with the generally applicable ammonia nitrogen effluent standard. Accordingly, as proposed by petitioners, the Board will require petitioners to continue its efforts to reduce ammonia discharge from the Lemont Refinery.

Consistency with Federal Law

Petitioners' Position

Petitioners state that Section 303(d) of the Clean Water Act (CWA) "requires states to identify impaired waterways and the causes of impairment and then develop what is essentially a waste load allocation for addressing the impairment." Pet. at 9. According to the Agency's 2006 water quality report, the Canal is listed as impaired for a variety of reasons, none of which is ammonia nitrogen. *Id.* at 9-10.

Petitioners note that USEPA has adopted categorical limits applicable to industries including petroleum refining. Pet. at 10. Petitioners assert that these regulations "are less stringent than the limits in the existing site-specific rule." *Id.* citing 40 C.F.R 419; *see* 35 Ill.

Adm. Code 304.213, Postel Test. at 5. Petitioners claim that the Board has found that the Refinery's wastewater treatment system exceeds USEPA's BAT requirements. Pet. at 10. Petitioners state that USEPA has also "established effluent guidelines for wastewater discharges by industry category." *Id.* On the basis of its processes and production, the Refinery is classified as a cracking refinery with effluent limits based on production and calculated on the basis of pounds per day. *Id.*

Petitioners also note that Illinois regulations limit the size of an allowable mixing zone to 25 percent of stream flow and require meeting water quality standards at the edge of that mixing zone. Pet. at 10; *see* 35 Ill. Adm. Code 302.102. Petitioners maintain that the requested monthly average concentration of 6.9 mg/L as the projected discharge and 25 percent of the Canal's low flow yield "an incremental change of 0.17 mg/L at the edge of the mixing zone." Pet. at 10; *see* Pet. Exh. 2 at 33. After noting that the Refinery has operated under a number of variances and site-specific rules granted by the Board, petitioners argue that the requested relief is not inconsistent with the effluent standards and area-wide planning criteria under the Clean Water Act. Pet. at 11.

Agency Position

The Agency states that allowing higher ammonia discharge levels to the Canal would be in a direct conflict with the mandates of the Clean Water Act (CWA). Rec. at 12. Specifically, the Agency notes that, pursuant to Section 303(d) of the CWA, the Canal is designated as impaired for indigenous aquatic life use with dissolved oxygen as one of the causes. The Agency asserts that federal regulations require states to conduct a total maximum daily load (TMDL)³ for pollutants causing impairment, and also for all pollutants that prevent or are expected to prevent the attainment of water quality standards. *Id.* Since ammonia is an oxygen demanding substance, the Agency argues that "adding higher ammonia discharge levels would only further prevent attainment of dissolved oxygen standard." *Id.*

Discussion

The Board notes that when the first site-specific rule was adopted for the Refinery in 1987, USEPA stated that, "because the technology-based standard is clearly more stringent than BAT and appears more stringent than dictated by water quality concerns, applicability is appropriately a state decision." *See In the Matter of: Union Oil Company of California to Amend Water Quality Standards Regulations*, R84-13 (Mar. 19, 1987). USEPA thus indicated that site-specific relief was consistent with the federal law at that time. Other than the issue of consistency with Section 303(d) of the CWA, the record indicates that issues concerning federal categorical requirements and BAT limitations have not changed since the adoption of the initial site-specific rule.

³ TMDL (total maximum daily load) is a calculation of the maximum amount of a pollutant from all contributing sources that a water body can receive and still meet the water quality standard. Rec. at 12.

Regarding the Agency's argument that higher effluent ammonia nitrogen concentrations prevents the attainment of dissolved oxygen standard, the Board notes that the studies performed for UNO-VEN, Citgo's predecessor, in support of its 1993 site-specific rule "show that the refinery's discharge has no substantial impact on dissolved oxygen levels." See In the Matter of: Petition of UNO-VEN to amend Regulations Pertaining to Water Pollution, R93-8 (Dec. 16, 1993). In this regard, Mr. Huff testified that, in the earlier rulemaking, petitioners used the QUAL2E model to predict dissolved oxygen levels in the Canal and the Des Plaines River to the Illinois River. He noted that, based on the level of the maximum daily load at low flow, the impact on DO was a maximum of 0.06 mg/L, below what is capable of measurement with a dissolved oxygen meter. Tr. at 189.

Board Finding

The Board finds that granting petitioners the requested relief from the ammonia nitrogen effluent standard at Section 304.122(b) is not inconsistent with federal law. The record clearly indicates that the proposed effluent limits are more stringent than the federal categorical and BAT requirements. Further, granting of the requested relief does not have a significant impact on the attainment of the dissolved oxygen standard in the Canal.

Efforts to Achieve Compliance and Alternatives

Petitioners' Position

Petitioners argue that the Refinery has since 1984 undertaken a number of efforts to reduce the concentration of ammonia nitrogen in its wastewaters. Pet. at 13-14. In addition, Ms. Postel testified that the Refinery in the 12 to 18 months preceding the hearing took a number of steps to improve its nitrification. Specifically, she testified that the Refinery had begun to segregate the desalter water from other process wastewaters; continuously remove solids from the process water tanks; use operational checks to conduct management of monoethylene amine (MEA), which is used to scrub refinery gases and waters; and add an antifoam to the MEA system. Tr. at 119.

In her testimony, Ms. Postel claimed that petitioners and their predecessors had spent nearly \$75 million to improve the Refinery's wastewater treatment facilities, with nearly \$45 million of those expenditures in the last ten years. Postel Test. at 7 (¶19). While Ms. Postel acknowledges that "some of that was not done for the specific purpose of improving nitrification, approximately one quarter of that investment had, as a substantial component, improving the ability of the wastewater treatment process to provide nitrification." *Id.* She further claims that some improvements that were not intended chiefly to improve nitrification nonetheless improved that process. *Id.* She cites as one example the Purge Treatment Unit (PTU), which the Refinery installed as a component of a consent decree "in large part to ensure consistent ammonia nitrogen removal." *Id.*, citing Pet. Exh. 10 at 7.

Petitioners claim that the Refinery processes an increasing proportion of heavy crude oils and expects that trend to continue. Pet. at 3, Postel Test. at 6. Petitioners assert that, despite reliance on heavier crude oils, higher crude oil throughput, and decreased volumes of

wastewater, the Refinery has improved the performance of its ammonia removal. Pet. at 15, Postel Test. at 6. Nonetheless, petitioners conclude that “the Refinery cannot continuously meet the 3 mg/L limitation.” Pet. at 15 (¶44). As a part of its justification for requested relief, petitioners examined alternatives to the Refinery’s current wastewater treatment process. See Pet. at 15-17; Pet. Exh. 9 at 40-60 (Section 4.0 Analysis of Alternatives).

This evaluation was performed by AEI on behalf of petitioners. AEI analyzed a number of technologies to determine whether one or more might remove ammonia to an extent that would consistently comply with the 3 mg/L standard. Pet. at 14 (¶40), Pet. Exh. 9 at 40. “AEI conducted an analysis of these treatment technologies for application at the refinery based on technical and economic feasibility.” *Id.* AEI evaluated activated sludge treatment (AST) and various AST modifications, land treatment, wetland polishing, and physical-chemical treatment technologies. Pet. Exh. 9 at 40-41. Based on an initial evaluation, which involved a review of available literature, previous studies on the Refinery’s wastewater, and its own experience with similar wastewaters, AEI specifically identified four activated sludge based technologies as having “the greatest potential for achieving the Illinois 3.0 mg/L ammonia nitrogen standard on a consistent basis.” *Id.* at 41; see Pet. Exh. 10 at 5-6. These four are:

Activated sludge with powdered activated carbon addition. (Pet. Exh. 9 at 43-46.)

This technology adds powdered activated carbon to the aeration basin mixed liquor and “includes a wet air oxidation process which allows for recovery of the powdered activated carbon (PAC).” Pet. Exh.9 at 43. This alternative also requires “construction of a third secondary clarifier to handle both the additional solids loading from the powdered carbon and the slower settling nitrifying bacteria.” *Id.*; see *id.* at 44 (Table 4-2 design summary), 45 (Figure 4-1 process flow diagram). This technology enhances the existing treatment system by “providing removal of biologically resistant organics.” *Id.* at 43. “The mechanism for powdered activated carbon to enhance biological nitrification appears to be through removal of inhibitory compounds rather than enhanced nitrifier growth on the surface of suspended solids.” *Id.*; see Pet. Exh. 10 at 5.

Activated sludge with a fixed media system. (Pet. Exh. 9 at 46-49; see Pet. Exh. 10 at 6.)

In this process, the activated sludge system provides a suspended growth biological system for removal of the organic components in the wastewater. This is then followed by a fixed media rotating biological contactor (RBC), closely-spaced discs mounted on a horizontal shaft and submerged and rotating in the wastewater. Pet. Exh. 9 at 46, see *id.* at 48 (Table 4-3 design summary), 49 (Figure 4-2 process flow diagram). “The surface of the discs provides an ideal mechanism for nitrifying organisms to grow.” Pet. Exh. 9 at 46; see Pet. Exh. 10 at 6, Tr. at 211-12 (Stein testimony). AEI states that this alternative would require a tertiary clarifier, “since there will be some sludge sloughing and additional solids discharging into the RBC system.” Pet. Exh. 9 at 47.

Activated sludge with membrane bioreactor. Pet. Exh. 9 at 47, 50-53, Pet. Exh. 10 at 5-6.

This system “couples the activated sludge process with membrane separation of the treated effluent from the mixed liquor.” Pet. Exh. 9 at 47. With the membrane added directly to the aeration basins, the basins can maintain high MLVSS levels and sludge ages. *Id.* at 50; see

id. at 51 (Table 4-4 process design), 52 (Figure 4-3 process flow diagram). “[E]xisting secondary clarifiers would be converted to sludge thickeners.” *Id.* at 50.

Activated sludge with breakpoint chlorination/dechlorination. Pet. Exh. 9 at 53-57.

“Breakpoint chlorination provides chemical destruction of the ammonia nitrogen.” *Id.* at 53. Specifically, wastewater is chlorinated following the activated sludge system to generate a free chlorine residual. *Id.* “Dechlorination is accomplished by adding sulfur dioxide after the chlorine reaction is completed.” *Id.*; *see id.* at 54 (Table 4-5 design summary), 55 (Figure 4-4 flow diagram).

AEI analyzed each of these technologies as additions designed to improve the capability for nitrification at the existing wastewater treatment system. Pet. Exh. 9 at 41. Specifically, AEI developed process designs including “the actual design parameters, the required modifications to the treatment system to implement these technologies, and a comparative cost estimate for each design alternative.” *Id.* The costs associated with each technology along with AEI’s findings on technical feasibility of treating the Lemont refinery wastewater are summarized in the table below.

Summary of AEI’s Evaluation of Compliance Alternatives

| Treatment Alternative | Capital Cost (\$ Million) | Annual Operating Cost (\$ Million) | Total Annualized Cost (\$ Million) | Issues of Technical Feasibility |
|---------------------------------------------|---------------------------|------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AS with Powdered activated Carbon | 14.8 | 1.42 | 3.63 | <ul style="list-style-type: none"> Lacks proven reliability to consistently achieve 3 mg/L Results in increased sludge production |
| AS with Rotating Biological Contactor (RBC) | 13.5 | 1.2 | 3.2 | <ul style="list-style-type: none"> History of shaft failure Chemical incompatibility may cause RBC media failure No assurance of consistent compliance with 3 mg/L limit |
| AS with Membrane Bioreactor | 54.7 | 3.3 | 11.4 | <ul style="list-style-type: none"> New technology, limited experience in petroleum industry Membrane cleaning/replacement very costly |

| | | | | |
|----------------------------------------------------|----|-----|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | | | <ul style="list-style-type: none"> • May not provide consistent compliance with 3 mg/L limit |
| AS with Breakpoint chlorination/ dechlorination | 14 | 3.3 | 3.6 | <ul style="list-style-type: none"> • Simplest in terms of equipment/operation • Chlorinated by-products in effluent • Not an appropriate technology for organics containing waste streams |

AEI states that, while an addition such as a fixed media biological treatment unit at the Refinery may remove more ammonia, it does so at significant expense. Pet. Exh. 9 at 59. AEI also concludes that “it is uncertain that the upgraded system would achieve consistent compliance with the 3.0 mg/L ammonia nitrogen standard.” *Id.* AEI concludes that “upgrading the treatment system with additional treatment technologies for ammonia removal is not justified.” *Id.*; see Pet. at 16, Postel Test. at 8-9, Pet. Exh. 10 at 6, 17.

AEI notes that the Refinery has participated in various studies and programs to address wastewater treatment and that it expects “to improve treatment plant performance based on research through the Petroleum Environmental Research Forum. Pet. Exh. 9 at 59. Although stressing that nitrification may be affected by “the inherent variability in refinery wastes,” AEI expects optimization of the existing system to yield improved performance of the treatment system. *Id.* AEI recommends that the Lemont Refinery continue its ongoing research studies and projects designed to optimize the existing wastewater treatment system to obtain the maximum possible ammonia removal on a consistent basis. *Id.* at iii (Executive Summary). Based in part on AEI’s report and conclusions, petitioners have proposed to “continue to investigate improvements to its existing wastewater treatment system.” Pet. at 18, Postel Test. at 10.

Cost Effectiveness of Compliance Alternatives

Petitioners relied on cost effectiveness of the compliance alternatives to illustrate the high cost of implementing the lowest cost alternative at the Lemont refinery. In his testimony on behalf of petitioners, Mr. Huff addressed the cost effectiveness of these alternatives. Huff Test. at 12. He noted that, over the last decade, the Refinery has made a net contribution of 43 pounds per day of ammonia to the Canal. *Id.*, citing Pet. Exh. 5 at Figure 3 (Annual Average Ammonia Influent and Effluent Loading). Assuming that the lowest cost of the four alternatives discussed in the preceding paragraphs would remove that 43 pounds per day contribution, the annualized cost of \$3,220,000 would translate to a cost of \$205 per additional pound removed. Huff Test. at 12. Mr. Huff determined the cost of removal on the basis of effluent data from June 2002 through July 2007 to be \$113.30 per pound. Pet. at 17.

Petitioners compared the cost effectiveness of the lowest cost compliance alternative to the cost of ammonia removal at MWRD's Calumet plant. Petitioners note that, after adjusting its figures for inflation, a 1983 analysis shows that the Calumet Water Reclamation Plant removes ammonia at a cost of approximately \$3.00 per pound. Pet. at 17, Huff Test. at 13. Petitioners also claim that the MWRD has spent \$39 million installing five side-stream aeration facilities along the Chicago Waterway to add oxygen to compensate for 720,000 pounds of ammonia discharged by MWRD's plants. *Id.* Including the cost of aeration, the cost per pound of ammonia oxidized translated to approximately \$7-10. *Id.* at 17-18 and at 13 (citing 1983 Huff & Huff assessment of Refinery discharge).

Wastewater Treatment at Other Refineries in Illinois

In addition to reviewing alternative wastewater treatment technologies that might improve ammonia removal at the Refinery, petitioners also reviewed the performance of technologies employed by the following other refineries in Illinois: Conoco Phillips in Roxana, Exxon Mobil in Joliet, and Marathon in Robinson. Pet. Exh. 9 at 57; see Pet. at 18, Postel Test at 9. That review concluded that "[t]he treatment process at the Lemont Refinery is similar to that at the other Illinois refineries. All of the refineries employ the activated sludge process for nitrogen removal." Pet. Exh. 9 at 57. AEI found only the activated sludge retention time to be the only difference among the four treatment systems. *Id.* "The Conoco Phillips and Marathon refineries have a longer retention time than the Lemont Refinery. The Exxon Mobil and Lemont Refineries have similar activated sludge retention times." *Id.*

Petitioners argue that none of the other three Illinois refineries "were using the technologies investigated by Aware [AEI] as possible additions to the Lemont Refinery." Pet. at 18. Further, petitioners strenuously dispute the Agency's claim that other Illinois refineries "are able to guarantee compliance" with a monthly average ammonia concentration limit of 3.0 mg/L and a daily maximum limit of 6.0 mg/L." Pet. Brief at 14. In testimony on behalf of petitioners, witnesses elaborated on these comparisons of the Refinery with the other three Illinois refineries.

ExxonMobil. With regard to Exxon Mobil, Mr. Huff expressed the understanding that its refinery is constructing a PTU to manage its air pollution control discharge and intends to send the stream from that unit into its biological wastewater treatment plant instead of bypassing that plant. Tr. at 135. At present, the Exxon Mobil refinery is discharging under the terms of a site-specific rule. However, according to the Agency, Exxon Mobil does not seek to extend that site-specific rule to apply during the operation of the PTU. Tr. at 242-43; see Tr. at 150-51. Mr. Huff characterizes this as "a higher risk approach," as the additional loading requires an increased air supply in the activated sludge unit, decreases separations of solids, and can produce filamentous growth in the clarifiers. *Id.* at 130-31, see also *id.* at 133, 135-36 (Stein testimony). Mr. Huff expresses the belief that this approach could have short-term negative effects on the system's ability to nitrify. *Id.* at 132-33. Mr. Stein agreed that, if an existing wastewater treatment plant achieving nitrification begins to receive PTU discharge from an air pollution control device such as an FCC, it may not be able to continue achieving nitrification. *Id.* at 134. Mr. Stein opined that, under these circumstances, Exxon Mobil "very well could experience

problems” and may not “be able to handle and achieve nitrification with that PTU discharge going into the regular plant.” *Id.* at 136.

Conoco Phillip Refinery. Based on a review of Conoco Phillips’ 2002-07 ammonia effluent levels, Mr. Huff states that Conoco Phillips does not meet a 3.0 mg/L monthly average or a 6.0 mg/L daily maximum all of the time. Huff. Test. at 10; *see* Tr. at 137-38, Pet. Exh. 10 at 9 (finding approximately 90% compliance). He further argues that, because Conoco Phillips’ intake is groundwater, its average ammonia discharge of 67 pounds per day can be considered a net discharge exceeding the Refinery’s net discharge of 43 pounds per day. *Id.*; *see* Tr. at 138-39. Mr. Huff claims that, because of differing water conservation practices, newer refineries such as petitioners’ may “discharge less water per barrel of crude processed than older refineries,” making it misleading simply to compare the concentrations discharged. Huff Test. at 10. Mr. Huff maintains that “[t]he Lemont Refinery nitrifies a high percentage of the time and its effluent also passes the whole effluent toxicity testing.” *Id.* He argues that Conoco Phillips’ discharge is “very similar to” and “totally consistent with the Lemont Refinery’s performance.” *Id.*; *see* Tr. at 138.

Marathon Refinery. At hearing, Mr. Stein acknowledged that, while using an activated sludge system similar to the Refinery’s, Marathon achieved low ammonia nitrogen concentrations in its effluent. Tr. at 152-53. The Agency acknowledged, however, that Marathon was not subject to the ammonia nitrogen concentration limit of 3.0 mg/L. Tr. at 235 (Le Crone testimony). Under the terms of a current permit dated 1989, Marathon was subject to mass-based limits with a daily average of 763 pound of ammonia and a daily maximum of 1,679 pounds. Tr. at 235-36. Petitioners note that the Marathon refinery does not treat its air pollution control wastewater in its treatment plant. Instead, Marathon hauls its scrubber effluent offsite for treatment and disposal. Pet. Br. at 5, 14.

Agency Position

The Agency first addresses petitioners’ list of improvements made since 1987 at the Refinery. While the Agency acknowledges that some the improvements were related to ammonia removal, it states that others appear not to be directly related to ammonia removal and that some other provide multiple benefits. Rec. at 5. The Agency argues that the \$75 million of wastewater treatment improvements claimed by petitioners are not itemized and explained and are not entirely relevant to the issue of ammonia removal. *Id.* at 5-6, citing Pet. at 4 (¶8).

The Agency also addresses the issue of detention times in the Refinery’s aeration basins. Regarding petitioners’ claims that the operating parameters for biological treatment at the Refinery are within proper ranges for providing nitrification, the Agency states that the Refinery’s “aeration basins have the lowest detention time of the four refineries in Illinois.” *Id.*, citing Pet. Exh. 9 at 58. The Agency notes that the detention time in petitioners’ aeration basin is 7.7 hours as compared with ExxonMobil at 10.9 hours currently and an upgrade to 19.4 hours, Conoco-Phillips at 31.4 hours, and Marathon at 37 hours. *Id.* The Agency claims that the “[t]hese longer detention times may be at least partially responsible for the more effective and more consistent nitrification achieved at these facilities.” Rec. at 9-10.

The Agency argues that petitioners need “to investigate whether their equipment is properly sized and operated for the current needs of the facility,” as it has not addressed “the adequacy of residence time in the aeration basins to ensure that consistent nitrification is occurring.” Rec. at 9. Regarding the evaluation of compliance alternatives, the Agency states that petitioners “did not consider the construction of an additional aeration basin and/or an associated additional clarifier to provide a longer detention time, more in line with other refineries.” *Id.* at 9-10; *see* Tr. at 249-51 (Le Crone testimony). Further, the Agency disputes petitioners’ claims 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).” Rec. at 16, citing Pet. at 16. The Agency maintains that other Illinois refineries have successfully used these technologies to achieve consistent compliance with the ammonia nitrogen standard. Rec. at 16 (¶37). The Agency notes that ExxonMobil, which intends to construct additional clarifiers to increase detention time, intends to meet the ammonia nitrogen concentration limits at 35 Ill. Adm. Code 304.122 (b). Rec. at 10 (¶21). The Agency suggests that “this upgrade may be at least partially responsible for meeting the applicable ammonia limits.” *Id.*

In its post hearing brief, the Agency states that, in previous petitions, the Board has required continuing efforts to meet the generally applicable rule and has set a date on which the regulatory relief expires. Agency Brief at 5. The Agency claims that it was appropriate for the Board to extend the expiration date from one site-specific rule to another because of technical limitations in achieving compliance. *See* Agency Brief at 5-6. The Agency asserts that, because those technical limitations no longer apply, the Refinery must now comply with the 3.0 mg/L ammonia nitrogen concentration limit on or before December 31, 2008, the expiration of the current site-specific rule. *See id.* The Agency argues that petitioners acknowledge all four refineries in Illinois use wastewater treatment technologies that are very similar to one another. Pet. Brief at 6, citing Postel Test. at 9, Pet. Exh. 10 at 14. Further, the Agency contends that the three refineries other than petitioners’ “have demonstrated that the goals and expectations of Section 304.122(b) can be met and *are technically feasible.*” Pet. Brief at 6 (emphasis in original).

The Agency emphasizes its observation that longer detention times for the activated sludge at the other refineries in Illinois “may contribute” to their compliance with the rule of general applicability. Ag. Br. at 8. The Agency notes Mr. Stein’s agreement that, among the treatment systems at the four refineries, retention time appears to be the only difference. *Id.*, citing Pet. Exh. 10 at 14. The Agency also notes that, while Mr. Stein referred to a comparison of food to micro-organism ratios as a “more realistic evaluation,” he had not performed such a study. Agency Brief at 8. The Agency argues that petitioners have failed to demonstrate that compliance with the Board’s ammonia nitrogen standards is not technically feasible at the Refinery. Agency Brief at 10. The Agency concludes by requesting that the Board deny petitioners’ request for relief. *Id.*

Petitioners’ Response

In response to the Agency's arguments about the expiration of regulatory relief (*see* Agency Brief at 5-6), petitioners state that "[t]he sunset provision in R84-13 did not preclude the Board's order in R93-8. Further, the sunset provision in R93-8 did not preclude an even longer-lasting Order in R98-14." Reply at 3; citing In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14, In the Matter of: Petition of Uno-Ven to Amend Regulations, Pertaining to Water Pollution, R93-8, In the Matter of: Proposal of Union Oil Company of California to Amend the Water Pollution Regulations, R84-13. Petitioners argue that they have proposed an adjusted standard with only half of the duration of the relief granted by the Board in R98-14. Reply at 3, citing In the Matter of: Petition of PDV Midwest Refining, L.L.C. for a Site-Specific Rulemaking Amendment to 35 Ill. Adm. Code 304.213, R98-14. Additionally, petitioners argue that in no previous order granting regulatory relief to the Refinery has the Board ever indicated that it was the final relief the Board would grant. Reply at 5.

Petitioners also dispute the Agency's claim regarding the technical feasibility of complying with the generally applicable rule. Petitioners assert that, while the four Illinois refineries use similar wastewater treatment technologies, "they do not all utilize similar *air control methods, complete* on-site wastewater treatment, or identical configuration of wastewater treatment technologies." Reply at 5 (emphasis on original). Petitioners maintain that Exxon Mobil has not yet added its PTU discharge to its general wastewater treatment, an addition which may jeopardize its ability to achieve nitrification. *Id.*, citing Tr. at 137, 210-11, 244 (Stein and Huff testimony). Petitioners argue that "Marathon does not discharge all of its ammonia-nitrogen bearing waste stream through its wastewater treatment facilities" and that warmer weather at its southern Illinois location is more conducive to nitrification. Reply at 5. Finally, petitioners note that Conoco Phillips is not subject to the requirements of 35 Ill. Adm. Code 304.122(b).

Petitioners express astonishment that the Agency continues to emphasize detention time as a means of reducing ammonia discharges from the Refinery. Reply at 8. Petitioners maintain that the Agency failed to support its claim with any evidence or testimony that increased detention time would improve nitrification. Reply at 8. Petitioners claim that the Agency has overlooked testimony by Mr. Stein and Mr. Huff that increased detention time would not solve the Refinery's discharge issues. *Id.*, citing Tr. at 138. Specifically, petitioners argue that Mr. Stein testified that "increased detention time may actually harm nitrification because it also leads to greater cooling." Reply at 8, citing Tr. at 253-54. Petitioners also note that the Agency has criticized Mr. Stein for failing to compare the four refineries' food-to-microorganism ratios when those data are not publicly available and may constitute trade secrets. *Id.* at 8-9.

Finally, petitioners state that they have addressed all of the issues set forth in the Board's procedural rules and have met their burden of proof as set forth in the Act. Reply at 9, citing 415 ILCS 5/27(a) (2006), 35 Ill. Adm. Code 104.406. Claiming that the Agency has not successfully disputed their evidence, petitioners assert that the Agency does not "present a cognizable reason to deny the regulatory relief that Petitioner has so thoroughly demonstrated it deserves." Reply at 10.

Discussion

Petitioners assert that their requested relief is justified due to lack of a technically feasible and economically reasonable alternative for removing ammonia nitrogen and achieving consistent compliance with the generally applicable ammonia nitrogen effluent standard at Section 304.122(b). Petitioners support their assertions by relying on AEI's evaluation of petitioners' present wastewater treatment plant and alternative ammonia removal technologies. Pet. at 14. AEI evaluated the technical feasibility and economic reasonableness of several compliance alternatives described above. The Board notes that AEI also evaluated petitioners' present wastewater treatment plant and its operation to determine if the system is consistent with USEPA BAT criteria, and whether the system conditions are conducive to biological nitrification. Pet. Exh. 9 at 2. The Board will below discuss petitioners' efforts to achieve compliance, the technical feasibility and economic reasonableness of the compliance alternatives, the Refinery's present wastewater treatment plant, and issues raised by the Agency.

Petitioners' Efforts to Achieve Compliance

The Board notes that petitioners have since 1984 undertaken a number of efforts to reduce the concentration of ammonia nitrogen in its wastewaters. Pet. at 13-14. Specifically, petitioners assert that they have spent nearly \$45 million on various improvements to its treatment plant since the granting of the current site-specific rule in 1998. While the Board agrees with the Agency that not all improvements are directly related to reduction of ammonia nitrogen, several upgrades such as addition of aeration basin, upgraded aeration system, and addition of second secondary clarifier are directly related to the plant's ability to nitrify. Although a breakdown of the cost of various improvements related to nitrification would have been helpful, the record clearly indicates that petitioners made significant efforts to improve the Refinery's effluent quality. The improvement in nitrification is reflected in the proposed ammonia nitrogen effluent limits of 6.93 mg/L whenever the monthly average discharge exceeds 100 pounds of ammonia per day and 10.61 mg/L whenever the daily discharge exceeds 200 pounds. These proposed limits represent a 59 percent reduction of the daily limit and a 27 percent reduction of the monthly limit.

Additionally, the Board notes that petitioners have proposed to take additional steps to further reduce the ammonia levels in its effluent during the course of the adjusted standard. These measures include an additional 2 million gallons of storage capacity, participation in investigation of reducing desalter environmental impacts, and work with the Agency to develop a permit condition to address definition of malfunction/upset.

Compliance Alternatives - Technical Feasibility and Economic Reasonableness

The Board notes that AEI specifically identified four modifications of activated sludge (AS) process system as having the greatest potential for achieving the ammonia nitrogen effluent standard of 3.0 mg/L on a consistent basis. Pet. Exh. 9. at 41; *see* Pet. Exh. 10 at 5-6. These technologies include AS with powdered activated carbon (PAC), AS with rotating biological contactor (RBC), AS with membrane bioreactor, and AS with breakpoint chlorination/dechlorination (BCD). The Board notes that, with the exception of AS with BCD, AEI found that none of the other technologies assure consistent compliance with an effluent

standard of 3 mg/L. Regarding AS with BCD, AEI noted that, while the technology is capable of removing ammonia, there is risk because of the formation of chlorinated organic compounds. Since these compounds have toxic effect on aquatic life, AEI states that AS with BCD is not a justifiable treatment technology for the Refinery's organic containing waste stream.

The Board notes that, while all the four technologies evaluated by AEI are reported to be applicable for providing ammonia removal, AEI evaluated to determine whether these technologies are suitable for treating the Lemont Refinery wastewater to comply with the effluent standard of 3 mg/L on a consistent basis. In this regard, the Board notes that AEI has identified specific problems associated with each technology and that may result in the effluent not meeting the effluent limit on consistent basis. AEI states that AS with PAC may not be able to adsorb compounds which limit nitrification at the Refinery. This system also results in increased sludge production, adding to the operating costs. Regarding AS with RBC, AEI notes that there is a potential for chemical incompatibility with the refinery wastewater and that the RBC system is prone to mechanical failure. AEI notes that membrane bioreactor is a new technology with limited data on utilization in the petroleum industry. As noted above, AEI maintains that AS with BCD is not a justifiable treatment technology for the Refinery's wastewater.

As summarized in a table above, AEI estimated the capital cost, annual operating cost, and total annualized cost for the four compliance alternatives. The capital cost range from \$54.7 million for AS with membrane bioreactor to \$13.5 million for AS with RBC. The total annualized cost range from \$11.4 million for AS with membrane bioreactor to \$3.2 million for AS with RBC. Further, the Board notes that petitioners' comparison of cost effectiveness shows that the cost of removal of ammonia for the Refinery using AS with RBC, the lowest cost compliance alternative, would be \$205 per additional pound removed as compared to a cost of \$7-10 for the MWRD plant. The Board also notes that none of the other three refineries in the state employ any alternative treatment technologies other than single stage activated sludge treatment to achieve nitrification.

Aeration Basin Detention Time and F/M Ratio

The Agency raised the issue of aeration basin detention time as potential factor affecting the degree of nitrification in the Refinery's wastewater treatment plant. The Agency argues that, while petitioners considered various options for increasing the biological treatment capacity, it did not consider the construction of an additional aeration basin and/or an associated additional clarifier. Rec. at 10. The Board notes that, according to AEI, the detention time in petitioners' aeration basin is 7.7 hours as compared with ExxonMobil at 10.9 current hours and an upgrade to 19.4 hours, Conoco-Phillips at 31.4 hours, and Marathon at 37 hours. Pet. Exh. 9 at 58. The Board recognizes the Agency's concern regarding the issue of detention, since AEI noted that the only difference between treatment systems of petitioners' and other Illinois refineries is the detention time.

However, Mr. Stein testifying on behalf of petitioners addressed the issue of detention time. He stated that increased detention time would not solve the Refinery's discharge issues. Tr. at 138. Specifically, Mr. Stein explained nitrification was dependent a number of factors

such as the F/M ratio, type of aeration system, and configuration of the aeration basin. Tr. at 174. Mr. Stein noted that detention time was one of the factors he considered in his evaluation of the Refinery's treatment plant. He found that the plant had adequate detention time since the system was equipped with fine bubble diffusers, which are a better approach to get good oxygen transfer. Tr. at 175. Mr. Stein also testified that increased detention time might actually harm nitrification because it also leads to greater cooling. Tr. at 253-54. In this regard, he noted that the threshold temperature between having good nitrification and experiencing problems is around 68° F and that petitioners' treatment plant operates at 72° F.

Regarding the Agency's contention that petitioners should have evaluated the F/M of other refinery treatment plants, petitioners state that AEI was not able to compare the F/M ratios because such information is not publicly available. Petitioners note that the Agency may be the only body with access to cross-refinery data on F/M ratio. The Board finds that, while petitioners have generally addressed the issue of detention time, this factor must be further evaluated as a part of petitioners' ongoing investigation. Particularly, since the Agency claims that a potential reason for ExxonMobil not seeking an extension of its site-specific relief is its proposed expansion, which will increase its detention time. See Rec. at 10. The Board also finds that petitioners should further evaluate the issue of F/M ratio, if the Agency is willing provide the necessary F/M data.

Board Finding

The Board finds that petitioners have made significant efforts to achieve compliance during the last 10 years. Further, the Board believes that petitioners' commitment to continue its efforts to reduce ammonia nitrogen discharge during the course of the adjusted standard, along with any new data that may become available from other refineries, will help petitioners resolve its compliance issues.

The Board also finds that, while ammonia removal beyond the current levels from the Refinery's wastewater may be technically feasible, the compliance alternatives do not assure compliance with the effluent standard of 3 mg/L on a consistent basis. In light of this, the Board finds that the high cost of associated with the implementation of the compliance alternatives is not economically reasonable.

Other Issues

Chicago Area Waterway System (CAWS) Rulemaking (R08-9)

In October 2007, the Agency filed a proposal to amend the water quality standards of Secondary Contact waterways under 35 Ill. Adm. Code 302, Subpart D as CAWS water quality standards. See In the Matter of: Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303, and 304, R08-9 (Oct. 26, 2007) (proposed regulations). The proposed amendments include ammonia nitrogen water quality standards similar to the General Use ammonia water quality standard found at 35 Ill. Adm. Code 302.212(e). If adopted by the Board, the proposed standards would apply to the Canal.

Petitioners state that “the unionized ammonia nitrogen concentrations [in the Canal] have been consistently below 0.010 mg/L, below even the proposed change reflected in R08-9.” Pet. Br. at 7 citing Tr. at 58. Further, petitioners note that the Agency recently completed Use Attainability Analyses [UAA] for the Lower Des Plaines River and the Chicago Area Waterways and made those analyses the basis of a proposed change in the Board’s water regulations. Pet. Exh. 2 at 30, citing Water Quality Standards and Effluent Limitations for the Chicago Area Waterway System and the Lower Des Plaines River: Proposed Amendments to 35 Ill. Adm. Code Parts 301, 302, 303, and 304, R08-9 (Oct. 26, 2007) (proposed regulations and statement of reasons). Petitioners state that “[t]he refinery’s request for a site-specific ammonia limit is not impacted by the UAA, nor will it have any impact on the Agency’s proposal in R08-09. The available water quality data on the Ship Canal indicate that the proposed more restrictive unionized ammonia water quality standard is currently being achieved.” Pet. Exh. 2 at 30.

Other than noting the assertions made by the petitioners, the Board will not make any findings concerning the implications of the proposed CAWS water quality standards for ammonia nitrogen. The Board believes that any implications of the CAWS proposal should be addressed only upon the final adoption of that proposal.

Mixing Zone and Best Degree of Treatment (BDT)

The Board notes that petitioners intend to comply with the applicable ammonia nitrogen water quality standard by utilizing a mixing zone established in accordance with 35 Ill. Adm. Code 302, Subpart A. Pet. Exh. 2 at 9. One of the threshold requirements for the provision of a mixing zone under the Board regulations is whether the discharger is providing best degree of treatment (BDT) as it relates to the parameter of concern. See 35 Ill. Adm. Code 301.102(a). Since the issue of technical feasibility of achieving compliance with the generally applicable effluent limit was an issue of contention between the petitioners and the Agency, as discussed below, the Board further finds that petitioners provide BDT at the Lemont Refinery to remove ammonia nitrogen from its wastewater effluent. As such, petitioners qualify for a mixing zone and a zone of initial dilution (ZID) pursuant to Section 302.102 of the Board’s regulations.

A mixing zone is “an area for allowed mixing which is formally defined by the Agency in the NPDES permitting process and, if granted, is included as a condition in the permittee’s NPDES permit.” Granite City Division of National Steel Co., et al. v. PCB, 155 Ill. 2d 149, 613 N.E.2d 719 (1993); *see also* 35 Ill. Adm. Code 302.102(d). “A ZID is likewise formally defined and granted by the Agency during the permitting process and, if granted, is included in the discharger’s mixing-zone permit condition.” *Id.*

Under the “allowed mixing concept,” a discharger that is unable to comply with the requirement of not causing or contributing to water quality violations, “after making every effort to fulfill the obligations of the discharger . . . and given the limits imposed by the nature of the receiving water body and the character of the outfall(s), is entitled to use a limited portion of the receiving body of water to effect mixing of the effluent with the receiving water. Within this limited portion of the receiving body of water, the discharger is excused from compliance with 304.105.” Marathon Oil Co. v. IEPA, PCB 92-166 (Mar. 31, 1994).

Depending on the Agency's permit decisions about the mixing zone, the permittee may use mixing as a means of compliance with the Board's water quality standards. *See* 35 Ill. Adm. Code 302.102(g), (h). Board regulations state that a mixing zone is available where the discharger has made every effort to comply with Section 304.102, which requires all dischargers to provide BDT. 35 Ill. Adm. Code 302.102(a). The regulations further provide that BDT must be consistent with technological feasibility, economic reasonableness and sound engineering judgment. 35 Ill. Adm. Code 304.102(a). As noted above, the Board found that none of the compliance alternatives evaluated by AEI are technologically feasible and economically reasonable for treating ammonia nitrogen discharge from the Lemont Refinery to achieve consistent compliance with an effluent limit of 3 mg/L.

Further, AEI's evaluation of Lemont's wastewater treatment plant indicates that the plant performance is consistent with USEPA BAT criteria. Pet. Exh. 9 at 24, 30. Also, the treatment plant's activated sludge system has consistently operated at F/M, sludge age, DO, alkalinity, pH, and temperature levels normally found to be satisfactory for single-stage biological nitrification. *Id.* at 38. In light of this, the Board finds that petitioners are providing the BDT at the Lemont Refinery to remove ammonia nitrogen. Thus, Board finds that the Lemont Refinery's ammonia nitrogen discharge qualifies for a mixing zone and ZID. However, the Board will not specify a mixing zone in this adjusted standard. The Board leaves that designation for the Agency to make in petitioners' NPDES permit.

While the Board has the authority to designate a mixing zone in an adjusted standard⁴, here the Board leaves that designation for the Agency to make in petitioners' NPDES permit. The Illinois Supreme Court has stated that the mixing zone is formally defined by the Agency in the NPDES permitting process and, if granted, is included as a condition in the permittee's NPDES permit. *Granite City Steel, Co. v. PCB*, 155 Ill. 2d 149, 160, 613 N.E.2d 719 (1993). The Board acknowledges that the Agency is typically charged with reviewing an NPDES permit application requesting recognition of a mixing zone pursuant to its responsibilities as permitter. *See Amendments to Title 35, Subtitle C (Toxics Control)*, R88-21(A) (Jan. 25, 1990). It is then the Board's position to resolve disputes between permit applicants and the Agency.

Accordingly, the Board expects the Agency to apply a mixing zone and ZID to the Refinery's discharge in accordance with Board mixing zone regulations, through the NPDES permitting process. While the record suggests that the Agency has applied a mixing zone to petitioners' discharge under the current sit-specific rules, the Board expects the Agency to define a new mixing zone and ZID for the Refinery's effluent based on an updated flow data.

Adjusted Standard Conditions

The Board notes that petitioners proposed a number of conditions to their proposed adjusted standard that are based on the requirements specified in the current site-specific rule at 35 Ill. Adm. Code 304.213. A significant change with respect to requirements of Section

⁴ "In adopting adjusted standards the Board may impose such conditions as may be necessary to accomplish the purposes of the Act." 35 Ill. Adm. Code 104.428(a). 21

304.213 is the inclusion of the new ammonia nitrogen effluent limits: a monthly average limit of 6.93 mg/L, whenever the monthly average discharge exceeds 100 lbs per day; and a daily maximum limit of 10.61 mg/L, whenever the daily discharge exceeds 200 lbs per day. These limits, which are significantly lower than the current site-specific limits, are derived using 95th percentile values of a statistical analysis of the Refinery's ammonia effluent data from June 2002 to May 2007. Pet. Exh. 2 at 31 and Appendix D. The Board finds the proposed ammonia nitrogen effluent limits to be appropriate for the Refinery's discharge based on the current operating conditions. As noted below, the sunset provision in today's order will provide an opportunity to consider new information and revisit the issue of Refinery's ammonia nitrogen effluent limits within five years of the effective date of the Board's order in this proceeding.

In addition to requiring compliance with the new ammonia nitrogen effluents limits, the proposed adjusted standard conditions require the Refinery to: meet the BAT limitations set forth at 40 CFR 419.23; continue its efforts to reduce the concentration of ammonia nitrogen in its wastewater; monitor the nitrogen concentration of its oil feedstocks; continue its efforts to control and manage solids from its crude oil supply; and submit annual reports to the Agency. Finally, petitioners propose a five-year sunset provision, which sets forth that the adjusted standard will expire on December 31, 2013. The Board finds the conditions based on the current rules to be appropriate for petitioners' adjusted standard. While the proposed five-year sunset provision is half the duration of the current rule, the shorter duration is adequate for evaluation of treatment plant improvements and operational and water quality data.

In response to hearing questions, petitioners identified certain specific measures that they are willing undertake to further reduce the ammonia concentration in their effluent. Pet. Br. at 5. These measures, which are intended to assure reliability of the Refinery's nitrification process include: provision of an additional 2 million gallons of wastewater storage capacity; participation in the Petroleum Environmental Research forum on reducing desalter environmental impacts; and development of an appropriate malfunction/upset definition condition in consultation with the Agency for inclusion in the NPDES permit. The Board will include the measures proposed by petitioners to assure the reliability of nitrification process as additional conditions in today's order.

Finally, as discussed above under compliance alternatives, the Board will require petitioners to evaluate the effects of F/M ratio and aeration basin detention time on achieving nitrification on a consistent basis and report on that evaluation to the Agency on or before December 31, 2012. Specifically, the Board will require petitioners to evaluate the effect of increased detention time on nitrification, including the performance of ExxonMobil's upgraded aeration basis in achieving compliance with the generally applicable effluent standard. As noted by Mr. Huff, petitioners must perform the evaluation using ExxonMobil's effluent quality data that becomes available after the completion of its aeration basin upgrade and the wastewater treatment plant is receiving discharge from the wet gas scrubber. Tr. at 210. Regarding, F/M ratio, the Board requires petitioners to evaluate the effect of F/M ratio on nitrification of refinery wastewater using data from other refineries in the state, as long as such data is made available by the Agency.

CONCLUSION

The Board finds that petitioners have provided sufficient justification for an adjusted standard from Section 304.122(b) of the Board's water pollution regulations (35 Ill. Adm. Code 304.122(b)) for the discharges from the Refinery and therefore grants petitioners an adjusted standard from the regulation, subject to conditions.

The Board grants relief from Section 304.122(b) as described in the order below.

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

ORDER

Effective January 1, 2009, the Board grants Citgo Petroleum Corporation (Citgo) and PDV Midwest Refining, L.L.C. (PDV) (collectively, petitioners) an adjusted standard from 35 Ill. Adm. Code 304.122(b) for its refinery located at 135th Street and New Avenue in Lemont, Will County, subject to the following conditions:

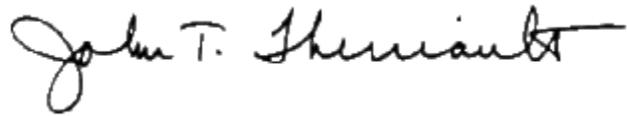
- a) This adjusted standard applies to discharges from PDV Midwest Refining, L.L.C. Refinery ("The Refinery"), located in Lemont, into the Chicago Sanitary and Ship Canal;
- b) The requirements of Section 304.122(b) shall not apply to the discharge. The Refinery must meet applicable Best Available Technology Economically Achievable (BAT) limitations pursuant to 40 CFR 419.23 (2003), incorporated by reference in subsection (d);
- c) The Refinery must also meet a monthly average limitation for ammonia nitrogen of 6.93 mg/L whenever the monthly average discharge exceeds 100 lbs per day and a daily maximum limit of 10.61 mg/L whenever the daily discharge exceeds 200 pounds of ammonia;
- d) The Board incorporates by reference 40 CFR 419.23 (2003) only as it relates to ammonia nitrogen as N. This incorporation includes no subsequent amendments or editions;
- e) The Refinery must continue its efforts to reduce the concentration of ammonia nitrogen in its wastewaters;
- f) The Refinery must monitor the nitrogen concentration of its oil feedstocks and report on an annual basis such concentrations to the Agency;
- g) The Refinery must continue its efforts to control and manage solids from its crude oil supply with respect to its wastewater treatment system;

- h) The Refinery must submit the reports described in subsection "f" and "k" no later than 60 days after the end of a calendar year;
- i) The Refinery must evaluate and report to the Agency on or before December 31, 2012, the effect of:
 - 1) Increased detention time on nitrification of refinery wastewater to achieve consistent compliance with the generally applicable effluent standards set forth at 35 Ill. Adm. Code 304.122. This evaluation must consider effluent quality data of Exxon-Mobil's Joliet refinery that may become available after the completion of that refinery's aeration basin upgrade, and the wastewater treatment plant starts receiving discharge from the wet gas scrubber;
 - 2) Food to microorganisms (F/M) ratio on nitrification of refinery wastewater to achieve consistent compliance with the generally applicable effluent standards set forth at 35 Ill. Adm. Code 304.122. This evaluation must be done by giving consideration to F/M ratio data of other refineries in the state to the extent such data are made available by IEPA;
- j) The Refinery will provide an additional 2 million gallons of wastewater storage capacity. This additional storage tank capacity must be included in a construction permit application within three months of the granting of this adjusted standard;
- k) The Refinery will continue to participate with the Petroleum Environmental Research forum on "Reducing Desalter Environmental Impacts", and must provide an annual progress update on the technologies researched, potential for feasibility at the Refinery, and a time line for bench scale application, if appropriate;
- l) The Refinery must, in consultation with the Illinois Environmental Protection Agency, develop an appropriate malfunction/upset definition condition for inclusion in the NPDES permit. The upset condition shall address mechanical malfunctions in the production process or in the wastewater treatment plant ("WWTP"), and situations in which the organic loading to the WWTP exceeds the aeration capabilities or a wastewater stream is inhibitory to nitrification; and
- m) This adjusted standard will expire on December 31, 2013, unless the Refinery requests the Board to terminate the adjusted standard at an earlier date.

IT IS SO ORDERED.

Section 41(a) of the Environmental Protection Act provides that final Board orders may be appealed directly to the Illinois Appellate Court within 35 days after the Board serves the order. 415 ILCS 5/41(a) (2006); *see also* 35 Ill. Adm. Code 101.300(d)(2), 101.906, 102.706. Illinois Supreme Court Rule 335 establishes filing requirements that apply when the Illinois Appellate Court, by statute, directly reviews administrative orders. 172 Ill. 2d R. 335. The Board's procedural rules provide that motions for the Board to reconsider or modify its final orders may be filed with the Board within 35 days after the order is received. 35 Ill. Adm. Code 101.520; *see also* 35 Ill. Adm. Code 101.902, 102.700, 102.702.

I, John T. Therriault, Assistant Clerk of the Illinois Pollution Control Board, certify that the Board adopted the above opinion and order on December 18, 2008, by a vote of 5-0.

A handwritten signature in black ink that reads "John T. Therriault". The signature is written in a cursive style with a long horizontal stroke at the end.

John T. Therriault, Assistant Clerk
Illinois Pollution Control Board