BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

SIERRA CLUB, NATURAL RESOURCES DEFENSE COUNCIL, PRAIRIE RIVERS NETWORK, and ENVIRONMENTAL LAW & POLICY CENTER Petitioners, v. ILLINOIS ENVIRONMENTAL PROTECTION AGENCY and MIDWEST GENERATION, LLC Respondents.	)	PCB 2015-189 (Third Party NPDES Appeal)

NOTICE OF FILING

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PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board Respondent, Midwest Generation, LLC's Post-Hearing Brief, a copy of which is herewith served upon you.

Dated: November 14, 2016

MIDWEST GENERATION, LLC

By: /s/ Susan M. Franzetti

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RESPONDENT MIDWEST GENERATION, LLC'S POST-HEARING BRIEF

NOW COMES, Respondent, MIDWEST GENERATION, LLC ("MWGen") by counsel, and requests that the Illinois Pollution Control Board (the "Board") uphold the challenged permit, NPDES IL0002259, because the petitioners, SIERRA CLUB, NATURAL RESOURCES DEFENSE COUNCIL, PRAIRIE RIVERS NETWORK AND ENVIRONMENTAL LAW & POLICY CENTER (the "Petitioners") have failed to meet their burden of proving that the subject National Pollutant Discharge Elimination System ("NPDES") permit for the MWGen Waukegan Generating Station ("Waukegan Station,") was issued in violation of the Illinois Environmental Protection Act ("Act") or Board regulations. Alternatively, Petitioners' appeal petition should be dismissed for failure to comply with the requirements of the Act.

I. INTRODUCTION

Petitioners' appeal challenges two of the conditions contained in the NPDES permit issued to the Waukegan Station. First, Petitioners challenge the Illinois Environmental Protection Agency's (the "Illinois EPA" or "Agency") decision to renew the permit's thermal alternative effluent limitation (the "Thermal AEL") even though there was no material change in the thermal discharge and no showing that the Thermal AEL had caused appreciable harm to the receiving

waters. Second, Petitioners appealed on the mistaken contention that the Illinois EPA should have applied a "Best Technology Available" ("BTA") standard under the Clean Water Act's ("CWA") 316(b) Rule to the Waukegan Station's cooling water intake structure (the "Intake Structure"), arguing below that the Agency should have required the Waukegan Station to be converted to closed-cycle cooling.

Petitioners have failed to carry their burden of proof on both challenges. They have not shown, under either federal or state law, that the Illinois EPA's decision to renew the Thermal AEL was inconsistent with applicable law. As to the § 316(b) issue, the Board has already ruled that the "interim BTA" standard, not the BTA standard, applies to the Intake Structure as a matter of law. (April 7, 2016 Opinion and Order, Docket PCB 2015-189 at 15 ("Board Order").) Applying the correct "interim BTA" standard under § 316(b), the Petitioners' arguments that the Waukegan Station should have been required to convert to closed-cycle cooling are clearly legally misplaced, and they have failed to provide any evidence showing that there were other changes to the Waukegan Station that were required under the "interim BTA" standard. Therefore, the Board should deny this third-party appeal and uphold the Waukegan Station NPDES Permit. In the alternative, Petitioners' case should be dismissed for failing to preserve these arguments during the permit renewal proceedings below.

II. STANDARD OF REVIEW AND BURDEN OF PROOF

A. Standard of Review

In a third-party permit appeal, "[t]he Board must review the entire record relied upon by IEPA to determine whether the third party has shown that IEPA failed to comply with criteria set forth in the applicable statutes and regulations before issuing or denying the NPDES permit." *IEPA v. Pollution Control Bd.*, 896 N.E.2d 479,487 (3d Dist. 2008) (citing 40 ILCS

5/40(a)(l), (d)); *see also Prairie Rivers Network v. Pollution Control Bd*., 781 N.E.2d 372 (4th Dist. 2002)).

B. Burden of Proof

The overriding issue in this third-party permit appeal is whether the Petitioners have met their burden of proof. "Section 40(e)(3) of the Act unequivocally places the burden of proof on the petitioner, regardless of whether the petitioner is a permit applicant or a third-party." *Prairie Rivers Network v. IEPA and Black Beauty Coal Co.*, PCB 01-112, slip op. at 8 (Aug. 9, 2001) (citing 415 ILCS 5/40(e)(3)). In a third-party challenge to a NPDES permit, the third party must prove that "the issuance of the permit violates the Act or Board regulations." *NRDC v. IEPA and Dynergy Midwest Gen., Inc.*, PCB 13-17, at 36 (Jun. 5, 2014). "[The Agency's] decision to issue the permit in this instance must be supportable by substantial evidence. This does not, however, shift the burden away from the petitioner, who alone bears the burden of proof in this matter." *Prairie Rivers Network*, PCB 01-112, slip op. at 9 (citing *Waste Mgmt., Inc. v. IEPA*, PCB 84-45, PCB 84-61, PCB 84-68 (Nov. 26, 1984) (consolidated)). Additionally, in examining what constitutes "substantial evidence" for purposes of administrative decisions, the Board has stated that "the main inquiry is whether on the record the agency could reasonably make the finding." *Waste Mgmt., Inc.*, PCB 84-45, slip op. at 9 (quoting Davis, *Administrative Law Treatise*, Section 29.00-1 at 526 (1982 Supp.)).

III. STATUTORY AND REGULATORY BACKGROUND[1]

A. Thermal Alternative Effluent Limits under Illinois Law and the Clean Water Act

1. Delegation of NPDES authority to the Illinois EPA

In 1977, Illinois applied under CWA § 402(b) for authority to administer the NPDES permit program locally. This included both administering the program and adopting regulations that substantially mirrored the CWA and federal regulations for NPDES permits. 415 ILCS 5/13(b)(1). Rather than adopt the federal regulations verbatim, Illinois created its own water pollution regulations intended to match the substance of the federal regulations while co-existing with applicable state regulations. For instance, although the federal regulations included specific provisions on relief for thermal discharges, Illinois already had similar regulations (called the "heated-effluent demonstration" requirement) for years before applying to administer the NPDES program. (Agency Statement of Reasons, R13-20, at p. 3 (June 20, 2013), a copy of which is attached as Attachment A). So instead of adopting new regulations mirroring the federal language, Illinois simply modified its rules to clarify that heated-effluent demonstrations could be used to obtain thermal AEL relief consistent with CWA § 316(a):

> The standards of [Title 35, Subtitle C: Chapter I] shall apply to thermal discharges unless, after public notice and opportunity for public hearing, in accordance with Section 316 of the CWA and applicable federal regulations, the Administrator and the Board have determined that different standards shall apply to a particular thermal discharge.

35 Ill. Adm. Code 304.141(c) (2005); *see also* Statement of Reasons, Attachment A, at 10. Although the federal § 316(a) regulations do contain one reference to AEL "renewal," neither

[1] MWGen provided a more detailed history of the relevant statutory and regulatory provisions at issue in this permit appeal in its Motion for Summary Judgment, at pages 5-14 (filed Dec. 10, 2015). So that the Board is not burdened by repetition, MWGen incorporates those pages by reference.

CWA § 316(a) nor the implementing regulations contains any language requiring an AEL to be rejustified during each permit renewal. The federal § 316(a) regulations state, with no other guidance or conditions, that applications to renew AELs need only the studies and data that may be requested by the administrator. *See* 40 C.F.R. § 125.72(c) ("Any application for the renewal of a section 316(a) [AEL] shall include only such information described in paragraphs (a) and (b) of this section as the Director requests within 60 days after receipt of the permit application."). Hence, for decades, Illinois, like many states, did not interpret the federal § 316(a) regulations as imposing any mandatory requirements regarding the renewal of thermal AEL relief with each permit cycle. (See U.S. EPA, *Review of Water Quality Standards, Permit Limitations and Variances for Thermal Discharges at Power Plants*, EPA Doc. 831-R92001, at 6-7 (Oct. 1992), a copy of which is attached as Attachment B).[2] Similarly, there were no established procedures for renewing an AEL. The Illinois regulations that U.S. EPA reviewed before agreeing to delegate the NPDES program did not contain a provision requiring thermal AELs to be renewed. *Agency Application for Authority to Administer the NPDES Program*, at 27 (July 1977), a copy of which is attached as Attachment C). Accordingly, in 2005, when the Waukegan Station filed its renewal application and up until just a few years ago, the Agency automatically incorporated the Station's Thermal AEL in renewed permits, and the U.S. EPA did not require the Agency to do otherwise.

2. The Board promulgates the Subpart K regulations

In 2013, the Agency proposed revisions to the Illinois regulations governing thermal AELs, to be codified at 35 Ill. Adm. Code Part 106, Subpart K and Section 304.141(c). ("Subpart K") This rulemaking was driven by the fact that the existing Board regulations lacked

[2] "The concept of Section 316(a) varies significantly between States and between Regions. . . . In some States, plants in operation before a certain time have been grandfathered, and are excused from performing a Section 316(a) demonstration." Attachment B, at 6-7.

specific procedures for granting *new* AELs, and the Board had recently halted the practice of using Illinois' adjusted-standard procedures instead. *See in re Petition of Exelon Generation*, AS 13-1, slip op. at 4-5 (Oct. 18, 2012). Although the proposed Subpart K rules primarily concerned new applications, the rules also, for the first time, required in Section 106.1180 that thermal AELs be formally renewed with each permit, and established a "streamlined" approach for permittees meeting certain conditions. (See Statement of Reasons, Attachment A, at 10):

> **Section 106.1180 Renewal of Alternative Thermal Effluent Limitations**
>
> a) The permittee may request continuation of an alternative thermal effluent limitation granted by the Board, pursuant to this Subpart, as part of its NPDES permit renewal application.
>
> b) Any application for renewal should include sufficient information for the Agency to compare the nature of the permittee's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife at the time the Board granted the alternative thermal effluent limitation and the current nature of the petitioner's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife. The permittee should be prepared to support this comparison with documentation based upon the discharger's actual operation experience during the previous permit term.
>
> c) If the permittee demonstrates that the nature of the thermal discharge has not changed and the alternative thermal effluent limitation granted by the Board has not caused appreciable harm to a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is made, the Agency may include the alternative thermal effluent limitation in the permitee's renewed NPDES permit.
>
> d) If the nature of the thermal discharge has changed materially or the alternative thermal effluent limitation granted by the Board has caused appreciable harm to a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which

> the discharge is made, the Agency may not include the thermal relief granted by the Board in the permitee's renewed NPDES permit. The permittee must file a new petition and make the required demonstration pursuant to this Subpart before the alternative thermal effluent limitation may be included in the permittee's renewed NPDES permit.

35 Ill. Adm. Code 106.1180. The Agency did not say that the change was simply codifying past regulatory policy; rather it was a response to complaints from U.S. EPA that Illinois lacked regulations requiring the renewal of thermal AELs. (Statement of Reasons, Attachment A, at 4)

With minor modifications to the Agency's proposed language, the Board adopted Subpart K on February 20, 2014, and it became effective six days later. *See* 38 Ill. Reg. 6086 (Feb. 20, 2014). In their comments on the new rules, both the Board and the Agency devoted relatively little attention to the renewal provisions of Subpart K. (*In re Procedural Rules for Alternative Thermal Effluent Limitations*, R13-20, at 18-19 (Feb. 20, 2014); Statement of Reasons, Attachment A, at 10.) Although Section 106.1180(b) of the new Subpart K regulations addressed requirements for the contents of NPDES permit renewal applications for the renewal of thermal AELs by advising permittees to "include sufficient information for the Agency to compare the nature of the permittee's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife at the time the Board granted the alternative thermal effluent limitation and the current nature of the petitioner's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife," there was no explanation of how this AEL renewal requirement could be applied to a renewal application that not only had already been filed with the Agency, but on which the Agency had already completed the public notice and comment period. The Subpart K regulations do not contain any indication that they are to be applied retroactively to renewal applications already pending before the Agency for years before

Subpart K's effective date. Nor did the Agency or the Board indicate during the rulemaking proceeding that they were intended to be applied to anything besides newly filed permit renewal applications.

The discretion and flexibility incorporated into both the federal § 316(a) and Illinois Subpart K AEL renewal requirements is generally thought to vary by the amount of demonstrated risk involved in an individual renewal:

> The question is, at what point is the evidence adequate for a 316(a) determination? No hard and fast rule can be made as to the amount of data that must be furnished. Much depends on the circumstances of the particular discharge and receiving waters. The greater the risk; the greater the degree of certainty that should be required.

In re Seabrook Station NPDES Permit, 1 EAD 332, 1977 WL 22370, at *11 (1977), *rev'd on unrelated grounds by Seacoast Anti-Pollution League v. Costle*, 572 F.2d 872 (1st Cir. 1978).

Thus, extensive proof of the lack of appreciable harm will typically be required only where other evidence shows "that circumstances have changed, that the initial variance may have changed, that the initial variance may have been improperly granted, or that some adjustment in the terms of the initial variance may be warranted." 44 Fed. Reg. 32854, 32894 (June 7, 1979) (preamble to Final Rule establishing 40 C.F.R. §125.72); *see also* U.S. EPA Report, Attachment B, at 16 ("Although facilities engage in a great deal of research and data collection to initially acquire a [thermal AEL], the amount of data required by the permitting authority to support reissuance . . . usually is minimal.").

B. Clean Water Act Section 316(b) and the Final Phase II 316(b) Rule

Although Illinois law generally regulates cooling water intake structures under 35 Ill. Adm. Code 306.201, CWA § 316(b) is the primary driver. Section 316(b) states:

> **Cooling water intake structures**
>
> Any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

CWA § 316(b) (codified at 33 U.S.C. § 1326(b)).

In 2005, when the permit renewal application in this case was filed, the U.S. EPA had only recently established regulations putting these provisions into effect for existing facilities. *See* 69 Fed. Reg. 41576 (July 9, 2004). The regulation, hereinafter the "Phase II Rule," required permittees to perform a "Comprehensive Demonstration Study" in order "to characterize impingement mortality and entrainment, to describe the operation of your cooling water intake structures, and to confirm that the technologies, operational measures and/or restoration measure you will have selected and installed, or will install, at your facility meet the applicable requirements" 40 C.F.R. § 125.95(b) (2005). The first step in meeting this requirement was the submission of a Proposal for Information Collection (PIC), which would collect the information needed to assess "full BTA," such as historical studies, information about the existing control technologies at the facility, and assess available control technologies.[3] *Id.* at § 125.95(b)(1) (2005). (Hearing Tr. at 134) [4]

In 2007, U.S. EPA suspended enforcement of the Phase II rules, directing the Agency and other administrators to "include conditions under [CWA § 316(b)] developed on a Best Professional Judgment basis" for newly issued permits. (R:144)

[3] The term "full BTA" does not exist in the CWA § 316(b) regulations, but was crafted by the Board in this permit appeal to avoid confusion with references to "interim BTA." (Board Order at 13.) Accordingly, the use of the "full BTA" terminology is continued here for this same reason.
[4] "Hearing Tr." refers to the transcript of the Board's October 5, 2016 hearing.

The U.S. EPA reissued modified CWA § 316(b) rules in 2014, hereinafter the "Reissued Phase II Rule." 79 Fed. Reg. 48300 (Aug. 15, 2014). U.S. EPA recognized that it would be impractical to apply the full BTA rules to NPDES permit renewals that were initiated before the rule became effective—the multi-year studies required to establish BTA would result in unreasonable delays for NPDES permitting decisions already close to completion. Thus, the U.S. EPA established a lower, "interim BTA" standard, which allowed state administrators to set permit conditions on a site-specific basis. 40 C.F.R. § 125.94(h). This standard—rather than the comprehensive full-BTA standard—would apply to "any permit issued after October 14, 2014 and applied for before October 14, 2014." *Id.* at § 125.98(b)(6).

Although the interim BTA standard is not specifically defined, it reflects the U.S. EPA's desire to minimize impingement/entrainment mortality while avoiding the installation of control technologies that might have to be removed or destroyed to make way for full BTA installations. *See* 79 Fed. Reg. at 48327 ("If the compliance schedule is not harmonized, it is possible that a facility could install (at significant cost) coarse-mesh traveling screens that it might have to later retrofit with fine-mesh panels."). And this is how the interim BTA standard has been interpreted in recent permitting decisions. For instance a U.S. EPA-administered permitting decision in Puerto Rico limited its interim BTA review to technologies that "are relatively easy to implement, do not result in significant increases in costs, and are not permanent changes or preclude future decision-making . . . ." (See U.S. EPA, Region II, *Palo Seco Power Plant 316(b) Decision Document*, p. 37 (July 2014), a copy of which is included as Attachment D). U.S. EPA Region II concluded that there was no available technology that could meet the interim BTA standard at the generating station, because the technologies considered either placed too much

strain on existing control technologies or their costs were "too high for such a brief period [of operation]." (Id.)

U.S. EPA's Palo Seco determination suggests that the idea of a control technology that can be quickly installed on a limited footprint, while still producing enough ecological benefits to be cost-effective over a short period of time, might be an impossibly small target to hit. Indeed, other permitting decisions have kept their discussions of interim BTA fairly brief. The Indiana Department of Environmental Management ("IDEM") recently issued a permit with interim BTA language similar to the language in the Waukegan Station's permit:

> IDEM has made an interim determination using best professional judgment (BPJ) that the existing cooling water intake structures at the U.S. Steel Corp. Gary Works facility represent Best Technology Available (BTA) to minimize adverse environmental impact in accordance with Section 316(b) of the federal Clean Water Act (33 U.S.C. section 1326) at this time. IDEM will reassess this BTA determination during the next permit cycle.

(Excerpt of IDEM NPDES Permit No. IN0000281, p.118 (Oct. 2, 2015),[5] a copy of which is included as Attachment E). IDEM's finding is conditioned on the initiation of full BTA studies and proper operation and maintenance of the intake equipment. (Id. at 118-19.) Similarly, the Executive Director of the Texas Commission on Environmental Quality issued a preliminary NPDES decision that offers only a cursory discussion of the existing technology at the plant that was found to meet interim BTA. (Excerpt of Fact Sheet and Executive Director's Preliminary Decision, TPDES Permit No. WQ0002105000, p. 25 (Jan. 12, 2015),[6] a copy of which is included as Attachment F).

[5] http://www.in.gov/idem/cleanwater/files/permit_notice_us_steel_gary_20151015_final_renewal.pdf
[6] http://www.tceq.texas.gov/assets/public/comm_exec/agendas/comm/backup/HR-RFR/2015-1152-IWD-EDR.pdf

IV. STATEMENT OF FACTS

A. Prior NPDES and Thermal AEL decisions regarding the Waukegan Station

In 1977, Commonwealth Edison (ComEd) operated two power generating stations in Waukegan, the Waukegan Station and the Zion Generating Station (Zion Station). Both stations used once-through cooling systems, which pull heat from the stations' condensers using water from Lake Michigan and then return the heated water to the lake. Because neither station could meet general thermal limits for Lake Michigan, ComEd petitioned the Board for a thermal AEL for each of these two stations under 35 Ill. Adm. Code 304.141(c).[7] In that Board proceeding, docketed as PCB 77-82, the Board found, based on several expert studies, that the thermal discharges from the Waukegan Station and the Zion Station caused no disruption of the zooplankton community and had not been associated with any fish kills. (R:1) Indeed, the much larger Zion Station produced a local thermal mortality rate of only 1%, which the Board adjudged "so low that it does not pose a serious threat to the population." (R:2) Accordingly, the Board approved the Thermal AEL for Waukegan Station that limited it to its 1978 generating capacity, 5.301×10^9 BTU/hr. (R:1-2)

Both the Waukegan and Zion stations had to comply with a separate but related Illinois regulation, 35 Ill. Adm. Code 302.211(f),[8] which required the stations to complete heated-effluent demonstrations. The proceedings for these demonstrations, docketed at PCB 78-72, -73 (consolidated), relied primarily on the Board's findings from PCB 77-82. (R:1-2, 1115) The Board again found the expert studies persuasive and adopted their findings in the process of

[7] The Order refers to Water Pollution Rule 410(c), which was the applicable provision before being recodified at 35 Ill. Adm. Code 304.141(c). Because this language was not changed when it was recodified, all references will be to the current citation to avoid confusion.

[8] Section 302.211(f) was originally numbered as Water Pollution Rule 203(i)(5). Because the rule has not been materially changed before or after it was renumbered, the current citation is used to avoid confusion.

concluding that the stations "have not caused and cannot be reasonably expected to have cause significant ecological damage to receiving waters." (R:1116)

Neither of the Board's decisions in PCB 77-82 and PCB 78-72, -73 was overturned or vacated by a subsequent Board decision.

B. Waukegan Station's 2005 NPDES Permit Renewal Application

On January 21, 2005, MWGen timely applied to renew the Waukegan Station's existing NPDES permit that the Illinois EPA issued in 2000. (R:25) The existing 2000 NPDES Permit contained the Thermal AEL granted by the Board in 1978. (R:1124) Because of its historical compliance with the Thermal AEL, MWGen asked the Agency to remove the thermal discharge monitoring requirement, which had existed in the Station's previous NPDES permits, including its most recent permit issued in 2000. (R:27, 1119)

Much of the early activity on the Waukegan Stations' NPDES permit renewal application concerned compliance with the Phase II Rules in effect in 2005, which required MWGen to submit a Proposal for Information Collection (PIC). MWGen submitted its PIC, prepared by its contractor EA Engineering, Science & Technology ("EA"), in 2005, outlining a multi-year sampling study. (R:1204) Because EA had already initiated collection operations, the PIC also included the results from the first year of the Phase II study. (R:1209, 1231) The first year's results indicated that the Waukegan Station's Intake Structure was impinging almost exclusively low-value alewives. (R:1216) EA also reviewed historical impingement/entrainment studies from the Waukegan Station and discovered that those studies had found that alewives accounted for the same percentage of impinged fish as the new 2005 study had—97%. (R:1213, 1216) The new study was also finding somewhat greater species richness (45 species) than the historical study had (35 species). (R:1216)

The PIC, which was submitted for the Agency's consideration under 40 C.F.R. § 125.95(b)(1) (2007), also collected a list of "possible impingement and entrainment control technologies" to be considered for future implementation at the Waukegan Station. At the time, the Phase II Rule required a full BTA standard to be applied upon completion of the Phase II Rule studies. (R:1212, 1228-29) However, EA's preliminary review of the practicality of these technologies for the Waukegan Station found that "most (or all) of these options may not be cost effective." (R:1212)

At the time, Section 125.95(b)(6) of the Phase II Rule allowed permittees to meet the BTA standard by demonstrating that all available new control technologies would have "costs significantly greater than the benefits of meeting the applicable performance standards of [Phase II]."[9] 40 C.F.R. § 125.95(b)(6) (2005). In the PIC submitted to the Agency, EA recommended that MWGen consider pursuing this site-specific, existing-technology compliance option and noted that the cost-effectiveness of new, potential technologies could not be practically determined without first performing the Comprehensive Demonstration Study required by the Phase II Rule. (R:1212-13)

Because of the complexity of the Comprehensive Demonstration Study, MWGen requested an extension from the Agency to complete the study. Special Condition 7 of the Agency's first tentative draft of the renewed Waukegan Station NPDES permit indicated that the extension of time to complete the Comprehensive Demonstration Study would be granted, but that the permit would be modified in the future to reflect the implementation, monitoring, and reporting requirements indicated by the study results. (R:140)

Following the suspension of the Phase II Rule in 2007, the Agency revised Special Condition 7 to reflect the now-applicable "Best Professional Judgment" standard. (R:148,

[9] This compliance option is not in the 2014 Phase II Rule.

161-62) But, anticipating that U.S. EPA would eventually promulgate something similar to the suspended Phase II Rule, the Agency also mandated that MWGen resume the PIC study once the permit was reissued. (R:185-86; Hearing Tr. at 134) This language would eventually carry over into the final reissued permit, although with added details about the nature of the future studies. (R:696-97)

C. Illinois EPA Responds to the 2008 Hanlon Memo on 316(a) AEL Renewals

Like many agencies operating delegated NPDES programs, the Illinois EPA regarded thermal AELs as one-time determinations (similar to the one-time heated-effluent demonstrations under Illinois law). And during the initial years after MWGen's 2005 permit renewal application, the thermal effluent portions of the permit received relatively little discussion, with the Agency's tentative draft permit acknowledging the continuation of the Thermal AEL and eliminating the thermal monitoring requirement that had existed in prior permits. (R:140) But in 2008, U.S. EPA issued a memo from the Director of its Office of Wastewater Management, James A. Hanlon, (the "Hanlon Memo") indicating that it was no longer satisfied with the variation among the states in how they implemented and enforced CWA § 316(a)'s requirements. (R:1128) Most importantly, the Hanlon Memo opined that thermal AELs expire with each NPDES permit and thus had to be re-justified with each permit renewal. (R:1130) U.S. EPA directed state administrators to obtain as much information "as necessary" to demonstrate that the thermal AEL protected local ecology. (Id.) "Such information may include a description of any changes in facility operations, the waterbody, or the BIP since the time the [AEL] was originally granted." (Id.)

Following the issuance of the Hanlon Memo in 2008, U.S. EPA Region V began pressuring the Illinois EPA to renew thermal AELs as part of each NPDES permit cycle.

For instance, in a separate review of an Illinois NPDES permit involving thermal discharges, Region V commented that an AEL "is renewed with the reissuance of each NPDES permit . . . ." (R:1009)

The Illinois EPA viewed the 2008 Hanlon Memo as a "wake-up call," and it would ultimately play a role in the Agency's decision to add an AEL renewal requirement in the subsequent Subpart K rulemaking. (Hearing Tr. at 131) But it also had a more immediate effect on the Agency's review of the Waukegan Station's permit renewal application.[10] The Agency consulted with the Illinois Department of Natural Resources (IDNR), learning that Lake Michigan's aquatic community had gone through significant changes in the last three decades, but that these changes had non-industrial causes, particularly the effects of invasive species, like zebra mussels and water fleas. (R:618) The Agency also decided to require that the Thermal AEL be conditioned on the performance of future studies, the first time the Agency required such a condition in any renewed NPDES permit. (R:240, 245)

Also, in 2012, the Agency requested that MWGen provide more information to justify the renewal of the Thermal AEL, including additional data about the current generating capacity of the Waukegan Station. (R:492) MWGen responded that in the decades since the historical thermal AEL studies were conducted, the Waukegan Station had decommissioned two of its four generating units, reducing its design flow rate by 37%, and its heat-rejection rate (the rate at

[10] The U.S. EPA's direction to Illinois EPA on the renewal of the Waukegan Station's Thermal AEL was not limited to the 2008 Hanlon Memo. For instance, the U.S. EPA also specifically requested that an equation for determining facility heatload be included in the renewed permit, which Illinois EPA did. (R:622, 625, 686) The U.S. EPA also raised concerns about a trigger provision within Special Condition 7 that would automatically apply the new Phase II Rules once those were issued. The U.S. EPA argued that an "automatic" modification of the permit would improperly circumvent the permit modification procedures that provide for public notice and comment. The Agency agreed to remove the provision. (R:622, 684)

which BTUs are discharged into the lake) by 39%.[11] (R:239-40) This information resulted in the Agency modifying the draft NPDES Permit to reduce the flow rate of the Waukegan Station's condensers, lowering them from 665 MGD to 589 MGD. (R:664, 688, 882)

As part of its justification of the renewal of the Thermal AEL, MWGen provided a copy of the 1974 ComEd letter to USEPA that provided a summary of the evidence supporting its § 316(a) Thermal AEL request. (R:241-43, 492-96) MWGen also reminded the Agency that, as summarized in the Board's prior Waukegan Station Thermal AEL and heat-demonstration decisions, the findings of the extensive historical studies done in support of the Thermal AEL, which covered all relevant trophic levels of the receiving water's aquatic community and also included a thermal plume study, showed "virtually no" harm from the Station's discharge. (R:217-18) Indeed, by 2011, those studies probably *overestimated* the risks posed by the Waukegan Station because in the intervening years, two of the four generating units at the Waukegan Station had been shut down, reducing the plant's generating capacity from 1016 MW to 742 MW. (R:205, 619, 880)

MWGen also provided the Agency with a recent 2009 United States Geological Survey ("USGS") study of prey fish populations in Lake Michigan. The authors of the study, which had sampled fish populations in the vicinity of the Waukegan Station discharge as well as other areas, attributed recent declines to non-industrial discharge factors, including poor fish recruitment, habitat loss, and predation. (R:222, 231)

Based on all of this information, the Agency reasonably concluded that Waukegan Station would be even less likely to cause appreciable harm than it had been in 1978. (R:662; Hearing Tr. at 21)

[11] MWGen also provided DMR data on the Agency's request. (R:578)

D. The Agency Responds to the Draft NPDES Permit Comments from Petitioners

During the permitting process, Illinois EPA received three sets of comments from the Petitioners. (R:472, 995, 1132) In these comments, the Petitioners asked that the permit renewal be denied until the Waukegan Station reduced impingement/entrainment mortality by converting to closed-cycle cooling. The Petitioners did not present any information about either the feasibility or costs of converting the Waukegan Station to closed-cycle cooling and did not advise how long such a conversion might take. Nor did the Petitioners ask the Agency to consider any intake control technologies besides closed-cycle cooling.

Regarding the potential benefits of installing new cooling water intake control technologies, Petitioners merely submitted information about impingement/entrainment harms caused by power plants in Italy and submitted a 1979 study regarding impingement/entrainment mortality in the Great Lakes as a whole. (R:1134) Petitioners did not present any information about what ecological benefits would result from converting the Waukegan Station to closed-cycle cooling. Nor did Petitioners provide any information indicating that any other intake control technologies were necessary at the Waukegan Station to satisfy the requirements of the Reissued Phase II Rule.

The Agency acted on multiple concerns raised by the Petitioners. When the Petitioners criticized an earlier version of the draft NPDES Permit for lacking a BPJ determination for the Waukegan Station's Intake Structure in Special Condition 7. (R:185-86, 473, 1132) The Agency responded and modified the language to include a BPJ determination. (R:696-97) The Petitioners also objected that the Agency's BTA finding was solely a carryover from past NPDES permits. (R:876, 998) The Agency clarified that instead of simply assuming that nothing had changed, it

had compared the results of historical studies to the results of recent studies performed as part of the first year of the 2005 PIC to support the BPJ finding. (R:666; Hearing Tr. at 129)

In support of their comments on the draft NPDES Permit's proposed renewal of the Thermal AEL, Petitioners attached the same 2009 USGS study of prey fish populations in Lake Michigan that MWGen had provided to the Agency to support the AEL's renewal. (R:1043) Without any additional facts or other information, Petitioners contended that the lakewide fish population declines described in the 2009 USGS study supported a decision not to renew the Thermal AEL. They completely ignored the fact that the study's authors had concluded that these declines were related to non-industrial causes. (R:222, 231-32)

The Agency issued a fourth draft of the permit in February 2013. (R:251) It did not change the CWA § 316(a) or § 316(b) provisions. (R:264-65)

Subsequently, by e-mail dated July 10, 2013, the Agency requested, and MWGen provided, additional information regarding the Waukegan Station Intake Structure. (R:511-12) MWGen's response included a detailed description of the Intake Structure. It described the passage of cooling water through the intake canal, into the embayment, through two intakes (one for each of the two operating Units 7 and 8), and the fact that bar racks are located in front of traveling screens at each intake. (R:512) It went on to describe each component of the screenhouse (*i.e.*, fixed trash bars, through-flow traveling screens, and a high-pressure wash-water system); the screens configuration (#12 gauge wire with 3/8-inch openings); and the orientation of the traveling screens. (Id.) The Intake Structure description also included a detailed description of each of the pump systems for the still operational Units 7 and 8. (Id.)

Following a public hearing (R:660), the Illinois EPA prepared a Responsiveness Summary addressing the public comments, which it forwarded along with a draft NPDES Permit

to U.S. EPA for comment. (R:594; 656-85) U.S. EPA responded with relatively minor suggestions, and notified the Agency that it would not object to permit issuance. (R:620) U.S. EPA's letter added that the permit "provides the best professional judgment Best Technology Available determination for the cooling water intake structure as required by Clean Water Act § 316(b)." (R:622) The Agency reissued the final permit on March 25, 2015. (R:683)

ARGUMENT

I. THE ILLINOIS EPA'S DECISION TO RENEW THE THERMAL AEL DOES NOT VIOLATE THE ACT OR BOARD REGULATIONS.

A. The Agency Reasonably Concluded that MWGen's Reduced Thermal Discharges did Not Constitute a "Material Change."

The Board's April 2016 Order in this appeal granting in part and denying in part summary judgment relief applied the Subpart K renewal requirements to the Waukegan Station's NPDES Permit. The Board found that Subpart K requires the Agency to determine whether "the nature of the thermal discharge has changed materially." (Board Order at 12, emphasis added.) The Board's interpretation of the Subpart K language gave meaning to the word "material," consistent with the deliberate choice of this word in the drafting of Subpart K, *see Newland v. Budget Rent–A–Car Sys., Inc.*, 319 Ill.App.3d 453, 456 (1st Dist. 2001) ("If possible, courts must give effect to every word, clause, and sentence and may not read a statute so as to render any part inoperative, superfluous, or insignificant."), and was consistent with the commonsense observation that Subpart K was not intended to punish thermal dischargers for *reducing* the ecological impact of their discharge, *see People v. Ill. Commerce Comm'n.*, 231 Ill.2d 370, 380 (Ill. 2008) ("In determining the plain meaning, we consider the regulation in its entirety, keeping in mind the subject it addresses and the apparent intent of the Commission in enacting it."). By so interpreting the Subpart K AEL renewal requirements, the

Board has correctly rejected Petitioners' previously advanced theory that any change—even if likely ecologically-beneficial—offends Subpart K's renewal provisions. (See Pet'r's Resp. Mot. S.J. at 27-28.) Interpreting Subpart K to bar renewal when *any* change in the thermal discharge occurs would impermissibly read the word "material" out of the Subpart K regulation.

When, as here, the regulation does not provide a definition of the meaning of "material," the term is given its "plain, ordinary, and popular meanings." *Valley Forge Ins. Co., v. Swiderski Electronics, Inc.*, 860 N.E.2d 307, 316 (Ill. 2006). To determine these meanings, courts look to their dictionary definitions. *Id*. In the context of the Subpart K regulations, the ordinary meaning of "material" would be "having real importance or great consequences" for purposes of determining whether the Thermal AEL should be renewed. Merriam-Webster, "material", http://www.merriam-webster.com/dictionary/material.

The Agency reasonably concluded that the reduction in the Waukegan Station's thermal-loading rate since the Thermal AEL was originally granted did not constitute a "material change" because the reduced thermal output would have no negative effect on the local aquatic community. (Hearing Tr. at 21, 57, 117-18) Indeed, the Agency permit writer, Jaime Rabins, P.E., testified during the October 5, 2016 hearing in this matter that a reduction in thermal load would produce corresponding ecological benefits. (Id. at 21) What's more, there is absolutely nothing in the permit record suggesting that a reduction in a generating station's thermal loading capacity would cause appreciable harm to aquatic life. (Hearing Tr. At 124-25) The Agency reasonably concluded that the nature of the Waukegan Station's reduced thermal discharge was not a material change that prohibited the renewal of the Thermal AEL pursuant to Subpart K.

To date, the only argument the Environmental Groups have provided as to how the significantly reduced operations at Waukegan Station could have resulted in more ecological

impact than the "virtually no" impact the Board found in 1978 is a brief comment from their Motion for Summary Judgment: "[W]e don't know if perhaps the lower volume of heated water means that the heated water is impacting more of the sensitive near-shore habitats than it was when the original studies were conducted more than 40 years ago." (Pet'r's Mot. S.J. at 28.) Petitioners' pure speculation that a flow-rate reduction would cause a significant shift or change in the thermal plume's location is insufficient to meet their burden to prove that the Agency wrongly determined there was no material change in the thermal discharge for purposes of the Thermal AEL's renewal.

But even assuming that Petitioners' unsupported contention warrants further consideration, it is refuted by the October 5, 2016 hearing testimony presented by the Illinois EPA. At the hearing, the Agency presented witness testimony by Darren LeCrone, P.E., the Manager of the Industrial Unit in the Water Pollution Controls Permit Section. (Hearing Tr. at 114). In his 24 years with the Agency, Mr. LeCrone has reviewed many such thermal plumes. (Id. at 114, 149) He credibly testified at hearing that the studies before the Board in 1978 would have advised the Board whether the plume was capable of shifting between areas of different thermal sensitivity, and whether appreciable harm could result. (Id. at 120-21) Mr. LeCrone's testimony is consistent with the fact that the Board's PCB 77-82, -83 decision specifically noted that "[l]ake currents parallel with the shore rapidly bend the plume either north or south" and that its size ranges seasonally from a theoretical minimum of 0.8 acres to a theoretical maximum of 583 acres. (R:1116)

Petitioners' illogical theory, which they have resorted to for the first time at the summary judgment stage of this appeal and never raised in their comments during the permit-renewal process below, is without a shred of support in the permit record. Petitioners bear the evidentiary

burden in this proceeding (Board Order, at p. 9), yet can cite no evidence that (1) the current plume would impact a completely different, unstudied area of the receiving water than the 1978 plume, with a higher heat load, was capable of impacting, (2) that there are any areas in the vicinity of the Waukegan Station that contain an aquatic community that is more thermally sensitive than the areas impacted by the 1978 plume, and (3) that the hypothetical thermally-sensitive community would be appreciably harmed by a smaller (Hearing Tr. at 151-52) thermal plume containing 39% less heat than it did in 1978. The Petitioners were given opportunities at the permitting phase and at the Board's hearing to present evidence supporting their case. They did not take those opportunities, and the rules do not allow them to pile speculation on top of speculation and then demand that the Agency look to a closed administrative record to disprove it.

B. The Agency had Sufficient Information on Which to Reasonably Conclude that the Thermal AEL was Not Causing Appreciable Harm.

Based on the information in the permit record, the Illinois EPA reasonably concluded that no appreciable harm to the aquatic community was being caused by the 1978 Thermal AEL. In reaching this conclusion, the Agency relied on several pieces of information submitted during the Waukegan Station NPDES permit renewal process:

- The findings of the historical thermal studies adopted by the Board in PCB 77-82, and PCB 78-72,-73, which found that Waukegan Station (operating at the higher 1978 heat-loading levels) had caused "virtually no" environmental impact, (R:2, 662; Hearing Tr. at 21, 117-18) and that the Zion Station, which discharged three times as much heat as Waukegan Station, caused only a negligible 1% local thermal mortality rate.[12] (R:1-2)

[12] Despite criticizing the 1978 Board studies as "decades-old," the Petitioners have never argued, let alone shown, that the methodology employed by those studies is unreliable and did not contest the methodology during the NPDES permit renewal process. (Pet'r's Mot. S.J., at 10; Pet'r's Reply Mot. S.J, at 11).

- The opinion of the IDNR, based on local electrofishing studies, that aquatic declines in Lake Michigan were driven by invasive species and were not meaningfully related to industrial activity.[13] (R:618; Hearing Tr. at 64, 127-28)

- The U.S. EPA's full review of the draft Waukegan Station NPDES Permit and its decision not to object to the renewal of the Thermal AEL, which the Agency reasonably interpreted to mean that the draft permit "[met] the requirements of the Clean Water Act."[14] (R:620; Hearing Tr. at 145-48)

- MWGen's PIC study, which indicated that the local aquatic community had not significantly changed since 1978, and continued to be dominated by invasive species, a problem that predated the AEL being granted. (R:1216; Hearing Tr. at 126-27)

Agency staff also relied on the 2009 USGS study submitted by both MWGen and the Petitioners. (R:997, 1043) The study included contemporary Lake Michigan data collected in the vicinity of Waukegan, and its authors attributed the declines in prey fish biomass to more recent developments in poor fish recruitment, habitat loss, and predation. (R:222, 231-32) Reviewing the study, Illinois EPA staff concluded that the lakewide nature of the declines in the aquatic community indicated that the declines were not being caused by a single, industrial, source. (Hearing Tr. at 129-130) By contrast, there was no evidence in the record indicating that the Waukegan Station's thermal effluent was affecting the aquatic community. (Hearing Tr. at 124-25)

The mere existence of declines in the Lake Michigan aquatic community, with no other indication that the Waukegan Station Thermal AEL is connected, and with affirmative data supporting the conclusion that there is no such connection, does not support a finding of "appreciable harm" in the context of a thermal AEL renewal. Subpart K asks specifically

[13] *See in re Aurora Energy, LLC*, 2004 WL 3214470, at *6 (Env. Appeals Bd. Sept. 15, 2004) (affirming thermal AEL where Regional Administrator, applying 40 C.F.R. § 125.73(c)(1), declined to require permittee to conduct new aquatic studies because "the discharge has been occurring for over 50 years with no adverse impact on [the BIP]" and because the USEPA had reviewed information from the Alaska Department of Fish and Game.)

[14] The Agency also sent a copy of the draft permit to the U.S. Fish & Wildlife Service, inviting them to reply if they objected. (R:169) The Service did not respond.

whether the thermal AEL "granted by the Board has caused appreciable harm," not whether there is harm caused by other factors. 35 Ill. Adm. Code 106.1180(d). Indeed, the Board's order creating the Thermal AEL here notes that it was granted at a time of disruption in the aquatic community unrelated to thermal discharges. (R:2, "[W]hile some changes in the relative abundance of various kinds of fish have been noted, these changes are more attributable to competition among the species than to thermal changes . . . ."). The recent lakewide declines in Lake Michigan did not bar the Agency from renewing Waukegan Station's Thermal AEL, particularly when the evidence showed that the declines had no connection to the Thermal AEL.

C. The Agency's Renewal of the Thermal AEL Complied with Subpart K.

The Illinois EPA decision to renew the Waukegan Station's Thermal AEL did not violate the requirements of Subpart K. The Agency was given sufficient information to compare the nature of Waukegan Station's thermal effluent in 1978 to the current discharge. *See* 35 Ill. Adm. Code 106.1180(b). (Hearing Tr. at 118) This information included the description of the data relied on by the Board in 1978, as provided in the Board's 1978 Order, and more recent daily monitoring reports, both of which the Agency relied on. (R:578; Hearing Tr. at 58, 82) Agency staff also utilized data from MWGen's actual operation experience during the permit term—both the PIC study indicating overall stability in the local aquatic community and the 2009 USGS study compiling data from Waukegan and other parts of the lake. *See* 35 Ill. Adm. Code 106.1180(c). (Hearing Tr. at 23, 25-27, 82)

Because nothing in the record contradicts the data that the Agency relied on, the Petitioners simply argue that the information provided was insufficient. But, the demonstration requirement under CWA § 316(a) is not a constant, instead it varies from site to site. *In re Seabrook Station NPDES Permit*, 1977 WL 22370, at *11; U.S. EPA Report, Attachment B, at 16. As the U.S. EPA explained in the Preamble to Section 125.72 of the

§ 316(a) regulations, extensive proof of the lack of appreciable harm will typically only be required where other evidence shows "that circumstances have changed, that the initial variance may have changed, that the initial variance may have been improperly granted, or that some adjustment in the terms of the initial variance may be warranted." 44 Fed. Reg. at 32854. For instance, in reviewing a thermal AEL renewal for a generating station in Massachusetts, the application received heightened scrutiny from regulators because in the years after the AEL was granted, a biologist had completed studies showing that the thermal discharges had caused "a dramatic decline in the health of [local] fish populations . . . ." USEPA Region I, *CWA NPDES Permitting Determinations for Brayton Point Station's Thermal Discharge and Cooling Water Intake*, Chapter 3, pp. 3-4 (July 22, 2002).[15]

But the Waukegan Station is at the opposite end of the spectrum. Its thermal discharges have decreased 39% since the Thermal AEL was granted in 1978, and there was absolutely no scientific data before the Agency indicating that the Thermal AEL was causing appreciable harm to the aquatic community. Indeed, the information received by the Agency from various sources as part of the Waukegan Station NPDES permit renewal process indicated that the 1978 Board findings were still representative. The data reviewed by the Agency was more than adequate to justify renewal where there was no evidence of appreciable harm.

D. MWGen and the Waukegan Station's Previous Owner, ComEd, Complied with All Conditions in PCB 77-82

PCB 77-82 does not explicitly condition the Waukegan Station Thermal AEL on the performance of future thermal studies. In its Order on summary judgment, the Board noted ComEd's promise to continue studying thermal discharges as a reason for granting the Thermal AEL. (R:2; Board Order at 5) The Petitioners' questioning at the October 5, 2016 Hearing

[15] https://www3.epa.gov/region1/npdes/braytonpoint/pdfs/BRAYTONchapter3.PDF

indicates that they took this reference to ComEd's promise as encouragement to pursue another fact-specific argument that they never raised to the Agency in their comments on the draft Waukegan Station permit. (Hearing Tr. at 29-30) As a result, the Agency did not include historical documents relevant to the history of the "ComEd promise" in the permit record. It was not anticipated that Petitioners' would contend, without proof, that ComEd did not conduct any additional studies pursuant to that promise.[16]

MWGen cannot, and should not lawfully be required to, remain silent when Petitioners are belatedly raising a factual contention that is patently false. This appeal should not be decided on innuendo or "red herring" arguments raised by Petitioners. If the Board is going to consider untimely claims about what did or did not happen in the aftermath of the Board's 1978 Order, then it should allow the truth about those facts to be heard.

The truth is that the Waukegan Station's permitting history shows that ComEd performed the studies discussed in PCB 77-82. The context of the Board's statement in PCB 77-82 is key: The Board was reviewing thermal relief for both the Waukegan Station and the much larger Zion Station in a combined proceeding.[17] Both the Board and the USEPA (which conducted its own thermal AEL proceeding for the two stations) were much more concerned with the upstream, larger thermal discharge from the Zion Station. Indeed, USEPA had explicitly conditioned the AELs on the performance of thermal studies at Zion, and did not require studies at Waukegan, which had a longer operating history. The permit condition is shown both in Waukegan Station's modified 1978 permit (then issued by USEPA), and the Station's renewed 1979 permit which

[16] At all ends, Petitioners present no affirmative evidence that the Zion studies were not performed, and so cannot meet their evidentiary burden for their stalking-horse argument. Although one permit writer testified that he did not know whether the studies were performed, this, with no other foundation about efforts to find the studies or past permits referencing the studies, has no evidentiary weight. (See Hearing Tr. at 29-30)

[17] Zion Station's design heat-rejection capacity was 17.33×10^9 BTU/hr. Waukegan Station's was only 5.301 x 109 BTU/hr. (R:1)

expressly stated that these additional monitoring studies were to be performed solely at Zion.[18] NPDES Permit IL0002259, p. 19 (Jan. 20, 1978), a copy of which is included as Attachment G); NPDES Permit ILL0002259, p. 24 (Mar. 18, 1979), a copy of which is included as Attachment H). This is why PCB 77-82 says that ComEd would "continue" performing studies; ComEd was already conducting the Zion studies required by the U.S. EPA. (R:2)

MWGen has been unable to find copies of the studies conducted at the Zion Station, and they may no longer exist. The Zion Station was decommissioned by ComEd in 1998, was never owned by MWGen and hence, no Zion Station historical files likely would have been transferred to MWGen as part of its 1999 purchase of Waukegan Station. There is, however, persuasive evidence that the studies were performed and did not identify any reason or basis to modify the Waukegan Station Thermal AEL. A copy of Waukegan Station's subsequent NPDES Permit, issued in 1985 after the expiration of the 1979 NPDES Permit that contained the additional-studies requirement, explicitly notes that "[n]o additional monitoring or modification is now being required for reissuance of this NPDES permit." See NPDES Permit No. IL0002259, p. 8 (Oct. 24, 1985), a copy of which is included as Attachment J.

Because the performance of the Zion thermal studies had been a strict condition in prior permits, the requirement would not have been removed from the subsequent 1985 Waukegan NPDES Permit without the studies being completed. Similarly, if the Zion studies had shown adverse environmental impacts, there would have been either modifications required to the Thermal AEL or additional studies at the Waukegan Station. This information strongly suggests

[18] See Letter from USEPA Region V to ComEd (Jan 20, 1978) (Attachment I). The letter attached copies of the Zion and Waukegan Stations' NPDES permits that had been revised to reflect the new Thermal AEL, and reminded ComEd that "[c]onducting the [monitoring] program at Zion is a condition of the §316(a) alternative thermal limitations granted for the Zion and Waukegan Stations on June 30, 1977). (Id. at 5)

that the ComEd promise to perform additional studies was fulfilled and did not warrant any further action regarding the Waukegan Station Thermal AEL.

E. The Retroactive Application of Subpart K to the Waukegan Station Permit Renewal is Contrary to Illinois Law and Violates Due Process

1. Subpart K was never intended to apply to previously filed permit applications.

In its decision on the parties' summary judgment motions, the Board concluded that applying a new regulation to a permit renewal application that predated the regulation's effective date is *per se* prospective provided the regulation is effective before the permit is issued. (Board Order at 11.) Although MWGen maintains that even under the requirements of Subpart K, the Illinois EPA had sufficient information in the permit record on which to reasonably conclude that the Thermal AEL should be renewed, MWGen respectfully submits that the Board's finding on the applicability of the new Subpart K regulations to the renewal of the Thermal AEL is contrary to the express terms of Subpart K's renewal provisions and contrary to Illinois law regarding the retroactive application of laws. Under the regulations and practice in place through almost the entire permit renewal process, the Agency was obligated to include the Thermal AEL in the renewed permit, and the permit should be upheld for complying with those pre-Subpart K regulations.

The Subpart K regulation created a new requirement that thermal AELs—previously an automatic inclusion in renewed permits—be re-justified with each permit cycle. It also generally describes the type of information that a permittee is to include with the NPDES permit renewal application. 35 Ill. Adm. Code 106.1180(b). By the time Subpart K was enacted in 2014, the Waukegan Station draft renewed NPDES Permit had been through the public notice and comment periods required under the Illinois NPDES regulations. Neither the NPDES nor Subpart K regulations gave MWGen the right to suspend the NPDES permitting process and to

file a new NPDES permit renewal application that addressed Subpart K's new thermal AEL renewal requirement. There is nothing in the language of Subpart K or in the Board's Opinion adopting Subpart K that addressed how already-pending NPDES permit renewals were to be addressed, particularly those as advanced as the Waukegan Station's where all that remained in the NPDES permit renewal process was for the Agency to issue the permit. MWGen had no notice nor any opportunity under the Subpart K regulations to file a new permit renewal application that specifically addressed the new Subpart K renewal requirements. Taken together, the Subpart K AEL permit renewal application requirements, Subpart K's silence on pending AEL renewals at the time of adoption, and the Board's NPDES appeals rule that limits its review to information in the permit record at the time of the permit's issuance, show that Subpart K was not intended to apply to the pending Waukegan Station NPDES permit renewal. Accordingly, while the information contained in this permit record clearly supported the renewal of the Waukegan Station Thermal AEL, the Board should not determine this issue by applying the requirements of Subpart K.

2. Applying Subpart K to the Waukegan Station permit is retroactive, even though the final permit was issued after Subpart K's effective date.

In making its decision to apply the Subpart K regulations here, the Board notes that whether Subpart K is a procedural rule or a substantive one does not matter, because it was the rule in effect on the day the final permit was issued. (Board Order at 10-11.) But the Board needs to consider the unfair and prejudicial result the application of Subpart K could bring in this case: If Subpart K's renewal application requirements are applied to a permit renewal application filed more than eight years before the rule was proposed and went into effect, this cannot be accurately characterized as a "prospective" application of the regulation. And this is why in

similar cases where pending applications were subjected to new regulations, courts have repeatedly prohibited this as impermissibly retroactive.

For instance, in *National Mining Association v. Department of Labor*, the D.C. Circuit Court confronted regulations issued by the Secretary of Labor that had changed the rules governing applications for benefits under the Black Lung Benefits Act. 292 F.3d 849 (D.C. Cir. 2002). The court held that: "If a new regulation is substantively inconsistent with a prior regulation [or] prior agency practice . . . it is retroactive as applied to pending claims." *Id.* at 860. The *National Mining* Court prohibited the application of a regulation that would look to worker's compensation payments as an offset for black lung payments as "impermissibly retroactive" because the Secretary of Labor had "appl[ied] the new regulations to claims that were already pending when the new regulation took effect." *Id.* at 866. The court found the same fault in applying several other portions of the regulation to pending claims, even though the regulations had been in effect at the time the claims were decided. *Id*. at 864 ("We find that the rule is retroactive as applied to pending cases, because it changes the legal landscape in a way that is likely to affect liability determinations."); *id.* at 867 ("[W]e hold that it would be retroactive to apply the [new] definitions to any claims other than those filed on or after the regulations' effective date."). Similarly, in *Boston Edison Co. v. Federal Power Commission*, 557 F.2d 845 (D.C. Cir. 1977), the D.C. Circuit rejected the application of a newly-created rate-increase standard to a rate-increase petition that had been filed before the standard went into effect. *Id.* at 847, 849; *see also Pine Tree Med. Assoc. v. Sec'y Health and Human Servs.*, 127 F.3d 118, 122 (1st Cir. 1997) (upholding application of newly created regulations that were strictly procedural).

The *General Motors* decision cited by the Board in its summary judgment order is not contrary to these rulings. (Board Order at 11, citing *General Motors Corp. v. U.S.*, 496 U.S. 530

(1990).) That decision does not discuss retroactivity, or cite to any of the controlling precedents in that area. *General Motors* focused on an opposite situation from the one here. In *General Motors*, the permittee asked to be governed under the new regulations, rather than the ones that had existed during most of their prior operations. Therefore, concerns of lack of fair notice or procedural unfairness caused by the retroactive application of the new regulations were absent. *Id.* at 540. Because MWGen does object to the application of the Subpart K regulations, the Board's reliance on *General Motors* is misplaced and should be reconsidered.

3. Subpart K is a substantive rule because it imposes an entirely new legal requirement on permittees holding Thermal AELs.

In its Order on summary judgment, the Board appears to agree that *Landgraf v. USI Film Products*, 511 U.S. 224, 263-64 (1994), bars the retroactive enforcement of a substantive regulation, particularly when the regulation does not explicitly call for retroactive application. (Board Order at 11.) The Board, however, concluded that that Subpart K was purely procedural in nature, insisting that the rule did not "impose new duties." (Id.)

But Subpart K goes well beyond being a mere procedural regulation "governing the proper format or preparation of applications." *See Pine Tree Med. Assoc.*, 127 F.3d at 122. Nor did the Board treat it as a purely procedural change: In the rulemaking for Subpart K, the Board held public hearings and requested a study from the Department of Commerce and Economic Opportunity, stating that it was obligated to do so under 415 ILCS 5/27(b). *See in re Procedural Rules for Alternative Thermal Effluent Limitations Under Section 316(a),* R2013-20 (July 18, 2013). Section 27(b) of the Act is, by its express terms, a provision that applies to *substantive* rules, and not "rules . . . relating to administrative procedures within the Agency or the Board, or amendment to the existing rules not relating to administrative procedures within the Agency Board . . . ." *Id.*

Subpart K, as applied to permittees who already have a thermal AEL and are seeking to continue it, is a new requirement that had previously been absent from Illinois administrative law and practice. The Board's Order insists otherwise and quotes a statement from the Agency's briefing that: "The Subpart K rules were adopted to provide 'specific procedural rules covering proceedings to obtain relief under CWA Section 316(a).'" (Board Order at 11.)

This statement is true of Subpart K only in a general sense: The rule focuses primarily on establishing procedures for the creation of *new* AELs. And the Agency was correct to say that in that respect, the rules were purely procedural: Before Subpart K, permittees had followed a different set of procedures to obtain an identical form of relief—a new thermal AEL. (See Statement of Reasons, Attachment A, at 5-6.) But by creating a new requirement in Section 106.1180 for the renewal of thermal AELs (for which there had been no prior rules either) the rule was creating both substantive requirements that had to be satisfied to renew an AEL and a process for doing so that had not existed previously. That new requirement was substantive and cannot be applied retroactively under *Landgraf*.

The Board's Order appears to reject the premise that Section 106.1180 imposed a new requirement, insisting that because federal § 316(a) regulations in existence at the time MWGen applied for permit renewal generally discussed the renewal of AELs, the application of Subpart K retroactively would be of little significance. (Board Order at 11, n.19.) But this is mistaken on two counts. First, the federal § 316(a) regulations did not affirmatively require a permittee to include any supporting information in its permit renewal application. The federal § 316(a) regulations solely and simply advised a permittee to be prepared to "justify" the AEL's renewal with the submission of additional information if requested by the U.S. EPA. In contrast, the

Illinois Subpart K regulation does affirmatively require a permittee to include information supporting the renewal of its AEL with its permit application.

Second, the Waukegan NPDES permit in this case was a creation of the Agency, applying state law and regulations that the Board, not the U.S. EPA, adopted. *See Granite City Div. of Nat'l Steel Co. v. Pollution Control Bd.*, 613 N.E.2d 719, 729 (Ill. 1993) ("[A]n administrative agency is a creature of statute, any power or authority claimed by it must find its source within the provisions of the statute by which it is created."); *Citizen Alert Reg. v. U.S. EPA*, 259 F.Supp.2d 9, 18 (D.D.C. 2003) ("After EPA [delegates NPDES administration to a state], the responsibility for issuing permits and for monitoring the use of those permits lies with the state, not with the federal government."). To the extent that 40 C.F.R. § 125.72 (2004) mandates the renewal of AELs with every permit cycle[19] that mandate did not carry over into the state regulations, and so was not enforceable by the Agency, which is specifically tasked with "administer[ing], in accord with Title X of this Act, such permit and certification systems as may be established by this Act or by regulations adopted thereunder." 415 ILCS 5/4(g).

The lack of an applicable renewal requirement in state or federal law at the time MWGen applied in 2005 to renew the Waukegan Station permit is shown by both Agency and Board practice in the years following the delegation of the NPDES program to Illinois. MWGen noted in its initial briefing that it was unaware of a single AEL renewal application in the history of the pre-Subpart K NPDES program in Illinois. (MWGEN Reply Mot. S.J., at 13.) Neither the Petitioners nor the Agency contradicted this statement. AELs were not renewed because Illinois chose to base its approach to the § 316(a) regulations on the one-time heated-effluent demonstration regulations that pre-dated the NDPES program. (*Agency Application*,

[19] Many states with delegated NPDES programs reached the opposite conclusion prior to the issuance of the Hanlon Memo (See *Review of Water Quality Standards*, Attachment B, at 6-7.)

Attachment C, at 27) U.S. EPA did not object to this approach at the time the program was delegated. (See MWGen's Mot. S.J. at 8.) There is no evidence of any federal or state regulation that required the Agency to formally renew AELs prior to the creation of Subpart K.

4. Even if Subpart K were a purely procedural rule, its application here would be impermissible as a violation of due process.

The Board's Order ends its retroactivity analysis upon concluding that Subpart K was a procedural regulation. (Board Order at 11.) But even procedural rules can be invalid if they deprive parties of due process. *Cartwright v. Civil Serv. Comm'n*, 80 Ill.App.3d 787 (1st Dist. 1980), identifies four factors that determine invalid retroactive application: Whether the case is one of first impression, whether the regulation represents an abrupt departure from well-established practice, the extent of reliance by the regulated party, and the degree of burden imposed. *Id.* at 791-92; *see also Hogan v. Bleeker*, 193 N.E.2d 844, 848 (Ill. 1963) ("[E]ven procedural or remedial statutes are not construed retroactively where to do so would deprive one of a vested property right.").

Illinois courts have consistently found that where a procedural change, even one that took effect before final agency action, will result in significant burdens to the regulated party, then the change is impermissible. This holding appears often in challenges to zoning ordinances, where the effect of the new rule would be to make the developer's intended use (a use that would be allowed under the regulations in effect at the time she applied for the building permit) impossible. *See 1350 Lake Shore Assocs. v. Healey*, 861 N.E.2d 944, 950 (Ill. 2006) ("[W]here there has been a substantial change of position, expenditures or incurrence of obligations made in good faith by an innocent party under a building permit or in reliance upon the probability of its issuance, such party has a vested property right.") (quoting *People ex rel. Skokie Town House Builders, Inc. v. Vill. of Morton Grove*, 157 N.E.2d 33, 37 (Ill. 1959)).

MWGen has a vested property interest in the inclusion of the Thermal AEL in its renewed permit. The burdens Waukegan Station faces if forced to comply with the general thermal water quality standards from 35 Ill. Adm. Code 302.507—the remedy demanded by the Petitioners—are severe. Even with the significant reductions in output since 1978, the Station discharges at temperatures well above the general standards. (R:42) Even if the Waukegan Station could meet these standards by converting to closed-cycle cooling, which is not economically feasible, this project would take up to ten years to complete, and the Waukegan Station would have to cease operations during that time. This is an unreasonable burden that would bar retroactive application of Subpart K.

The remaining *Cartwright* factors also apply. This was a case of first impression: Illinois environmental regulations had never before required the renewal of thermal AELs. And the Board is proposing to make an abrupt departure from that prior practice. The Board gave no warning of this change in the text of Subpart K, which provides no instruction to permittees that had already completed their NPDES permit renewal process and were awaiting the issuance of their renewed AEL. The rulemaking commentary for Subpart K was also silent on this question. Permittees would reasonably interpret this to mean that the rule is not intended to apply to pending permit applications; to read it as requiring the permittee to reapply and start the permitting process from square one would be an unlikely and unjust interpretation of the rule. Indeed, the Board's summary judgment Order sheds no light on how Subpart K renewals for long-pending applications were supposed to work. The Board is stuck with the same lack of guidance that permittees were, because this rule gives every indication that it was not meant to govern already-filed permit renewal applications.

Furthermore, finding an undisclosed retroactive effect in Subpart K would mean that the Subpart K rulemaking proceeding, R13-20, violated the Illinois Administrative Procedures Act's notice requirement, by failing to properly inform participants of the issues at stake in the rulemaking. *See* 5 ILCS 100/5-40(b)(3) (stating that first notice for new regulations must include "[a] complete description of the subjects and issues involved"). And even setting aside the statutory notice requirements, the Board would depart from standards of basic fairness by unearthing and applying a latent retroactivity provision in Subpart K: "An agency may be bound by its own established custom and practice as well as by its formal regulations. The [agency] may not deviate from such prior rules of decision on the applicability of a fundamental directive without announcing in advance its change in policy. . . . " *Ill. Bell Telephone Co. v. Allphin*, 419 N.E.2d 1188, 1198 (1st Dist. 1981)[20] (quoting *Briscoe v. Kusper*, 435 F.2d 1046, 1055 (7th Cir. 1970)). For decades, Illinois Thermal AELs were not required to be renewed, and were automatically applied to renewed NPDES permits. While the Board has the power to end that practice, it cannot do so without giving prior notice to permittees that would be caught midstream.

Turning to the last *Cartwright* factor, the Waukegan Station materially relied on the continued application of the pre-Subpart K rules during the permit phase: The Petitioners now insist that the permit be revoked because MWGen's demonstrations justifying renewal fell short of Subpart K's requirements. That argument was never raised before the Agency issued the permit. If MWGen had known that Subpart K governed, it could have provided significantly more documentation about the nature of the thermal discharge and its effect (or lack thereof) on the local aquatic community. It also could have requested more time from the Agency to collect additional site-specific data to support the Thermal AEL's renewal. MWGen should not be

[20] Affirmed by 93 Ill.2d 241, 245 (1982).

prejudiced on appeal by a reasonable reliance on PCB 77-82 during the notice and comment portion of the permitting process, where no regulation called the continued viability of that Board Order (and the Thermal AEL it established) into question either before or after the end of the comments period.

In sum, Subpart K cannot be used to impose a new requirement on applications that were filed years before the Subpart K regulations were proposed and enacted. Such an act would be retroactive, and inconsistent with the regulation's silence on retroactivity. Furthermore, as applied to the Waukegan Station, it would violate due process because of the lack of notice and significant burdens imposed. Subpart K should not be applied retroactively and the Agency's inclusion of the AEL in the renewed permit should be upheld as a proper application of the Board's Order in PCB 77-82.

II. THE ILLINOIS EPA'S DECISION THAT THE WAUKEGAN STATION'S COOLING WATER INTAKE STRUCTURE SATISFIED INTERIM BTA DOES NOT VIOLATE THE ACT OR BOARD REGULATIONS

A. The Agency Reasonably Concluded that Interim BTA was Satisfied.

Based on the evidence in the record and the purposes of the Reissued Phase II Rule, the Agency reasonably concluded that the Waukegan Station should not be required to install new cooling water intake structure control technologies on an interim basis before the completion of the Reissued Phase II Rule's full BTA studies and applicable standards. The permit record evidence showed that in 2005 the Waukegan Station's Intake Structure impinged mostly (97%) low-value, invasive, species, just as it had in 1978, when the structure was found to meet the BTA standard. (R:1213, 1231) The record also showed that because the plant used 37% less water than it had in 1978, its intake velocity had also decreased. (Hearing Tr. at 100) So, even

from the start of its interim BTA review, the Agency had no evidence of a problem that new technology was needed to address.

Further, in reviewing interim BTA, the Agency received expert opinions that, in the absence of full BTA studies, it would not be able to identify technologies that "are relatively easy to implement, do not result in significant increases in costs, and are not permanent changes or preclude future decision-making." (See *Palo Seco Decision Document*, Attachment D, at 37.) MWGen's technical consultant, EA, which had extensive experience evaluating Intake Structures, concluded that there was no evidence available to MWGen or the Agency that indicated significant ecological benefits would result from the installation of additional technology, and that the last potential source of that data, a full BTA survey, would take multiple years to complete. (R:1212-1213) The U.S. EPA also weighed in, advising the Agency that the final Waukegan Station permit "provides the best professional judgment Best Technology Available determination for the cooling water intake structure as required by CWA § 316(b)." (R:622; Hearing Tr. at 147)

Finally, during the permitting process, no participant asked the Agency to review any candidate interim BTA technologies, nor provided any evidence that such interim BTA technologies could be successfully applied to the Waukegan Station without the risk that they would be rendered worthless when the future full BTA strategy for the Intake Structure was implemented. The Petitioners advocated exclusively for a conversion to closed-cycle cooling, and provided none of the information on land availability,[21] cost, installation time, or ecological benefits that would be necessary for an interim BTA review of that technology.

[21] USEPA estimates that 25% of existing facilities do not even have the acreage necessary for the conversion to closed-cycle cooling. 79 Fed. Reg. 48300, 48341 (Aug. 15, 2014).

Moreover, for a plant with no pre-existing cooling towers, a conversion to closed-cycle cooling would cost tens of millions of dollars, if not more. And, the installation would take the better part of a decade. *See* 76 Fed Reg. 22174, 22206 (Apr. 20, 2011) (estimating 10 years for coal-fired stations conversions to closed-cycle cooling). This is why the Reissued Phase II rule lists closed-cycle cooling as one of the technologies to consider *after* full BTA studies are completed. *See* 40 C.F.R. § 125.94(c)(1).[22] Against this regulatory backdrop, and in the absence of any supporting evidence from the Petitioners indicating why closed-cycle cooling should be considered under the interim BTA standard, the Agency was not required to provide an extended discussion of why it would not require installation of a closed-cycle system that obviously did not meet that standard.

Unlike full BTA, the regulations for interim BTA do not provide extensive guidelines and procedures for regulators to follow. But even operating without the benefit of specific guidance, the Agency reached a permitting decision that was similar to and consistent with the independent work of other agencies. For instance, in evaluating a cooling water intake structure in Gary, Indiana, IDEM was confronted with similar information, and reached the same result. (See IDEM Excerpt, Attachment E at 118.) Like MWGen, the Indiana permittee had provided evidence that there "have been neither material changes to the existing [intake structure] nor any change in . . . operations that would result in the need for additional intake flow." On that information, IDEM found that the existing structure met interim BTA, and conditioned the permit on the initiation of full BTA studies and the proper maintenance and operation of the

[22] During the hearing in this appeal, the Illinois EPA permit writer Jaime Rabins testified that closed-cycle cooling would "fall within the meaning of interim BTA," despite being listed as a full BTA technology in 40 C.F.R. § 125.94(c)(1). (Hearing Tr. at 83) This means only that interim BTA's broad "best professional judgment" standard does not exclude any technology automatically, while the Revised Phase II Rule specifies particular full BTA technologies at 40 C.F.R. § 125.94(c)(1)-(6). (Hearing Tr. at 83-84, "Interim BTA is a requirement under the new 2014 [Phase II] rule. And it's based on best professional judgment. BTA has specific requirements under the new rule.").

existing structure, (Id. at pp. 118-19,) the same conditions imposed by the Agency here. (R:696-97, 700)

A Preliminary Decision by the Executive Director of the Texas Commission on Environmental Quality also reached the same result. That decision found that "the existing permit requirements to operate and maintain the cooling water intake structure" satisfied the interim BTA requirement, and advised the permittee to begin full BTA studies. (Preliminary Decision Excerpt, Attachment F, at 25)

Fundamentally, both the Agency and other regulators attempting to apply the Reissued Phase II Rule's interim BTA standard were confronted with the same conceptual problem that MWGen's technical consultant, EA, faced in 2005. The full BTA studies inform the selection of BTA, but they take years to complete. (Board Order at 14.) Without the studies, or comparable outside information, it is nearly impossible to determine which new technology will maximize cost effectiveness, or if new technology is even necessary. As EA explained:

> Depending on results from the ["full BTA" studies] potential compliance strategies may be modified. For example, technologies or operational measures may only be necessary during specific months . . . . Furthermore, if the biological benefits associated with impingement mortality and entrainment reductions are determined to be minimal, Midwest Generation retains the option of requesting a site-specific [BTA finding that there are no cost-effective modifications that could be required under CWA § 316(b).]

(R:1213)

The interim BTA standard is not the keystone of the 2014 Phase II Rule—it did not appear in the proposed rule, 76 Fed. Reg. at 22173, and after adding it to the final rule, it appears that the U.S. EPA did not evaluate the potential compliance costs that would come from adopting the standard, *see* 79 Fed. Reg. at 48303-04. Thus, in creating the standard, U.S. EPA likely did not have specific technologies in mind, but simply wanted to give regulators an opportunity in

appropriate cases to require easily implemented, effective and cost-efficient interim technologies if found. (Similarly, the interim BTA regulation also clarifies that regulators may include conditions requiring initiation of full BTA studies, if they so choose. 40 C.F.R. § 125.98(b)(6).) The similar decisions of USEPA Region II and regulators in Texas and Indiana—each concluding that the respective permittee's existing cooling water intake structure met interim BTA—indicate that few, if any, cases are appropriate for requiring additional changes to meet this standard. The Agency's finding that the existing intake structure at the Waukegan Station met interim BTA was a reasonable response to the information it received and a proper application of the 2014 Phase II Rule.

III. THE PETITIONERS DID NOT HAVE STANDING TO BRING THIS PETITION BEFORE THE BOARD.

Illinois law bars third parties from raising issues on appeal that they never presented to the Agency. 415 ILCS 5/40(e)(2). The Board does not disagree with MWGen's observations that the Petitioners made no mention of either the Subpart K or the 2014 Phase II Rule during the permitting process and that they now challenge Waukegan Station's permit as being in violation of those rules. (Board Order at 8-9.) In its the summary judgment decision, the Board states that a liberal interpretation of Section 40(e)(2) of the Act would find that the Petitioners secured standing on appeal by raising general concerns about thermal effluent and impingement/entrainment during the permitting phase. (Id.) But broad interpretations should not work to frustrate the purpose of Section 40(e)(2), which is intended to discourage permit participants from withholding their strongest case in order to create better chances for themselves on appeal. Here the Petitioners attempt to exploit opportunities created by their earlier silence: They insist that the Agency failed to formally state that the Waukegan Station's Intake Structure met "interim BTA," even though they never raised arguments concerning that standard during

the permitting process, and the administrative record would no doubt contain more discussion of that subject if they had. (See Pet'r's Prehearing Comments, at 4.) Similarly, they insist that the Agency failed to document Waukegan Station's compliance with Subpart K, yet did not discuss those regulations below. (Id.) Allowing participants in permit proceedings to preserve their right to appeal the permit based on only a very general and superficial discussion of permit issues will simply encourage future blindsides to issued permits. This will deny the Agency the opportunity to consider those issues or to supplement the permit record with relevant, responsive information to defend its actions. The Board's overly lenient interpretation of the permit appeal rules on standing will also harm the quality of the permit issuance process below by encouraging commenters to raise only general, scattershot objections to the inclusion of certain permit conditions. This will serve only to leave the Agency wondering how it can properly consider and respond to objections that only come into focus on appeal. (An appeal looking to a permit record containing merely the Agency's best guess at which documents will inform the Board's review.)

Additionally, the Petitioners' appeal petition violates the plain text of Section 40(e)(2)(A) of the Act: "A petitioner shall include the following within [the appeal petition]: a demonstration that the petitioner raised the issues contained within the petition during the public notice period or during the public hearing on the NPDES permit application, if a public hearing was held." The petition contained no such demonstration, attaching only a copy of the final permit and a copy of the Agency's Responsiveness Summary, neither of which identifies instances of the Petitioners raising the issues now discussed on appeal. (See Pet'r's Appeal Petition (filed April 25, 2015).) Despite Petitioners' failure to comply with an unambiguous and mandatory provision of the Act, the Board rejected this argument with no discussion. (Board Order at 16, "The Board otherwise denies the parties' motions for summary judgment.").

For all of the above reasons and concerns, MWGen respectfully submits that the Board should not expand its review in making a final decision on this permit appeal to consider Petitioners' arguments that were not properly preserved below.

CONCLUSION

The Petitioners' challenge to the renewal of the Waukegan Station NPDES Permit is without legal merit and is not supported by the record in this case. The record shows that the Station has significantly reduced its operations since the 1978 Thermal AEL proceedings and even further after its last NPDES permit renewal. Still, the Agency, acting on comments from MWGen, U.S. EPA, and the Petitioners, gave this permit's Thermal AEL provisions more scrutiny than those provisions had received in decades of prior NPDES permits that included the Thermal AEL. This scrutiny included the review of historical studies' findings, a new 2005 fish impingement study, the Station's operating data, peer-reviewed reports on the status of the Lake Michigan aquatic community, consultation with the IDNR on the changes to the Lake Michigan aquatic community and comments received at a public hearing. It was reviewed by Agency staff with extensive experience. The provided information proved a point that barely needed proving: A thermal discharger that caused no appreciable harm when its output was 39% higher than current levels, will not produce appreciable harm at the lower output. The Petitioners provide no credible reason to believe otherwise.

The data also supported the Agency's decision that the Waukegan Station's Intake Structure met the Reissued Phase II Rule's interim BTA standard. New 2005 studies of the Intake Structure's operations indicated that its impact on aquatic life had not significantly changed since 1978, and that any major reductions in impingement mortality would benefit almost exclusively invasive species, and thus produce no ecological benefit. Identifying an

interim technology, that would be cost-effective, rapidly installed, and would not interfere with full-scale projects in the future was highly unlikely, and no participant in the permitting process proposed a technology that would meet this standard. The Agency, with the additional review by and explicit support of U.S. EPA, reasonably concluded that the existing Intake Structure at the Waukegan Station met the interim BTA standard.

The permit at issue in this case reflects nearly a decade of information gathering and unexpected delays due to repeated changes in applicable regulations. For both of the challenged provisions, MWGen is required to conduct additional studies: The studies will gather biological information that could inform future permitting decisions and help accomplish the significant work required once the full BTA Phase II standards kick in. This permit poses no risk to Lake Michigan's aquatic community either during or after its five-year term and should be upheld.

The Board should deny the Petitioners' appeal on all grounds. Petitioners have failed to carry their burden of proof. The record and hearing testimony presented to the Board shows that the Agency had sufficient information to reasonably conclude that both the Thermal AEL and Intake Structure special conditions of the Waukegan Permit were lawful.

Dated: November 14, 2016

Respectfully submitted,

MIDWEST GENERATION, LLC

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CERTIFICATE OF SERVICE

I, the undersigned, certify that I have served the attached Respondent, Midwest Generation, LLC's Post-Hearing Brief, by U.S. Postal Service by First Class Mail, postage prepaid, upon the following persons:

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EXHIBIT A

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	R13-20
PROCEDURAL RULES FOR	)	(Rulemaking- Water)
ALTERNATIVE THERMAL	)	
EFFLUENT LIMITATIONS	)	
UNDER SECTION 316(a) OF THE	)	
CLEAN WATER ACT: PROPOSED	)	
NEW 35 ILL. ADM. CODE PART 106,	)	
SUBPART K AND AMENDED	)	
SECTION 304.141(c)	)	

STATEMENT OF REASONS

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA"), by and through its counsel, and hereby submits this Statement of Reasons to the Illinois Pollution Control Board ("Board") pursuant to Sections 13, 26, and 28 of the Environmental Protection Act ("Act") (415 ILCS 5/13, 26, and 28) and 35 Ill. Adm. Code 102.202 in support of the attached proposed regulations.

I. INTRODUCTION

The Illinois EPA proposes that the Board adopt a new Subpart K of Part 106. This proposed rulemaking is intended to establish procedural rules for establishing alternative thermal effluent limitations under Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141.

II. STATUTORY BACKGROUND

Section 316(a) of the Clean Water Act provides a unique procedure for relief from thermal effluent limitations or water quality standards that is different from the procedures applicable for all other categories of point sources and types of pollutants. That provision states that:

> With respect to any point source otherwise subject to the provisions of section 1311 of this title or section 1316 of this title, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the projection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State) may impose an effluent limitation under such sections for such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.

33 U.S.C. §1326. Relief under Section 316(a) of the Clean Water Act is sometimes referred to as an alternative effluent limitation or a "316(a) Variance."

In October 1977, Illinois received delegation of the National Pollutant Discharge Elimination System ("NPDES") permit program. In the requesting delegation of this program, the Agency explained how Section 316(a) of the Clean Water Act would be implemented in Illinois:

> A special provision to implement 40 C.F.R. Part 122, Thermal Discharges, which sets forth the procedure prescribed by Section 316(a) of the FWPA, is contained in Rule 410(c) of Chapter 3. Rule 410(c) allows the Board to determine that an alternative thermal standard, other than that found in 40 CFR Part 122 and Chapter 3, should apply to a particular thermal discharge.
>
> The concept of reviewing the effect of a thermal discharge on a receiving stream is not a recent addition to the Board's Water Pollution Regulations. Rule 203(i)(5), which became effective on April 7, 1972, requires that owners or operators of a source of heated effluent which discharges 0.5 billion BTU per hour or more demonstrate in a hearing before the Board that the discharge from that source has not caused and cannot reasonably be expected to cause a significant ecological damage to the receiving waters. Upon failure to prove the above, the Board will order that appropriate corrective measures shall be taken. The Agency proposes that the demonstration requirements found in 40 CFR Part 122 and the supporting technical documents be utilized in the determination of an alternative thermal standard pursuant to Rule 410(c) and Rule 203(i)(5).

See, Attachment A, State of Illinois Application for Authority to Administer the NPDES Program (July 1977) at p. 27. Since this program approval document was submitted, each of the referenced regulations has been re-codified. The federal Section 316(a) regulations were originally found in Part 122 and have been moved to 40 C.F.R. §§125.70, 125.71, 125.72 and 125.73 (40 C.F.R. Part 125 subpart H). Attachment B. The Board's former rule 410(c) is now found in 35 Ill. Adm. Code 304.141(c), and Rule 203(i)(5) refers to the Heated Effluent Demonstration procedures found in 35 Ill. Adm. Code 302.211(f) – (i) and Part 106 of the Board's procedural rules.

The former Rule 410(c) and the current 35 Ill. Adm. Code 304.141(c) states as follows:

> The standards of this Chapter shall apply to thermal discharges unless, after public notice and opportunity for public hearing, in accordance with Section 316 of the CWA and applicable federal regulations, the Administrator and the Board have determined that different standards shall apply to a particular thermal discharge.

Heated Effluent Demonstrations were to be conducted not less than 5 and not more than 6 years after the adoption of Rule 203(i)(5). Nevertheless, throughout the 1970s and 1980s (and even in a few cases into the 1990s), the electric generating industry came before the Board to fulfill the obligations under the Board's Heated Effluent Demonstration regulations. During these proceedings, some facilities simply made the required demonstration that no harm was being caused by their effluent without asking for Board relief. In other cases, dischargers used the heated effluent demonstration proceedings (as anticipated in the NPDES delegation submittal) to obtain thermal relief from the Board's regulations under Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c).

On October 28, 2008, the Director of the Office of Water Management at the United States Environmental Protection Agency ("U.S. EPA") sent a memorandum to the regional offices discussing the requirements of Section 316(a) of the Clean Water Act and expressing the goal of consistent compliance with these requirements across the various regions. In that document, U.S. EPA states that "A 316(a) thermal variance is an NPDES permit condition. It, therefore, expires along with the permit. A permittee may request a renewal of its 316(a) thermal variance prior to the expiration of the permit." Attachment C. Since the issuance of this memorandum, the Agency has been working with U.S. EPA Region V to review the status of Illinois electric generation facilities and their thermal discharges to ensure consistency with Section 316(a) of the Clean Water Act.

III. PURPOSE

This rulemaking comes to the Board as a result of the Agency's review of recent Board opinions in AS 13-1 and PCB 13-31. *In the Matter of: Petition of Exelon Generation, LLC, Under 35 Ill. Adm. Code 304.141(c) for Alternative Thermal Standards, Quad Cities Nuclear Generating Station*, AS 13-1 and *Exelon Generation LLC (Quad Cities Nuclear Generation Station) v. Illinois EPA*, PCB 13-31. Those proceedings began when Exelon Generation, LLC ("Exelon") filed a Petition to Approve Alternative Thermal Standards pursuant to Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c) on September 20, 2012. The petition sought relief from the thermal water quality standards and mixing zone requirements otherwise applicable in the Mississippi River found in 35 Ill. Adm. Code 302.102 and 303.331. The requested relief would have authorized the discharge of heated cooling water from Exelon's Quad Cities Nuclear Generation Station under Section 316(a). The Board docketed the petition as AS 13-1 and issued an opinion and order on October 18, 2012, directing petitioner to file an

amended petition satisfying the procedural requirements for an adjusted standard by December 19, 2012, or the case would be dismissed. The Board also gave Exelon the option of filing for relief through a site-specific rulemaking proceeding. The Board found that:

> Petitioner has requested, for its own Station only, a set of thermal standards different from those generally applicable thermal standards. For the reasons discussed below, the Board finds that that the Board is empowered to grant the requested relief under the Environmental Protection Act (Act) 415, ILCS 5/1 *et seq.* But, the Board does not believe that, *without a prior rulemaking process*, the Board can create a specific procedure for proceedings under Section 304.141(c) comparable to other specific procedures in Part 106 or as established in its Part 106 procedural rules. AS 13-1 (October 18, 2012) Slip. Op. at 4.

Prior to AS 13-1, the Agency held the opinion that the Board was able to grant relief under Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c) without procedural rules specifically addressing these matters. This belief was based on the recognition that the Board had done so in the past. See, *In the Matter of: 401(c) Petition for Dresden Nuclear Station*, PCB 79-134 (July 9, 1981); *In the Matter of: Alternative Thermal Effluent Limitations for Electric Energy, Inc. Joppa Generating Station*, PCB 77-124 (September 1, 1977) and *In the Matter of: Proposed Determination of Thermal Standards for Zion and Waukegan Generating Stations*, PCB 77-82 (August 3, 1978). Even though AS13-1 was the second time the Board had ordered that a Petitioner satisfy the Adjusted Standard procedural requirements to obtain Section 316(a) relief, it had not been clear to the Agency that the Board held the position that no procedures existed for granting relief under Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c).[1] As a result of U.S. EPA's focus on review of prior Section 316(a) relief and the Board's determination that it lacks authority to hear petitions

[1] The Agency does not interpret that the relief ultimately granted in *Petition of Commonwealth Edison Company for Adjusted Standard from 35 Ill. Adm. Code 302.211(d) and (e)*, AS 96-10 (October 3, 1996) as an alternative effluent limit pursuant to Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c) but rather as a thermal limitation which ensures that Midwest Generation achieves compliance with General Use temperature standards downstream of the Interstate 55 bridge.

for Section 316(a) relief without specific procedural rules addressing this type of proceeding, the Agency developed this procedural rulemaking proposal for inclusion in Part 106 of the Board's procedural rules.

IV. PROCEDURAL RULEMAKING

Under the Environmental Protection Act, the Board shall adopt "procedures which . . . are necessary or appropriate to enable the State of Illinois to implement and participate in the National Pollutant Discharge Elimination System (NPDES) pursuant to and under the Federal Water Pollution Control Act." 415 ILCS 5/13(b) (2010). Section 26 of the Act provides:

> The Board may adopt such procedural rules as may be necessary to accomplish the purposes of this Act. In adopting such rules the Board shall follow the rulemaking procedures of the Illinois Administrative Procedure Act.

415 ILCS 5/26. Under the Illinois Administrative Procedure Act, an administrative agency is not required to hold a public hearing before publishing first notice of the rule in the Illinois Register, but shall hold a hearing during the first notice period if there is public interest in the rule or a public hearing would facilitate the submission of views and comments that would not otherwise be submitted. See 5 ILCS 100/5-40. The Board's statutory requirement to hold a hearing before adopting a substantive rule does not apply to procedural rules.[2]

Under Section 304.141(c), thermal limits contained in the Board's regulations apply unless the Board, in accordance with the Clean Water Act and applicable federal regulations, determines that different standards should apply. 35 Ill. Adm. Code 304.141(c). In this procedural rulemaking, the Illinois EPA has integrated the existing federal regulations in 40

[2] *See,* 415 ILCS 5/27(b) ("[B]efore the adoption of any proposed rule not relating to administrative procedures. . . the Board shall . . . conduct at least one public hearing."); 415 ILCS 5/28 ("No substantive regulation shall be adopted, amended or repealed until after a public hearing"); In the Matter of Procedural Rules for Review of Petitions for Temporary Landfill Ban Waivers Under Section 95 of the Electronic Products Recycling and Refuse Act: New 35 Ill. Adm. Code106 Subpart J, R 12-21 (February 2, 2012) ("Because the Board is not required to hold a public hearing on proposed amendments to its procedural rules (415 ILCS 5/26, 27, 28 (2010)), the Board does not now intend to hold a hearing on these proposed rules.")

C.F.R. Part 125 (2012) with the typical procedures found in the Board's procedural rules. The Illinois EPA does not believe its proposed rules contain substantive regulations because Section 304.141(c) currently requires the Board to follow the federal regulations. Therefore, the Illinois EPA requests that the Board not hold hearings on this regulatory proposal before moving to first notice.

V. THE ILLINOIS EPA'S PROPOSAL

The following is a section-by-section summary of the Illinois EPA's proposal.

Subpart K: Alternative Thermal Effluent Limitations Pursuant to Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code 304.141(c)

This Subpart establishes procedural rules for those seeking alternative thermal effluent limitations from the Board. This purpose is described in Section 106.1100.

Section 106.1105 General

This Section describes the type of relief available under the Clean Water Act, the parties to any proceeding pursuant to this Subpart and the filing and service requirements. The Agency consulted with 35 Ill. Adm. Code 106.300(b) and (c) when drafting this section.

Section 106.1110 Definitions

The Illinois EPA had proposed general definitions derived from the Act, other Board regulations and 40 C.F.R. §125.71. The terms "Alternative thermal effluent limitations," "Representative important species," and "Balanced, indigenous community" are borrowed directly from the federal regulations.

Section 106.1115 Early Screening

Under this Section, the petitioner is required to submit early screening information to the Agency before filing a petition with the Board. This is identical in substance to the federal

requirements found in 40 C.F.R. § 125.72(a) except the Agency has proposed that the petitioner submit a proposed representative important species list to the Agency.

Section 106.1120 Detailed Plan of Study

This Section provides for the submittal of a detailed plan of study to the Agency after the establishment of the representative species list, but before the study is conducted or submitted to the Board. This Section is modeled after 40 C.F.R. §125.72(b) and (e). Subsection (g) has been added to the federal requirements to clarify that after the Agency completes its review of the plan of study, the Petitioner would be expected to complete the studies prior to submittal of a petition to the Board.

Section 106.1125 Initiation of Proceeding

This Section provides that a proceeding is initiated under Subpart K by filing a petition with the Board and serving the Agency.

Section 106.1130 Contents of Petition

These proposed requirements for the contents of a petition to the Board are taken from two sources: 40 C.F.R. §125.72(b) and (e) and the relevant informational requirements established by the Board for Heated Effluent Demonstration proceedings in Section 106.202(a). The Agency has also added to subsection (c) of this Section the requirement to submit "a summary of compliance or non-compliance with thermal requirements at the facility in the past five years."

Section 106.1135 Petiton Notice Requirements

Both Section 316(a) of the Clean Water Act and Section 304.141(c) of the Board rules provide that alternative thermal effluent limitations under Section 316(a) may only be granted

after public notice and opportunity for a public hearing. This Section was drafted to address that requirement and is modeled after Section 104.408(b) of the Board's procedural rules.

Section 106.1140 Proof of Petition Notice Requirements

This Section provides a process for the petitioner to demonstrate that it has complied with the public notice requirements in the preceding section. It was modeled after Section 104.410 of the Board's rules for adjusted standard proceedings.

Section 106.1145 Recommendation and Response

In order to facilitate the Board's decision making process, the Agency has drafted this Section which requires the Agency to provide a recommendation to the Board within 45 days of filing of a petition under this Subpart.

Section 106.1150 Request for Public Hearing

This Section provides the procedures for the public to request that a hearing be held on a petition for an alternative thermal effluent limitation.

Section 106.1155 Notice and Conduct of Hearing

This Section provides the criteria for granting a public hearing and the procedures for conducting and providing public notice of the hearing.

Section 106.1160 Burden of Proof

This Section provides the criteria for the Board's decision by identifying the burden of proof. The language for this Section is taken generally from 40 C.F.R. §125.72 and §125.73.

Section 106.1165 Evidentiary Matters

The Section references the additional Board procedural rules to be applied to proceedings under this Subpart.

Section 106.1170 Opinion and Order

This Section identifies the information to be included in the Board's order and the duration of relief granted.

Section 106.1175 Post-Hearing Procedures

This Section references the additional Board procedural rules to be applied to proceedings under this Subpart. The proposed rule language also would provide a mechanism for the Agency to bring to the Board's attention a formal U.S. EPA objection to an alternative thermal effluent limitation granted pursuant to this Subpart.

Section 106.1180 Renewal of Alternative Thermal Effluent Limitations

This Section provides a process for streamlined renewal of alternative thermal effluent limitations granted pursuant to this Subpart. The Agency's proposal provides for a screening process where the Agency can evaluate whether the conditions on which the prior relief was based have changed.

Section 304.141 NPDES Effluent Standards

The proposed amendments to subsection (c) of this Section include a cross-reference to the new Subpart K and update the language to reflect the delegation of permitting authority to Illinois EPA rather than USEPA.

VI. TECHNICAL FEASIBILITY AND ECONOMIC REASONABLENESS

Section 27 of the Act requires the Board to consider the technical feasibility and economic reasonableness of all rulemaking proposals. Because this proposal is a non-substantive, procedural rule there would be no need to implement additional treatment technologies if the rules were adopted. For this reason, the Agency's proposed changes are technically feasible and economically reasonable. Failure to establish procedural rules to allow relief from otherwise applicable thermal effluent standards pursuant to Section 316(a) of the

Clean Water Act could result in the requirement to install cooling technologies at potentially large costs by the affected facilities.

VII. AFFECTED FACILITIES AND OUTREACH

This proposal would impact any facility with a thermal effluent limit that seeks to demonstrate such effluent limit is more stringent than necessary to protect a balanced, indigenous population of fish, shellfish and wildlife. In general, the affected industry is the steam electric generating industry whether nuclear or coal fired. The universe of sources that may seek to avail themselves of these procedures is estimated to be approximately 25 power plants. The need to respond to the Board's opinions did not allow for an extensive period of outreach as would be conducted with a substantive rulemaking proposal. However, the Agency did submit drafts of the rulemaking proposal to U.S. EPA Region V for comments and a copy of the proposal was also shared with representatives of the electric generating industry and environmental groups in advance of this filing.

VIII. SYNOPSIS OF TESTIMONY

Because this is a non-substantive, procedural rulemaking, and a hearing is not required, the Agency will not be providing testimony. In the event the Board has questions on the proposal, the Agency will make appropriate staff available to address the Board's questions and concerns.

IX. PUBLISHED STUDY OR RESEARCH REPORT

Section 102.202(e) of Title 35 of the Illinois Administrative Code requires the regulatory proposal to include "[a] descriptive title or other description of any published study or research report used in developing the rule." Neither a research report nor a published study was used in developing this rule. Therefore, the requirement of Section 102.202(e) is inapplicable.

X. CONCLUSION

WHEREFORE, the Illinois EPA respectfully requests the Board to adopt the Illinois EPA's proposed regulation in its entirety as submitted.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

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EXHIBIT B

EPA 831-R92001
October 1992

United States
Environmental Protection
Agency

Office of Wastewater Enforcement and Compliance EN-338

EPA

Review of Water Quality Standards, Permit Limitations, and Variances for Thermal Discharges at Power Plants

ACKNOWLEDGEMENTS

Several U.S. Environmental Protection Agency (EPA) personnel were critical to the collection and analysis of information on the operation of power plants and the effect of thermal effluent on the environment: Ted Landry, Region I; Charles Kaplan, Region IV; and Peter Howe, Region V.

In addition, EPA Headquarters would like to thank the staff at several facilities who provided insight into their specific plants' operations and results of environmental studies. We would especially like to thank Bob Domermuth and the staff at Brunner Island for hosting two site visits.

The EPA Project Coordinator for this study was Mary Reiley, (202) 260-9456.

NOTICE

This document has been reviewed by the concerned offices and programs within the Office of Water: Statements of policy and opinion were prepared and incorporated by the Office. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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REVIEW OF WATER QUALITY STANDARDS, PERMIT LIMITATIONS, AND VARIANCES FOR THERMAL DISCHARGES AT POWER PLANTS

EXECUTIVE SUMMARY

This report provides an overview of issues relating to thermal effluent discharges, limitations, and variances. The report also highlights the environmental impacts of thermal effluents, methods to mitigate the impacts, and recommended EPA actions to address thermal issues.

Thermal discharges are defined as pollutants by the Clean Water Act (CWA) and are subject to effluent limitations. If the discharger can show that effluent limitations derived from applicable State water quality standards (WQS) are more stringent than necessary to ensure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water to which the discharge occurs (i.e., meets the variance criteria), EPA or State may adjust the permit limitations to a less stringent level.

This adjustment is called a "Section 316(a) variance" and is included in the National Pollutant Discharge Elimination System (NPDES) permit (or State equivalent) that the facility receives from the permitting authority. EPA draft guidance for issuing these variances is provided in the 1977 *Section 316(a) Technical Guidance Manual*; however, this guidance has never been finalized by EPA. Some EPA Regions, however, have developed their own guidance.

The actual thermal limitations and monitoring requirements with which the facility must comply are specified in the permit. Permit limitations for thermal discharges may be established as a maximum temperature at the point of discharge (POD), maximum rate of temperature increase at the POD, and temperature difference between a sample taken at the POD and a sample taken upstream of the POD (i.e., ambient water temperature). Discharge temperature limitations in the permit are calculated by considering a specified mixing zone in which the thermal effluent is expected to be assimilated by the receiving water. In many cases, heat load is commonly limited, but discharge temperature, although monitored, may not be limited.

WQS requirements for thermal discharges and the related mixing zone requirements vary widely from State to State. Preliminary reviews by EPA indicated that approximately one third of the 580 power plants in the U.S. have been granted a Section 316(a) variance from WQS. EPA's review also revealed that the EPA has little information readily available on the thermal limitations that have been granted.

Based on these findings, EPA determined that further evaluation was needed. In August 1989, EPA's Office of Wastewater Enforcement and Compliance (OWEC) initiated this study of the CWA Section 316(a) variances for thermal limitations for power plants discharging thermal effluent. This study was conducted in the following four stages:

- Prepared a compendium of State WQS
- Compiled a matrix of NPDES permit limitations and State WQS
- Developed a list of facilities recommended for review in depth

- Conducted data reviews and site visits, including site visits to, and a file review of, Brunner Island Power Plant; a review of facility operation and discharge data at selected facilities; and interviews with selected State, EPA Regional, and facility staff.

The first two stages resulted in separate reports, which are summarized here. The information gathered and findings for the remaining stages are included in this report.

I. Impact of Thermal Effluent

Information provided by the EPA Regions and permitted facilities did not reveal widespread environmental problems resulting from the discharge of thermal effluent from power plants.[1] Isolated cases where substantial degradation occurred were most often the result of administrative error on the part of the permitting agency (e.g., inappropriate permit limitations) rather than facility noncompliance with permit limitations. Fish kills caused by "cold shock" (sudden drop in temperature in the thermal plume during winter months) and excessive temperatures are two acute impacts that were identified at some facilities in this study. In some of these cases, facilities with Section 316(a) variances had high temperature discharges, which caused fish kills. It has been documented that certain thermal discharges have a chronic effect on the populations of different aquatic species in certain water bodies (e.g., reduced diversity, change in species mix, health effects) as well as adverse impacts on surrounding flora and fauna.

To support variance requests and permit reissuance, facilities conduct environmental studies of varying scope and depth. In some cases, these studies are required in the permit. In addition, facilities may employ a variety of procedures to reduce the impact of thermal discharges. Many of these procedures also may be required in permits. These are discussed in Section II below.

II. Shutdown Procedures and Control Mechanisms to Reduce Impact on the Environment

Power plants shut down under a variety of circumstances, including decreased power needs, periodic maintenance, and emergencies. Shutdown procedures are generally designed to protect equipment and address health and safety concerns. Although not the primary purpose, many of these procedures protect fish from cold shock by preventing sudden drops in discharge water temperature. This study identified few facilities that have procedures for a controlled shutdown specifically designed to reduce the potential for cold shock. One facility that does have such procedures is Brunner Island, which uses a "fish comfort system" designed to ensure temperature drops of no greater than 10° F per hour in the discharge channel during unit shutdown.

A wide variety of control mechanisms are used, other than controlled shutdowns, to reduce the impact of thermal effluents on the environment. These mechanisms range from cooling towers that cool the effluent to physical barriers that keep fish out of discharge channels where the fish are at greatest risk from exposure to temperature fluctuations and maximum temperatures. Control mechanisms that are designed to prevent environmental degradation due

[1] Note: Regions may not be apprised of problems because violation evaluation in the Permit Compliance System and on the Quarterly Non-Compliance Reports (QNCRs) may not necessarily meet the thresholds for reporting and/or enforcement action.

to thermal effluent may vary to accommodate seasonal temperature changes. These control mechanisms either reduce the water temperature at discharge and/or help reduce water temperatures outside the mixing zone. Mechanisms include: cooling towers, cooling ponds, submerged pipes, and multiport diffusers. Control mechanisms that are used to keep fish out of discharge channels include: screens, nets, barriers, water jets, and vertical bars. These mechanisms vary in effectiveness.

III. Environmental Studies Performed to Support Variances

Studies to support initial Section 316(a) variances may be quite extensive and involve collection of facility operating data, environmental data, and biological data, as well as mathematical or physical modelling. However, at the time of permit reissuance, the amount of data required to support a variance is usually less unless a change has occurred in: facility operating conditions, the discharges that interact with the thermal discharge, or in the biotic community of the receiving water.

Biosampling and environmental monitoring help ensure that the environmental integrity of a water body is maintained. Some permits require monitoring on a periodic basis, others have no requirements for monitoring or biosampling. In cases where the permit does not specify monitoring requirements, changes in water quality (most typically improvements) may go undetected unless the facility personnel perform monitoring on their own or a State or federal agency monitors that part of the waterway. Improvements in water quality may change the parameters under which a variance may be considered for reissuance.

IV. Key Findings

Key findings from this study to date are: 1) For the majority of facilities (some with variances, others without), impacts from thermal effluent have not been found to be large and/or permanent, although additional studies at some facilities are needed; 2) Most thermal issues are not related to intentional noncompliance on the part of the facility, but rather are administrative in nature on the part of EPA (e.g., there may be no permit provisions that ensure that variance criteria are met, no monitoring provisions are specified in the permit, and/or no permit requirements that protect fish at facilities where cold shock is likely to occur); 3) The lack of final guidance on Section 316(a) variances from EPA Headquarters has contributed to inconsistencies in permit requirements and the process by which variances are issued; 4) EPA is losing its institutional knowledge on thermal issues, thereby decreasing the EPA's ability to review permits.

The following recommendations reflect consideration of these findings and discussions with EPA staff from the Regions and Headquarters:

- Update the previously developed listing/summary of Section 316(a) and Section 316(b) status for power plants.
- Issue final guidance, formalize EPA policy, and develop permit language and enforcement checklists to ensure that Section 316(a) variances meet variance criteria.
- Provide training for EPA Regional and State permit writers.

- Identify States and EPA Regions that have established processes by which variances can effectively be issued and reissued (e.g., the Technical Advisory Committees in Region I) and share this information among the other States and EPA Regions through a national thermal guidance panel.

- Evaluate ways to increase the reporting to EPA and the public of thermal effluent violations from the States, including modifying the reporting protocols for the Permit Compliance System.

- Reconsider the establishment of technology-based new point source performance standards governing thermal discharges, for steam electric plants over the long-term.

In summary, OWEC believes that the Section 316(a) variance is a useful tool when appropriately and consistently applied. To promote consistency, OWEC is developing a training course for power plant permit writers and others involved in thermal effluent management. The pilot workshop is to be held in Region II in the second quarter of FY 1993. A guidance document also is under development and will be available in draft form by October 1993. The workshops and guidance document will address the first five recommendations made above. The sixth has been placed on the selection list for guidelines review, update, and reissuance.

REVIEW OF WATER QUALITY STANDARDS, PERMIT LIMITATIONS, AND VARIANCES FOR THERMAL DISCHARGES AT POWER PLANTS

1.0 INTRODUCTION TO THE REPORT

This report provides an overview of issues relating to thermal effluent discharges, limitations, and variances. The report also highlights environmental impacts of thermal effluent, methods to mitigate the impacts, and recommends EPA actions to address thermal issues.

The thermal component of any discharge is defined as a pollutant by the Clean Water Act (CWA) and is subject to technology-based or water quality-based effluent limitations, whichever is more stringent. Thermal discharges are of concern because they occasionally cause fish kills and have been known to cause other detrimental effects such as increased levels of parasitic and/or bacteriological infection and poor body condition in aquatic life, as well as reducing population size and species diversity. Thermal discharges may also have a detrimental impact on benthic flora and fauna in estuarine and marine areas. If the discharger can show that the effluent limitations calculated from State water quality standards (WQS) are more stringent than necessary to ensure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water where the discharge is to occur, EPA or the State may adjust the effluent limitation to a less stringent level that still ensures such protection and propagation.

This adjustment is called a "Section 316(a) variance" and is included in the effluent discharge permit the facility receives from the State or EPA Region. Section 316(a) of the CWA allows dischargers such as power plants to apply for a variance from WQS to provide flexibility to ensure that thermal discharge limits are protective of a "balanced indigenous population" of aquatic life in and on our nation's waters, while balancing other environmental, social, and economic factors. These factors may include costs such as cooling towers, retention ponds, and protocols for facility operations for minimizing effluent temperatures and fluctuations. Other factors include: losses of electricity production capacity due to retrofitting of cooling towers; evaporative water losses caused by cooling towers; land use restrictions; energy requirements; solid waste disposal; clean air act compliance; and aesthetics. This variance provision for thermal effluent is particularly important to power plants because thermal effluent is such a significant part of their discharge. EPA draft guidance for issuing these variances was provided in the 1977 *Section 316(a) Technical Guidance Manual*; however, this guidance has never been finalized by EPA. Some EPA Regions, however, have developed their own guidance.

WQS for thermal limitations and the related mixing zone requirements vary from State to State. Preliminary reviews indicated that approximately one third of the 580 major power plants in the U.S. had been granted a Section 316(a) variance from those standards. Major facilities are defined by EPA to include NPDES permittees with an industrial rating of 80 or greater under the NPDES permit rating procedures. EPA selected facilities from this universe because permit, violation, and enforcement data are more likely to be reported by the States in EPA's Permit Compliance System (PCS) data base. The review also revealed that EPA had little information readily available on thermal limitations.

Based on these findings, EPA determined that further study was needed. In August 1989, EPA's Office of Wastewater Enforcement and Compliance (OWEC) initiated a review (this study) of the CWA Section 316 variances for thermal limitations for major electric power plants discharging thermal effluent. The goals of the review are to:

- Compile information on State thermal loading guidelines, standards, and limitations
- Compile NPDES permit information on all power plants having active discharges
- Prepare a listing of facilities with Section 316(a) variances that warrant in depth review based on certain criteria
- Conduct an in-depth analysis of selected facilities above
- Compare and analyze permit limitations, discharges, and standards of similar facilities.

EPA initiated a second study in April 1991 to examine in further detail issues identified during the initial data collection phase. In this second study, EPA conducted additional interviews with EPA Regional staff and facility staff. This report details the information collected to date from both studies, as well as further research and analysis of thermal limitations, study methodology, findings, and conclusions/recommendations. Future work may include site visits to other facilities, review of State files on specific facilities, and further research to respond to issues identified in this report.

2.0 STUDY METHODOLOGY

EPA's review of WQS, permit limitations, and thermal variances occurred in four stages. The first two stages resulted in separate reports, the *Compendium of State Water Quality Limits for Thermal Discharges and Mixing Zones* and the *Matrix of NPDES Permit Limits and State Water Quality Standards for Thermal Discharges from Major Power Plants*, which are summarized in Sections 2.1 and 2.2 . The remaining stages are included in their entirety in this report. The information collected from the site visits to Brunner Island is contained in Attachments A and B and summarized in the findings section of this report.

2.1 Compendium of State Water Quality Standards

As a first stage in compiling and analyzing information on thermal discharge limitations, EPA developed a compendium of State-approved WQS relating to thermal discharges and corresponding mixing zones. The compendium contains a summary of each State's WQS for thermal discharges and mixing zones, the issuance date of the thermal discharge WQS, and the State regulatory citation for the WQS.

To develop this compendium, EPA collected information on State WQS from the *Environment Reporter - State Water Laws* issued by the Bureau of National Affairs. In addition, EPA conducted interviews with personnel from State water resources departments and EPA's Criteria and Standards Division to ensure compilation of the most current regulations. EPA compiled this information into a document entitled *Compendium of State Water Quality Limits for Thermal Discharges and Mixing Zones*.

It should be noted that WQS in many States are not based on the extensive data and modern scientific theories that have become available since the standards originally were issued. Largely because of the availability of Section 316(a) of the CWA, which enables permittees to perform site-specific evaluations in lieu of applying WQS, many States have not chosen to update their thermal WQS with the new data and procedures that have become available since that time.

2.2 Matrix of NPDES Permit Limits and State Water Quality Standards

In the second stage, EPA prepared a report containing matrices of National Pollutant Discharge Elimination System (NPDES) permit limitations and State WQS for the 580 major power plants with active thermal discharges. The State WQS included in the matrices were summarized from the compendium to facilitate comparison with the NPDES permit limitations in the matrix. (Note: Comparing WQS and permit limitations does not indicate whether a variance is warranted or whether the permit limitations have been exceeded. Permit limitations and State WQS are measured differently and as a result cannot be compared directly. Instead, the WQS must be put into a formula that takes into account the amount of heat discharged, size of the thermal plume, amount of water discharged, and other variables. In addition, some facilities will have permit limitations that allow for the discharge of heated effluent in excess of State WQS (because those facilities have been "grandfathered" from complying with certain State WQS requirements). EPA obtained a majority of the information on the NPDES permit limitations from EPA's Permit Compliance System (PCS). The Utility Data Institute, EPA Headquarters' files, EPA Regional offices, and State water quality authorities provided additional information for the matrices.

The information collected on NPDES permit limitations and State WQS included:

- Facility permit number
- Facility name
- Receiving water
- Permit expiration date
- Design discharge flow
- Pipe schedule number
- Thermal parameter measured at the discharge point
- Minimum limitation for the associated thermal parameter
- Average limitation for the associated thermal parameter
- Maximum limitation for the associated thermal parameter
- Months limitation applies
- State water quality class
- Maximum increase above the ambient temperature
- Maximum temperature of receiving water
- Status of Section 316(a) variance
- Enforcement actions for thermal violations.

Not all of this information was available for each facility. From this facility-specific information, EPA selected facilities for further review, as discussed below.

2.3 Facilities Reviewed In Depth

EPA selected from a list of the 580 major facilities 33 that met at least one of the following criteria for more detailed review:

- Variance application or approval, but no thermal discharge limitations (according to PCS)
- High thermal discharge limitations
- History of noncompliance or citizen complaints.

In some cases, EPA also used as selection criteria evidence of fish kills and location of facilities on water bodies designated by the State as having high resource value or containing endangered species. For the 33 selected facilities, EPA then compiled the following information:

- Permit number
- Facility name
- Receiving water
- Name of contact
- Telephone number of contact
- Variance approval status
- Thermal discharge limitations
- High discharge limitations
- Enforcement actions.

This information is contained in Attachment C of this report. The next section presents the methodology used in collecting the information; the findings are summarized in Chapter 3.0.

2.4 Data Reviews and Site Visits

Discussions with EPA Regional, State, and facility staff provided the core of data on facility operations and discharges. In addition, EPA reviewed PCS and facility records to compare the actual discharges, permit limitations, State standards, and variances of several facilities, including Brunner Island.

EPA contacted several of the selected facilities from Section 2.3 to discuss operational data, facility type, compliance rate, and discharge information. EPA also researched and analyzed the permit limitations, discharges, and enforcement history of the six facilities discharging thermal effluent into the Susquehanna River. The Susquehanna River was selected because of its proximity to a facility that had a history of fish kill incidents. Moreover, some of these facilities are located in Pennsylvania, which has a different method for assessing mixing zones than other States.

In all, EPA gathered information about 39 major facilities relating to facility operations, discharges, permit limitations, State WQS, and variances. For specific facilities, EPA collected information on facility procedures for unit shutdown, the process by which the facility obtained its initial variance, studies to support renewal of the variance, environmental monitoring conducted by the facility, and the presence of any environmental problems. EPA also interviewed Regional and State staff on how variances are issued and reviewed by the States and Regions (in particular the Technical Advisory Committee in Region I). Other interviews, particularly in Region V, focused on facilities experiencing difficulty complying with State thermal WQS, while other discussions focused on issues relating to the Section 316(a) program and the CWA reauthorization.

In addition, EPA made two site visits to Pennsylvania Power and Light's (PP&L) Brunner Island facility in York County, Pennsylvania. The purpose of the site visits was to make preliminary determinations of the type of information to be collected during site visits to other facilities. These site visits consisted of a review of State files, a tour of the facility, discussions with facility environmental staff, and observation of biosampling at the facility. This information supplemented the review of State files on the enforcement history of the facility. The information compiled on the Brunner Island facility is integrated with the findings from discussions with staff at other facilities and the State.

3.0 STUDY FINDINGS

The results of the research and analysis of data on permits, State WQS, and variances, the impacts of thermal effluent, as well as information on specific facilities, are contained in this section.

3.1 Establishing Thermal Permit and Variance Limitations

The goal of the CWA as stated in Section 101 is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." A key objective is the eventual elimination of pollutants discharged into the waters of the U.S. A principal means to achieve that objective is a system to impose effluent limitations on, or to otherwise prevent, discharges of pollutants into any waters of the United States from any point source. The CWA's primary mechanism for imposing effluent limitations on pollutant discharges is a nationwide permit program established under Section 402 of the Act, NPDES. Each effluent limitation imposed on an NPDES permittee is generally developed using technology-based or water-quality-based standard methodology. Generally, technology-based limitations define a floor or minimum level of control and are applicable at the point of discharge. Technology-based limitations are established through either: 1) national effluent limitation guidelines developed by EPA, or 2) the permit writer's best professional judgement.

In addition to technology-based limitations, each permittee must comply with limitations derived from additional or more stringent WQS established by the State (and approved by EPA) to achieve or maintain the beneficial uses of a particular waterway. State WQS take precedence over any less stringent technology-based controls. These standards do not apply directly at the discharge pipe, but rather, are converted to discharge pipe limitations by the permit writer by determining the assimilative capacity of the stream and dividing it among the discharger's waste load allocation (WLA) to the stream.

In the case of the thermal component of a discharge, no national technology-based effluent limitation guidelines currently exist. As a result, thermal limitations must be developed based on WQS. WQS applicable to thermal discharges are generally set as a maximum temperature or maximum incremental temperature increase at a point outside of the mixing zone. (NB: the first effluent guidelines for the steam electric power industry did place technology-based controls on heat. EPA was quickly sued by the power industry and the courts remanded that provision to EPA. Since that time, no additional technology-based limits have been proposed or adopted for the thermal component of discharges.)

The actual thermal limitations and monitoring requirements with which the facility must comply are specified in the NPDES permit. The State or EPA permit writer may consult various guidance manuals to determine the validity of the proposed permit limitations. One of those manuals is the *Quality Criteria for Water 1986* (The Gold Book). The manual outlines methodologies for determining appropriate water quality criteria for all States. This manual is an attachment to the report entitled *Compendium of State Water Quality Standards.*

The concept of Section 316(a) varies significantly between States and between Regions. A State can write both WQS and mixing zone dimensions for thermal pollutants in such a way that virtually no power plant will need to apply for a Section 316(a) variance. In some States, plants in operation before a certain time have been grandfathered and are excused from

performing a Section 316(a) demonstration. In other States, the requirements are more rigorous and even extend to industries other than steam electric power.

Permit limitations for thermal discharges may be established as a maximum temperature at the point of discharge (POD), a maximum incremental temperature increase at the POD, and/or the temperature difference between a sample taken at the POD and a sample taken at the plant intake or upstream of the POD. In most cases, heat load is commonly limited, but discharge temperature, though monitored, may not be limited. Compliance with mixing zone requirements is determined by in-stream thermal monitors or with mathematical models used to back calculate from the temperature at the POD to the expected temperature in the mixing zone as a result of the thermal discharge. The in-stream monitors that determine compliance with mixing zone requirements may be located as much as several miles downstream depending on the size of the mixing zone. The mathematical models consider such characteristics as the size of the waterway, the volume of the discharge, the stream bank configuration, mixing velocities, dilution ratio, and other hydrologic or physiographic characteristics. While each State has a specified mixing zone, each defines that mixing zone differently.

An exception to the mixing zone approach is that used by the Commonwealth of Pennsylvania. Pennsylvania does not specify or consider mixing zones in setting thermal discharge limitations. Instead, an instantaneous complete mix of the thermal discharge with the receiving stream is assumed. Therefore, the "mixing zone" actually is the entire stream, allowing for a greater dilution of the discharged thermal effluent. According to the Pennsylvania Department of Environmental Resources (PA DER), thermal discharge limitations established in individual facility permits are often more stringent to offset the benefits of whole stream dilution (this study did not attempt to verify this assertion). Generally, the effluent thermal limitations in Pennsylvania are based upon an allowable heat rejection rate and are expressed in terms of BTU's (British Thermal Units) per hour. The basic theory underlying this principle is that the heat gained by the stream is equivalent to the heat lost by the discharge. The maximum allowable or actual discharge temperature then is calculated based upon the equation of the heat rejection rate.[2] Variations in the equation account for cases where stream flow is augmented, or where the stream and intake temperatures differ. Pennsylvania has determined temperature variations and limitations on a site-specific basis for every body of water in the Commonwealth. Detailed calculations, equations, and examples are outlined in the PA DER's *Staff Guidance for Implementation of Temperature Criteria*, dated October 3, 1989. This document is an attachment to the EPA report entitled *Matrix of NPDES Permit Limits and State Water Quality Standards.*

3.2 Impact of Thermal Effluent

Thermal discharges can impact aquatic life in several ways. Either cold shock (a sudden decrease in water temperature) or high temperature discharges may cause high fish mortality rates due to the inability of different cold-blooded species to adapt to certain changes in temperature. In addition, increases in ambient temperatures may lead to changes in the population of certain aquatic species. Higher temperatures may also adversely affect plants and benthic organisms that are exposed to the thermal plume. The majority of facilities contacted did

[2] $T_d = (Q_1 / Q_d)(T_2 - T_1) + T_1$, where T_d is the maximum allowable or actual discharge temperature, Q_1 is the design stream flow, Q_d is the anticipated or actual discharge flow, T_2 is the maximum allowable downstream temperature, and T_1 is the intake temperature. The design stream flow and temperature are established to represent a worst-case scenario and are based on low flow and median temperature conditions.

not report any significant environmental problems as a result of thermal effluent. Discussions with State staff and a review of PCS data revealed some problems relating to fish kills and permit violations, however.

Several facility staff mentioned recreational benefits enjoyed by fishermen who take advantage of the higher concentrations of fish found in thermal plumes in fall, winter, and early spring. Any adverse effects to the fish, they believe, would be reported by the fishermen. Only one of the facilities contacted has received citizen complaints regarding thermal effluent. In addition, temperate waters are well suited for commercial fish operations; some State and/or federal agencies utilize waters near power plants for fish stocks or hatcheries.

The following section documents some of the problems that were identified in this study from conversations with staff in the EPA Regions and at facilities, and from site visits. However, the absence of adverse impacts at most of the selected plants in this study provides the basis for a conclusion that there is only a small likelihood of significant thermal impacts occurring at the nation's power plants operating under Section 316(a) variances.

3.2.1 Impact of Cold Shock

One of the most acute forms of environmental impacts from thermal effluent is "cold shock," which results in fish kills. Cold shock to fish results from sudden drops in temperature in a thermal plume, usually during winter months. Typically, cold shock occurs during a unit or facility shutdown when the thermal effluent is replaced by a rapid discharge of unheated water. Certain species of fish less than 1 year old are especially susceptible to a sudden drop in temperature over 5° F. The fish kills appear to occur only in winter due to the physiology and location of fish during these months. During the coldest water periods, sudden temperature drops are more likely to cause death in most fish species than during warmer ambient temperatures (spring and fall) when higher temperature drops can be tolerated. Furthermore, the comfort range of the fish is such that in the warmest months, fish congregate in the deeper, cooler waters, and during the winter they are attracted to and stay within the thermal plume. Accordingly, fish are more likely to be present in the plume and therefore affected by thermal fluctuations during the winter months.

Cold shock is most likely to occur at facilities that:

- Are located in cold climates (northeast and northwest) or mountainous regions.
- Have "once through cooling" and do not have any form of supplemental heat dissipation or rapid effluent mixing device (i.e., cooling ponds or multiport diffusers) to reduce the change in temperature (ΔT). These facilities are more likely to have a thermal plume with a significantly higher temperature than that of the ambient water.
- Have one or two operating units, where shutdown of one unit has a significant effect on the total discharge.
- Have older units, which are more likely than newer units to be used only intermittently during peak loading, and are shutdown on weekends, holidays, and during periods of lessened demand. The more shutdowns a facility has, the

greater the number of occasions where cold shock may occur as a result of temperature fluctuations in the thermal plume.

Only one facility in the study reported fish kills attributable to cold shock in the last 2 years. This facility experienced fish kills due to "cold shock" in December 1985, January 1988, January 1990, and January 1991. The 1991 fish kill occurred during a controlled shutdown of the largest of three units. At the time of the controlled shutdown, one of the remaining two units was already out of service. As a result of both unit shutdowns, the amount of heated discharge entering the channel was significantly reduced. The drop in water temperature killed 500 fish. In January 1990, one unit was brought out of service in a controlled shutdown to 1/3 of the unit's output. The "fish comfort system" activated and reduced the flow from the facility to avoid a sudden pass through of unheated river water. However, at 1/3 load, the temperature differential across the unit was too great to continue with a controlled shutdown without critical damage to the facility, and the staff removed the comfort control system from operation. The shutdown of the unit resulted in a 30° F increase in the discharge channel over an hour as flows from the other two units overran the first unit's decreased discharge. A sudden drop in temperature (15° F in approximately 10 minutes) occurred in the channel when the comfort system was removed. Subsequently, unheated river water passed through the facility and into the discharge channel. The facility staff interviewed believe the fish kill was a result of the sudden decrease in temperature and not the initial increase.

A January 1988 fish kill due to a "cold shock" resulted from decreased flow from the facility during shutdown of one unit and the undertow of the river water back up the discharge channel. This resulted in a 29° F drop over 10 minutes in the channel, killing 180 fish. At this facility, there are no controls preventing fish from entering the discharge channel, thus exposing the fish to the potential variations of temperature.

The facility staff attributed the December 1985 fish kill to a drop in power load; the staff attempted to maintain a 5 megawatt per minute drop in load, but ended with a 6 megawatt per minute drop. The target drop rate was based on the staff's experience that a 5 megawatt per minute drop rate maintains less than a 10° F drop per hour. The facility staff believes it is possible that the ambient river temperature being lower than expected (in addition to the greater drop) was a factor in the large decrease in temperature. Adjustments in procedures were to include a check of ambient river temperature and adjust the rate drop accordingly.

The staff reported that controlled shutdowns are preferred over a "trip" (i.e., an automatic emergency shutdown of the unit) for safety and environmental reasons. On a "trip," the temperature in the discharge channel actually increases because of the influence of the discharges from the two other units.

3.2.2 Impact of Excessive Temperatures

High temperature thermal discharges can cause fish kills and other detrimental impacts to the aquatic environment. Some facilities reported that they have experienced heat-related fish kills. Many of these fish kills were isolated incidents and not indicative of a chronic problem. Facilities with once through cooling and no supplemental heat dissipation facilities are more likely to discharge high temperature thermal effluent than are those facilities that employ cooling ponds, cooling towers, diffusers, or recycle the water back through the facility after cooling.

EPA Regions have identified facilities where ongoing problems exist or existed and where fish kills have been reported in great numbers due to excessive temperatures. According to Region V files, one station in Indiana heated the West Fork of the White River to 108° F, resulting in an extensive fish and mollusk kill downstream. Four Ohio facilities heated their respective streams to higher than 100° F several miles downstream. Files show one of the four facilities increased river temperatures to 110° F in the summer of 1988, resulting in a major fish kill of approximately 2 million fish. At the time of these fish kills, all four facilities were in compliance with their permits; none of the permits had maximum temperature limitations. Rather, limitations were based on the maximum heat rejection rate for the facility.[3] In effect, these facilities can heat the river to facility capacity. In practice, as river flow rates reach summer minimum or drought condition minimum flows, power plants generally must reduce their operations, because the volume of cooling water available in the river and/or high intake water temperatures make operating the plant at full capacity impossible. EPA has since imposed thermal limitations that require the facility to meet maximum State WQS on a fully mixed basis. There are ongoing permit limitation negotiations with several Region V facilities.

In addition to fish kills, high temperature discharges can adversely impact the aquatic environment in several ways including: 1) damage to benthic grasses and fauna; 2) loss of spawning areas; 3) bank-to-bank thermal plumes preventing fish migration; and 4) loss of eggs, larvae, and planktonic organisms in riverine thermal plumes. For example, the thermal plume from a Region IV facility adversely affected approximately 3000 acres of the receiving bay area. Within this 3000 acres, at least 1100 acres of seagrass and attached macroalgal communities were destroyed because of excessive temperatures. In addition, major components of locally indigenous fish and invertebrate species are excluded from the thermally-impacted area.

3.2.3 Changes in Population of Certain Fish Species

More commonly, high temperature discharges cause chronic, health related problems to aquatic life. For example, thermal discharge at certain power plants may affect indigenous fish populations by reducing the presence and number of cold-water species, while increasing the abundance of warm-water species. A report entitled *Changes in the Fish Community of the Wabash River Following Power Plant Start Up: Projected and Observed* and studies by Region V in Indiana suggest that changes in fish population are occurring in some water bodies where there are variances to the WQS in the permit. These variances allow facilities to exceed the maximum 5° ΔT criteria included in most State WQS. More studies may be needed to identify the long-term effects of exceeding the WQS at specific sites.

3.2.4 Entrainment and Impingement

Many facilities have installed mechanisms to reduce environmental damage caused from entrainment and impingement. Entrainment refers to smaller organisms (e.g., phytoplankton, fish eggs, larvae) that are passed through the facility with the cooling water and are subjected to pumps, antifouling agents, condensers, and other physical, chemical, or thermal related causes of damage. Impingement refers to larger organisms such as fish that enter the cooling water intake system and then are trapped on screens. Although this study does not address environmental damage caused by entrainment and impingement, it is important to note that at some facilities a trade off exists between discharge temperature and impingement. Often, the

[3] These variances are appropriate for many other facilities since the facility may discharge into an ocean, a Great Lake, or a large river with a strong current thereby minimizing any effect on water quality.

more water that is drawn from the water source through the condensers to lower effluent temperatures, the more aquatic organisms die from entrainment and impingement.

3.3 Shutdown and Load Reduction Procedures and Control Mechanisms at Facilities

Facility or unit shutdowns or load reductions often occur for facility or unit maintenance, reduction in energy demand, or exceedance of discharge temperatures. "Shutdown" refers to bringing a unit(s) offline (i.e., ceasing energy production). "Load reduction" refers to decreasing energy production.

An EPA review in August 1989 found that many facilities are not required by permit to have facility or unit shutdown procedures to eliminate or reduce risk of cold shock to aquatic life. However, a wide variety of control mechanisms to reduce the impact of thermal effluent on the environment are used, from cooling towers and cooling ponds that cool the effluent to physical barriers that keep fish out of discharge channels (where the fish are at greatest risk from temperature fluctuations). Control mechanisms that are designed to prevent environmental degradation due to thermal effluent may vary to accommodate for seasonal temperature changes. These control mechanisms reduce the water temperature at discharge and/or help reduce water temperatures within and outside of the mixing zone. Mechanisms include: cooling towers, cooling ponds, discharge pipes, and multiport diffusers. Control mechanisms that are used to keep fish out of discharge channels include: screens, nets, barriers, water jets, and vertical bars. These mechanisms vary in effectiveness.

3.3.1 Shutdown Procedures to Prevent Cold Shock

Most facilities have some type of shutdown procedures in which operating units gradually are brought offline as the power level is reduced. These procedures, however, normally reflect health and safety concerns related to protecting facility equipment, rather than preventing cold shock to fish. Efforts to reduce the risk of cold shock may be hampered, in some instances, by load reduction procedures that are required to meet air quality standards.

Some power plants operate only part time in order to supplement regional energy production during periodic high energy demand, resulting in occasional shutdowns. Fish that congregate in the facility's thermal plume during winter months may be susceptible to cold shock during these shutdowns. At this time, there are no national permit requirements or guidance on shutdown procedures to address the potential problem of cold shock. To help assess the impact of facilities operating part time, Region V has proposed special conditions in the permit of a facility that is prone to cold shock. The Region has suggested that the permit contain a "Special Condition" requiring the permittee to conduct an evaluation of the potential for cold shock to fish in the thermal plume. The evaluation would include winter fish sampling and a summary of winter operating conditions for the past 4 years. The summary would include daily average and maximum ΔT and discharge temperatures. After two years, a minimum discharge temperature of 36° F would be required when intake temperatures are below 36° F unless the evaluation documents the absence of cold shock potential. At one Region I nuclear facility, the permit requires gradual temperature decreases to protect marine life from cold shock. As characteristic of most nuclear plants, these controlled temperature decreases are not used in the event of a reactor emergency shutdown, because in those situations, the objective is to avoid core damage. Loss of adequate cooling water, such as would be caused by failure of cooling water condenser pumps or clogging of intake screens, might require an emergency reactor shutdown. Region IV

requires all Section 316(a) demonstrations to address potential "cold kills" and assure adequate procedural controls.

In 1983, Brunner Island installed a fish comfort system in response to frequent fish kills. The comfort system allows for controlled temperature decreases of 10° F per hour during unit shutdown. Since then, fish kills have occurred less frequently and with less severity, but a problem still exists. The problem of cold shock at Brunner Island may be related to the disproportionate amount of water discharged from one unit relative to the combined discharges of two other units. In response to this problem, Brunner Island prepared a report examining each of the seven fish kills between 1983 and 1991 attributable to cold shock. Recommendations from the study include: 1) install a control modification to the discharge channel valve system on units one and two to achieve more control over discharge temperature; 2) conduct an annual check of the fish comfort system on unit three; 3) revise unit three control shutdown procedures so that the facility can better ensure a 10° F drop per hour; and 4) install temperature monitoring equipment on two units.

For most facilities, shutdown procedures related to cold shock are not needed. Procedures are not needed at facilities that discharge directly into a lake or large waterway where a rapid mixing of effluent occurs. For example, at a Lake Michigan facility, a year-long study performed in conjunction with the State determined that wind and current affected water temperature more than the thermal discharge. In the case of internally driven shutdowns, the risk of cold shock also is low for a facility that has three or more units, because a single unit shutdown will only result in a moderate and endurable drop in temperature in the thermal discharge. However, grid-affected unit trips likely will impact all the units at a given site, causing a larger impact in thermal discharge. The risk of cold shock and the related need for facility procedures is also low for facilities that operate in climates that are warm year-round. The risks of cold shock are also likely to be minimal at facilities with a history of winter outages that have not caused fish kills. Because cold shock appears to be very site-specific, such actual historic data offers the best evidence possible that the likelihood of cold shock is minimal.

Cold shock may, however, become more of an issue as facilities age and are used only intermittently to supplement peak power demands, or retooling extends their useful life. An important consideration, however, is that fish populations (and certainly less mobile species) are less likely to congregate in a thermal plume that is intermittent, as opposed to a plume that is continuous. Moreover, older plants generally are smaller than newer plants, and thus they produce a smaller plume. All of these factors must be considered in evaluating cold shock potential.

3.3.2 Control Mechanisms to Prevent Damage from Thermal Discharge

Power plants employ a variety of techniques that use water to cool their condensers. Many facilities have installed heat dissipation systems to minimize the impact of thermal discharge on the environment; others use operating procedures (such as the shutdown procedures described previously) to reduce the impact on the environment.

Typically a once through cooling process does not cool the water prior to discharge, rather it involves drawing in water, running it once through the facility, and directly discharging the water in one uninterrupted flow. Power plants prefer using once through cooling because it costs less than mechanisms that cool the water prior to discharge. Once through cooling is appropriate for

certain facilities, but when used alone, it poses the greatest threat to aquatic life for both cold shock and thermal shock.

Cooling towers and cooling ponds are effective in lowering the temperature of the water after it is has passed through the condensers, prior to discharge. Depending on the facility, the cooled water is either recycled through the facility to be used again or periodically discharged to the receiving body. Cooling towers generally require the use of antifouling agents, which may have their own water quality issues. Salt water complicates any circulating water system, whether it is once-through or closed cycle, but this added complexity does not preclude the use of cooling towers. In addition, cooling towers may cause significant water loss due to evaporation.

Cooling or retention ponds are large reservoirs where water is stored after passing through the facility, allowing time for the water to cool prior to being recycled or discharged. Cooling ponds require approximately one acre per megawatt and may not be feasible for high megawatt facilities with a small plant site area. The acreage required for cooling ponds or reservoirs varies according to geographic location. Facilities located in arid climates may require more acreage per megawatt.

Some facilities locate their discharge pipes or multiport diffusers offshore or in the center and/or at the bottom of a river or lake to minimize the impact of the thermal discharge. The risk of fish kills from cold shock or excessive temperature is minimized when diffusers are used, as a function of water velocity and diffusion. Diffusers are equipped with nozzles or small diameter ports that blast water at a high velocity. The velocity is great enough that fish cannot swim against it; fish are unable to enter or rest in the high velocity zone. By the time velocities are reduced, diffusion has eliminated large temperature differentials, and there is little risk of cold shock or thermal shock to fish and other aquatic organisms.

The use of these control mechanisms may vary to accommodate for seasonal temperature changes. For example, some facilities only utilize their cooling towers or cooling ponds during summer months to reduce the discharge temperature and flow during critical ambient temperature periods. In addition, during very hot periods, some facilities reduce the amount of electricity generated which results in reduced temperature of the thermal effluent (as long as the same amount of water is run through the plant).

3.3.3 Control Mechanisms that Keep Fish Out of the Discharge Channel

Several facilities supplied information on control mechanisms used to keep fish out of the discharge channel. Mechanisms include: screens, barriers, water jets, and vertical bars. The appropriateness and effectiveness of the control mechanisms vary, and little data were available from the facilities to evaluate these methods. Screens vary in size and are used to physically keep fish out of the channel. Vertical bars keep larger, adult fish out of the channel. High velocity water jets keep fish out of the channel because the fish cannot swim against a rapid water flow. Discharge channels differ in terms of length (from a few yards to over 3 miles), depth, width, construction, and the temperature of water being discharged into them. Some facilities also stated that there were no mechanisms used to keep fish out of discharge channels, and that these channels are subsequently used for fishing by sportsmen during cold ambient temperature periods. Fish can make their way into the discharge channel by swimming through pipes, over fences, and a variety of other means. Subsequent heated effluent or change in discharge temperature can cause fish kills in the discharge channel.

For example, during the spring of 1991, a nuclear facility had an incident where 4,000 fish were killed in the discharge channel despite control mechanisms. Normally a wall blocks fish from entering the channel and discharge pipes maintain a water velocity that restricts access through the pipes. There are, however, occasions when the water velocity through the discharge pipes is reduced, and fish can swim up the pipes into the channel. In addition, during periods of high river flow, fish may be able to swim over the wall.

3.4 Environmental Studies Performed to Support Section 316(a) Variances

Environmental monitoring and studies provide data to both the facility and the permitting agency on the health and numbers of aquatic life near the facility. This data may be used to demonstrate that the facility meets Section 316(a) variance criteria under its current permit, that permit requirements need to be modified, or that a variance would not protect the environment.

This section describes some of the parameters that some initial studies for Section 316(a) variances monitored and discusses the extent to which facilities continue to monitor the biotic community. This section also discusses the environmental studies and monitoring that facilities seeking to renew their variances may be required to conduct.

3.4.1 Initial Section 316(a) Variance Studies

Facilities that have applied for Section 316(a) variances are often required to engage in extensive studies and data collection to demonstrate that facility operations under the requested variance will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the facility discharges. Guidance for conducting and evaluating these studies is provided by the permitting agency. Several EPA documents exist to assist a facility in preparing its Section 316 demonstration, including the draft *Interagency Section 316(a) Technical Guidance Manual*. EPA, however, has not finalized this draft guidance. In absence of national guidance, some EPA Regions have developed their own informal guides to Section 316 demonstrations, which describe the types of information an applicant will need to submit to be considered for a variance.

Typically, information must be gathered on physical, thermal, and biological characteristics of the receiving water, including information on plankton, plants, macroinvertebrates, and fish. The specific types of information and sampling methodologies are determined on a case-by-case basis. For example, general requirements for a Section 316(a) demonstration for facilities that will use "once-through" cooling water systems differ from the requirements for "recycling" cooling water systems (cooling towers, spray ponds, or cooling ponds) because of varying impacts on the environment.

An applicant is entitled to a variance so long as the overall existence of balanced, indigenous population of aquatic organisms results from operation of the facility in its existing configuration. The permitting agency will establish permit limitations that are protective of the water and its inhabitants and consistent with the conditions of the Section 316(a) demonstration. Each permit is unique, based on the particular circumstances of that facility and the receiving water body. For example, the Brunner Island discharge results in the loss of spawning habitat for some fish. According to the facility staff, Brunner Island maintains a variance because the water body is still able to sustain a very large amount of spawning habitat for affected species along other parts of the waterway.

3.4.2 Studies to Support Reissuance of Section 316(a) Variance

The Section 316(a) variance terminates when the permit expires. Although facilities engage in a great deal of research and data collection to initially acquire a variance, the amount of data required by the permitting authority to support reissuance of the variance at the time of permit reissuance usually is minimal. The permittee only needs to provide a basis for that reissuance. The basis could be as simple as: 1) there have been (and will be) no changes to thermal discharges from the facility or to plant operating conditions; 2) there are no changes to facility discharges that could interact with the permittee's thermal discharges; and 3) there are no changes (to permittee's knowledge) to the biotic community of the receiving water body. For many facilities, there is no need to perform additional reissuance studies, because no changes have occurred, and a reissuance is reasonable.

For certain facilities, however, continued reissuance studies may be warranted. For example, if the waterway to which the facility discharges undergoes an improvement in water quality or a return of anadromous fish, additional studies may be needed. As the water quality improves along many of the nation's waters (e.g., the Ohio River), the process for Section 316(a) variances may need to include studies on facility impact to the waterway. Several questions would need to be addressed by the permit writer prior to reissuance: 1) How do facilities or EPA Regions gather data on improved water quality? 2) What criteria need to be met to determine if additional testing is required for variance renewal? 3) Does the current biological data of a water body get compared to baseline data such as dissolved oxygen? 4) How should changes in water quality affect a facility's permit?

In addition, many variances initially were granted, and permit limitations established, based on modelling data. Actual field data from environmental studies may later indicate that the: 1) actual plant operation results in discharges that do not meet the permit limitations that were based on the modelled Section 316(a) demonstration; and/or 2) permit limitations are inadequate to ensure the protection and propagation of a balanced, indigenous population. Moreover, studies may be needed to support the reissuance of a variance where significant environmental degradation has occurred, as in the case of two of the four Ohio facilities mentioned in Section 3.2.2 of this report.

3.4.3 Environmental Monitoring

Some permits require a facility to engage in environmental monitoring, other permits have no such requirements. Moreover, sampling protocols currently are determined on a case-by-case basis, with little formal guidance from Headquarters or some EPA Regions.

Region I Technical Advisory Committees (TAC) develop and review site specific sampling and monitoring requirements for permitted facilities. One nuclear facility participates in an Environmental Surveillance and Monitoring Program, the purpose of which is to determine whether the operation of the facility results in measurable effects on the marine ecology and to evaluate the significance of any observed effects. If significant effects are detected, the facility must take steps to correct the situation. Similar programs were required in other EPA Regions for virtually all nuclear power plants.

In cases where permits do not require the facility to engage in environmental monitoring, changes in water quality may go undetected unless facility personnel perform monitoring on their own initiative or a State or federal agency monitors that part of the waterway. In these cases,

some facilities will monitor more extensively than others. For example, one Maryland facility is completing a 10-year quantitative study of its effect on fin fish population and other biota. This extensive study is contrasted by the studies performed at a facility in Region III where biosampling procedures for fish could have been more rigorous.

Region V is considering recommending that future Ohio permits contain a special condition requiring in-stream biological monitoring for facilities with Section 316(a) variances that do not require compliance with all State thermal WQS criteria. Ohio EPA also has established fish sampling protocols including suggested procedures for electro-netting fish.

3.5 EPA Procedures for Issuing and Reissuing Permits

Each EPA Region differs in the level of expertise, guidance, and institutionalized procedures that are used in the permitting process. Region I has established the most formalized system to issue and renew variances through the TACs. Region IV also has a TAC in place for a Florida nuclear facility. One issue that all of the Regions share is that as a result of retirement, attrition, and transfer, EPA is losing its institutional knowledge on thermal issues and consequently the ability to adequately review permits. One way to ensure consistency and preserve institutional knowledge is through Headquarters guidance.

3.5.1 Advisory Committees

Some Regions and States report using TACs when developing permits. As mentioned above, Region I forms TACs to oversee the process by which variances are issued to facilities. The Committees were established to augment expertise within EPA and to shepherd utilities through the Section 316(a) process. Committee members represent key biological regulatory agencies (e.g., U.S. Fish and Wildlife Service, the State fish and game agencies, marine fisheries agencies, and outside experts). Power plants also are represented on the Committee. This review process, described below, has been well received by industry and regulators. To date, no variance decisions in Region I have been challenged by the permittees.

When a facility requests a variance, the EPA Region and the respective State convene an advisory committee, which remains in place until the facility undergoes verification testing. The facility provides the committee with a broad overview of facility operations and details of any problems that may arise as a result of the facility's operations. Baseline biological data are collected for 1 to 3 years before the facility goes on line so that any potential problems can be addressed at an early stage.

There appear to be no other arrangements that are as institutionalized as the TAC, although other advisory groups exist. For example, the Maryland Department of Natural Resources has a power plant research program that makes technical recommendations regarding the environmental effects of a facility's operations. While this program was not specifically established to deal with thermal issues, that has been one of its primary functions for at least the past 15 years.

3.5.2 Lack of Institutional Knowledge

EPA personnel familiar with permitting and compliance issues relating to thermal effluent and power plants, including national technical experts are retiring or otherwise leaving EPA. As a result, EPA may need to take actions to ensure continued expertise on power plants, thermal

effluent, mathematical models, and other thermal issues. In one instance, Region V had objected to the original Section 316(a) request made by a facility, but after the Region's power plant expert left EPA, the Region lacked the expertise to support its permit objection, and the State granted the Section 316(a) variance. The facility in question later caused a large fish kill due to the high temperature discharge. Since that time, the permit limitations have been changed.

Currently, there is little guidance on permit preparation or conducting environmental studies and monitoring to support variance reissuance at the federal level. This potentially could result in poorly written permits, or lack of compliance oversight for thermal discharges. The loss of expertise on thermal effluent impacts will be mitigated somewhat in the future by the almost exclusive use of closed cycle cooling for new plants in certain EPA Regions; however, permit reissuance of older plants will still require some expertise on thermal discharges.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Key findings from this study to date are: 1) For the majority of facilities, impacts from thermal effluent have not been found to be large and/or permanent, although additional studies at some facilities are needed; 2) Most thermal issues are not related to noncompliance on the part of the facility, but rather are administrative in nature on the part of EPA (e.g., there are no permit provisions that ensure that variance criteria are met, no monitoring provisions are specified in the permit, and/or no permit requirements that protect fish at facilities where cold shock is likely to occur); 3) The lack of final guidance on Section 316(a) variances from EPA Headquarters has contributed to inconsistencies in permit requirements and the process by which variances are issued; and 4) EPA is losing its institutional knowledge on thermal issues, impacting EPA's ability to adequately review and prepare permits.

The following recommendations reflect consideration of these findings and discussions with EPA staff from the Regions and Headquarters:

- Update the previously developed listing/summary of Sections 316(a) and 316(b) status for NPDES permittees.

- Issue final guidance, formalize EPA policy, and develop generic permit language and enforcement checklists to ensure that 316(a) variances fully meet variance criteria.

- Provide training on thermal variances for EPA Regions and authorized States.

- Identify States and EPA Regions that have established processes by which variances can effectively be issued and reissued (e.g., the TACs in Region I) and share this information among the other States and EPA Regions.

- Evaluate ways to increase the reporting to EPA and the public of thermal effluent violations from the States, including modifying the reporting protocols for the Permit Compliance System.

- Reconsider the long-term establishment of technology-based new point source performance standards governing thermal discharges, for steam electric plants.

EPA guidance should address the need for maximum discharge temperature limitations for some permits, maximum ΔT in discharge temperatures over time, and ongoing biosampling and environmental studies. In addition, permit guidance should address the need for and feasibility of temperature monitoring requirements at various points in the waterway and/or requirements for periodic thermal surveys to ensure accuracy of thermal plume models. Guidance also needs to be developed on cold shock, especially for older peak power facilities, which operate part time. Cold shock guidance may include parameters for controlled temperature decreases during unit shutdown and control mechanisms to restrict fish from the discharge channel.

In summary, OWEC believes that the Section 316(a) variance is a useful tool when appropriately and consistently applied. To promote consistency, OWEC is developing a training course for power plant permit writers and others involved in thermal effluent management. The pilot workshop is to be held in Region II in the second quarter of FY 1993. A guidance document

also is under development and will be available in draft form by October 1993. The workshops and guidance document will address the first five recommendations made above. The sixth has been placed on selection list for guidelines review, update, and reissuance.

Additional recommendations for EPA guidance relate to clarifying EPA's interpretation of the CWA. Specifically whether and how Section 316(a) variances should consider impingement and entrainment factors. Permits Division staff also believe that a clearer interpretation of what "cost reasonableness" level is intended for Section 316(b) would be helpful.

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Attachment A

BRUNNER ISLAND REVIEW

Description of the Plant and its Operations

Brunner Island Power Plant is a coal fired steam electric station located at Brunner Island, York County, Pennsylvania. It is operated by Pennsylvania Power and Light (PP&L). The Brunner Island facility takes in approximately 744 million gallons per day of water from the Susquehanna River. The river water is pumped to the condenser through tubing to cool steam coming out of the turbines. The water is chlorinated prior to use to remove contaminants (e.g., algae, dissolved solids) and to reduce fouling of the facility mechanisms by algae and deposits. The condensed steam is recirculated; the heated water is returned to the Susquehanna. The schematic on the following page details the processes at a coal fired electric plant.

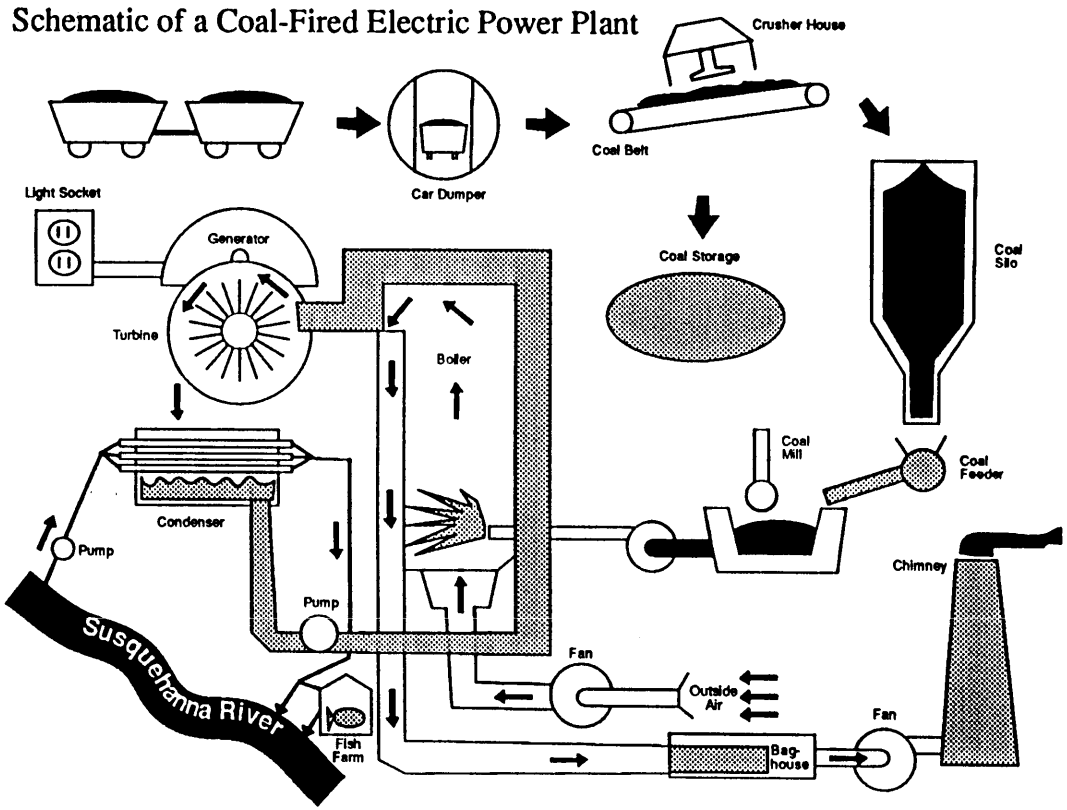
The facility consists of three units, Units 1, 2, and 3, built in 1958, 1961, and 1969, respectively. The Brunner Island facility is typical of many older facilities in that it uses "once through cooling," which means the river water is pumped in to the condenser cool the turbines, then pumped out as soon as cooling is completed. The facility returns the water to its source, unlike other facilities that discharge water after cooling into a water body different from the source. By discharging to the source, the facility avoids many of the problems that could occur otherwise (e.g., augmented flow, introduction of non-indigenous species, draw down of source water body).

During shutdowns the amount of water entering and leaving the condenser is restricted. The residence time of the water in the condenser is thus longer to ensure the cooling water will remain at a more constant temperature even though the plant is generating less heat. This is the Thermal Shock Prevention System, or "fish comfort system," used to avoid sudden or large fluctuations of temperature in the discharge channel.

If the temperature differential across the condenser becomes too great, plant equipment can be damaged. Under these circumstances, the fish comfort system is removed resulting in increased draw of river water into the condenser and discharge of unheated water into the channel. The unheated water may serve to greatly decrease the temperature of the water in the channel/river interface. The discharge channel at Brunner Island, unlike other facilities in the review, does not have controls to prevent fish from entering or amassing at the channel/river junction (where the fish are at greater risk to temperature fluctuations and high temperatures).

Units 1, 2, and 3 share a common discharge channel. Because Unit 3 produces as much discharge as Units 1 and 2 combined, the reduced flow from Unit 3 during shutdown allows the flows from Units 1 and 2 to fill the entire channel. The cross over causes the remaining flow on the Unit 3 side of the channel to equilibrate to the temperature of the crossover flow. The equilibration could be either an increase or decrease in temperature on the Unit 3 side of the channel depending on the direction of the temperature differentials between the two discharges. Thus, a shutdown of Unit 3 can have a significantly higher impact on the receiving stream than the removal of either Units 1 or 2 alone.

Brunner Island (PP&L), PA Site Visit



Facility File Review

The Brunner Island facility file review consisted of examining PP&L's facility history file kept by the PA DER in Harrisburg, Pennsylvania, and documents on file at EPA. Documents reviewed included Discharge Monitoring Reports (DMRs), violation reports, enforcement action files, and inspection reports. There have been citizen complaints about river water temperatures downstream from the Brunner Island plant, including one in August 1989. Reportedly, the water a great distance from the power plant had at times been hot enough to prevent wading, and several dead fish had been observed.

The file review revealed that Brunner Island Power Plant had no DMR violations of its thermal limitations in the last 2 years. Further review of permit and discharge information has shown the plant to be in compliance with the thermal limitation, which is expressed as a heat rejection rate in the facility's permit. The current rejection heat permit limitation was established as part of a Section 316(a) thermal variance in 1977. It is unclear whether PP&L was required to submit operating data to support continuation of the variance at the time of permit reissuance; the permit expires September 30, 1990, but has been extended to 1992. The permit for Brunner Island facility sets a limit on the BTU per hour the plant may discharge. The permit also requires the facility to monitor its discharge temperatures. There are no limitations per se on the maximum and minimum temperatures that may be discharged, or the deviation in temperature from the ambient water temperature. (There also is no requirement that the facility conduct biosampling, although it has since 1981.)

The permit limitation of 6,960 x 10^6 BTU per hour for the facility is more than double the rate that EPA calculated (2,690 x 10^6 BTU/hour) based on the Pennsylvania WQS. The commonwealth's WQS equates to not more than a 5° F rise above ambient temperature measured above the intake pump on the lowest 7 days (continuous) flow in 10 years. For the Susquehanna River, this is 2,400 cubic feet per second (i.e., 7Q10 of 2400 CFS). The heat rejection rates reported at the facility for April and May 1989 were 6,290 x 10^6 BTU per hour and 6,225 x 10^6 BTU per hour respectively. While these rates are within the permit limitation, they far exceed those that the Pennsylvania WQS have dictated.

The commonwealth files contained reports of two fish kills, one each in January 1990 and January 1988. (There were reports of other incidents unrelated to thermal loadings (i.e., sulfuric acid spill, oil spills)). On file were the inspection reports detailing the follow-up inspections due to the fish kills as well as the recommended and performed enforcement activity. As a result of the January 1990 fish kill in which several hundred fish died, the commonwealth imposed a fine of $1,000. (The fish that died included a few hundred gizzard shad, numerous sunfish, and a few carp, catfish, crappie, and fall fish). In the January 1988 fish kill, approximately 180 fish died. At that time, the commonwealth issued a letter of agreement without penalty to the facility.

Commonwealth files also indicate that there were two fish kills in 1985. During the first, in November 1985, two to three thousand gizzard shad died. The facility agreed to a $100 voluntary civil settlement. PA DER made no assessment against the facility. The second fish kill occurred in December 1985. The facility staff attributed the second fish kill to a controlled shut down of the plant initiated due to a tube leak.

Fish Kills

The Brunner Island facility staff provided additional information on the fish kills. The January 1990 fish kill was due to a boiler tube failure in Unit 3. Unit 3 was brought out of service in a controlled shutdown to one-third of the unit's output. The "fish comfort system" kicked-in and reduced the flow from the plant to avoid a sudden pass through of unheated river water. However, at one-third load, the temperature differential across Unit 3 was too great to continue with a controlled shutdown without critical damage to the plant, and the staff removed the comfort control system from operation. Subsequently, unheated river water passed through the plant and into the discharge channel.

The shutdown of Unit 3 resulted in a 30° F increase over an hour in the discharge channel as flows from Units 1 and 2 overran the Unit 3 decreased discharge. A sudden drop in temperature (15°F in approximately 10 minutes) occurred in the channel when the comfort system was removed. The facility staff interviewed suspected the fish kill to be from the sudden decrease in temperature, and not the initial increase.

According to facility staff, the January 1988 fish kill was due to a "cold shock" as a result of decreased flow from the plant during shutdown of Unit 3 and the undertow of the river water back up the discharge channel. This resulted in a 29° F drop over 10 minutes in the channel. A total of 180 fish were counted as dead, including several carp, bass, red horse suckers, and blue gills. One researcher noted an increase in the diversity of fish species, and an increase in carp, and attributed this in part to the elimination of Talapia (an introduced species of fish that had been intentionally removed). As noted earlier, there are no controls preventing fish from entering the discharge channel, thus exposing the fish to the potential variations of temperature.

The staff attributed the December 1985 fish kill to a tube leak in the reheater section on Unit 3. They attempted to maintain a 5 megawatt per minute drop in load, but ended with a 6 megawatt per minute drop. The target drop rate was based on their experience that a 5 megawatt per minute drop rate maintains less than a 10° F drop. The facility staff reported that the ambient river temperature being lower than expected (in addition to the greater drop) possibly was a factor in the large decrease in temperature. Adjustments in procedures were to include a check of ambient river temperature and adjust the rate drop accordingly. (It is not clear how this was factored into the 1988 and 1990 fish kills).

The staff said controlled shutdowns are preferred over a "trip" (i.e., an automatic emergency shutdown of the unit) for safety and environmental reasons. On a "trip" the temperature in the discharge channel actually increases because of the influence of the discharges from Units 1 and 2. The facility has had an average shutdown rate of 13 per year. There were six shutdowns in November and December of 1985 due to tube leaks.

When EPA asked why fish kills appear to occur only in winter, the facility staff explained that the fish are not present at the outfall in the warm months. The comfort range of the fish is such that in the spring, summer, and fall months, they congregate in the deeper, cooler waters of the river and during the winter stay within the thermal plume. Accordingly, there are no fish present to be affected by thermal fluctuations in the warmer months.

In addition, there appears to be a correlation between fish kills and Unit 3 problems. Because Unit 3 discharges as much effluent as Units 1 and 2 combined, a problem with Unit 3 causes a greater impact than a shutdown of either of the other two units.

At the time of this site visit, there had been no recent fish kills, and there were no signs of problems. A second site visit, later in August, allowed EPA to take a closer look at the environmental impacts. These are discussed in the next sections.

Biosampling (see schematic, page A-6)

Every August, in coordination with PA DER staff, the Brunner Island facility environmental staff samples for aquatic life impacts. Late August is selected because it is assumed to be the worst case scenario (i.e., lowest water level and the hottest water). The staff sampled at eight locations, including above the intake, at the POD, and 2 ½ miles below the POD. Sampling is conducted for fish, macroinvertebrate larval and nymph stages, and water quality (dissolved oxygen, temperature, conductivity, and pH). The sampling has occurred every year since 1981. The study results and data are available from the plant.

The biosampling is important because, in addition to fish kills, thermal discharges have been known to cause other detrimental effects to fish such as: increased levels of infections and poor body condition, reduced population size, and reduced species diversity. Without biosampling, nonlethal effects of thermal discharges cannot be adequately assessed.

EPA participated in the August 1990 biosampling of two of the eight sampling locations. The first was on the Susquehanna River about 5 ½ miles downstream from the thermal discharge on the east side of the river opposite the thermal plume (Station 6). The second was at the junction of the thermal discharge channel with the Susquehanna River (Station 3). Results of the sampling are described below.

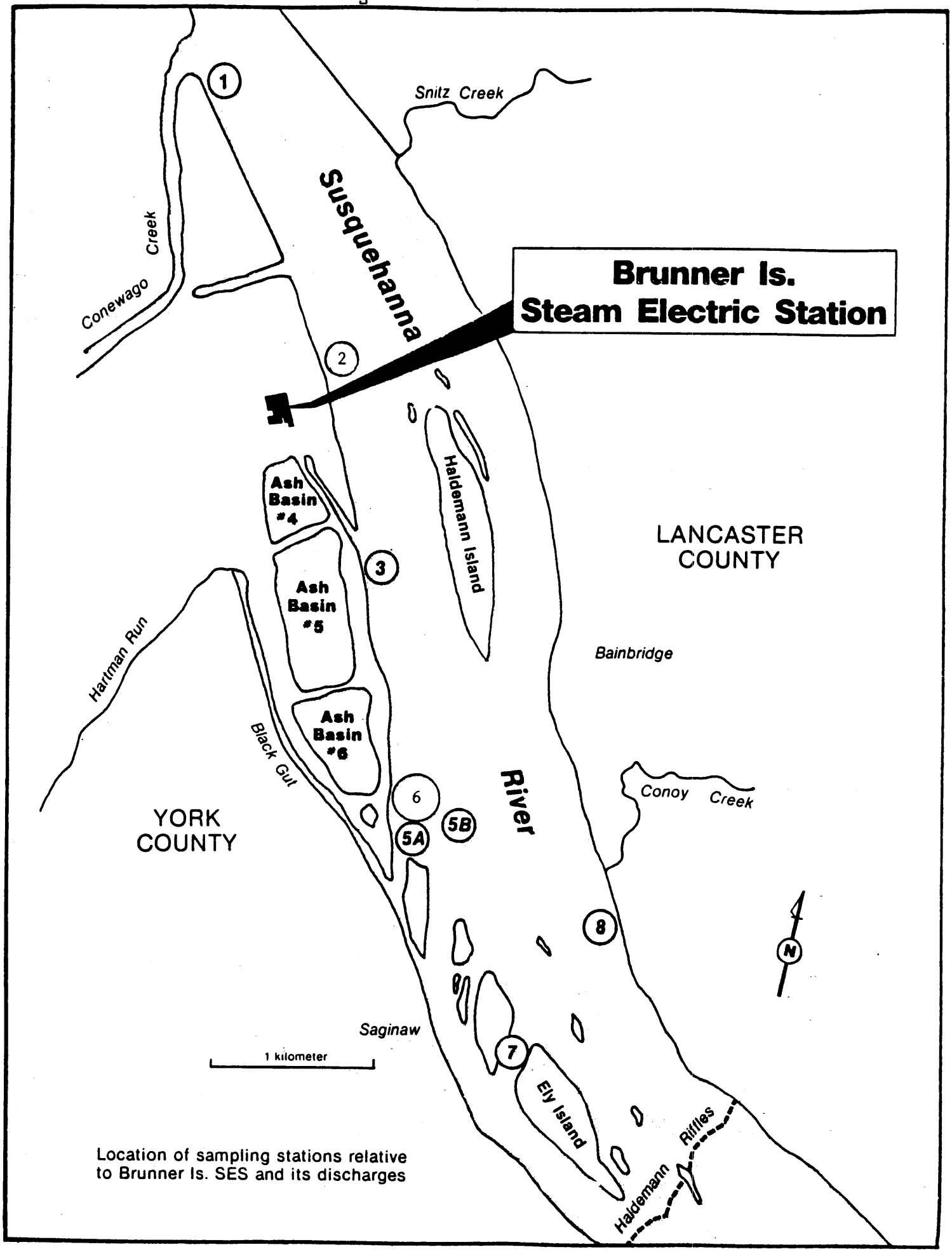
Station 6 Biosampling

The flow of the river on August 28, the day of the sampling, was about two feet above the normal August flow. This resulted in lower than normal numbers of fish caught in that part of the river. (Sampling conducted later in the week was closer to the expected numbers for August). The staff collected fish via electro-shock and netting procedures. The vast majority of the fish were two-inch long shiners, though the staff also caught a few channel catfish, carp, bass, and sunfish. The fish all appeared to be in good health with no obvious signs of disease or infection (i.e., no sores or lesions). For fish over two inches, the staff identified, measured, and weighed them in the field and returned them to the river (The weight and length of the fish are used to calculate body condition). The staff bottled and preserved the smaller fish for later identification.

Macroinvertebrates were collected by disturbing the substrate and collecting the wash in a small mesh seine. The macroinvertebrates collected were typically species found in past sampling (i.e., mayflies, caddisflies, mosquito larvae, hymenoptera). These samples were bottled and preserved for later identification and enumeration. The water temperature at Station 6 was 75° F.

Station 3 Biosampling

The fish collection at Station 3 was significantly different from that of Station 6. According to facility staff, Station 3 routinely demonstrates the lowest diversity and numbers of fish and macroinvertebrates as it is the most highly impacted by the thermal discharge of the eight sampling stations. The fish that were collected were almost exclusively shiners and mosquitofish, as well as a few small sunfish and bass. The staff did not catch any catfish or cod. Some of the fish were dead, though it could not be determined if they had died due to the thermal effluent or



Location of sampling stations relative to Brunner Is. SES and its discharges

from entrainment through the plant's cooling water system. The large fish were identified, measured, weighed, and returned to the river. The smaller fish were bottled and preserved for later identification.

The macroinvertebrate sampling at Station 3 uncovered only two insects, both mayflies, one of which was dead. The samples were bottled and preserved for later identification and more thorough examination. The water temperature at Station 3 was 96° F. The rocks and sediments at this station were covered by a thick (0.5 cm) spongy and slick growth of algae. There also was some discolored foam near the shoreline. (The water in this area is fairly turbulent and foam would be expected.)

Conclusions on Biosampling

The sampling methods and locations are appropriate to meet the company's goals: Year-to-year comparison of river flows, locations of thermal plume, numbers and diversity of fish and macroinvertebrates, and fitness of fish. The sampling is not necessarily rigorous enough, however, to demonstrate "no adverse effects" or "irreparable harm" as no sampling of aquatic vegetation takes place, and fish and macroinvertebrate sampling is only performed once a year.

The fish from Station 6 were robust and in good health. Those from Station 3 did not appear as well off nor were there as many or in as great diversity. The difference in numbers is to be expected, given the hotter water temperatures; in the summer months, most fish seek the cooler, deeper regions of the river. The fish that were dead (Station 3) were not kept to determine the possible cause of death.

The macroinvertebrate population at Station 6 was significantly greater and more diverse than at Station 3. Station 3 has high turbulence, hotter temperatures, and algae growths that interfere with the development of macroinvertebrate populations.

Miscellaneous Observations

Facility staff was not aware of "hot pockets" in the receiving waters, but acknowledged the thermal plume extended downstream at least 6 miles, hugging the right bank (although it occasionally moved depending on flow and weather conditions). The staff members were not aware of thermal stress on the fish, although they indicated that other PP&L plants had thermal stress problems.

The staff members were questioned on how they believe the plant impacts the local and downstream environment and if they believe the York Haven Hydrological Plant and the Three Mile Island Nuclear Power Facility (both just up the river) may be causing impacts for which PP&L was or could be held accountable. The staff responded that the original impact analysis (performed in 1979 and 1980) of the variance required no impact more than 5 miles downstream and believe that depending on the river flow for the year, little or no impact was observed at 2 ½ miles downstream from the discharge point. They noted no visible drawdown of the river due to the plant's use of the water.

None of the staff believed the upstream facilities mentioned caused problems for which PP&L was or could be held responsible. They did mention that the York Hydrological Plant occasionally had an impact on PP&L's ability to draw from the river. When York restocks its reservoir, a drawdown is apparent. This impact is not severe and is temporary, as the reservoir capacity is very limited.

Attachment B

TRIP REPORT FOR MARY REILEY

BIOSAMPLING
PENNSYLVANIA POWER AND LIGHT
BRUNNER ISLAND STEAM ELECTRIC

AUGUST 12-16, 1991

Background: In response to a citizens complaint in the fall of 1989 that the heated effluent from the Pennsylvania Power and Light Co.'s (PP&L) Brunner Island Steam Electric Plant was too hot to wade in for fishing and that cooked crayfish could be found, OWEC launched an investigation into the thermal limits, variances, and mixing zones placed upon steam electric plants. One result of the investigation was a review of the Brunner Island compliance file at the Pennsylvania DER and an informational meeting with the plant's management.

During the meeting, Ed Davis and Bob Domermouth (of Brunner Island and PP&L respectively) spoke of the company's annual biosampling on the Susquehanna River to asses the effects of the thermal effluent on the river. Bob Domermouth invited me to join the sampling team last year and called this past spring to ask if I would like to participate again.

Lay of the Land: (see attached schematic in Appendix A, page A-6)

The Brunner Island facility is located about 10 miles north of York, PA. The segment of the river it discharges to is two miles wide and divided down the center by a chain of islands approximately five miles long. The chain separates the deeper channel on the east side of the river from the shallower on the west and effectively creates a barrier between the thermal plume and cool east waters should the plume extend towards the river's center. The river bottom is almost entirely bedrock, either outcroppings or covered in stones and heavy gravel; some slower moving areas are silty.

The river's water level was extremely low (not much over the 7Q10 which is 2400 cfs) providing a prime opportunity to investigate the effects of the thermal discharge under the low flow conditions anticipated at permit issuance. The plume extended across approximately two-thirds of the west side of the river for atleast four miles. Previous studies at extremely low flows found impact similar to those at station seven as much as five and one-half miles downstream.

Sampling Methods: (see attached schematic in Appendix A, page A-6)

There are eight sampling stations in the annual study: one is a reference station above the thermal discharge at Conewago Creek; two is also a reference station above the thermal discharge on the west bank of the river at the discharge from the facilities sanitary waste treatment pond; station three has the highest impact as it is located at the end of the thermal discharge channel; station six Is the outfall of ashbasin six; stations 5A and 5B are on the west side of the river downstream from the thermal discharge, under normal flows this is an impacted area; station seven is between two islands located one-third of the way across the river, downstream from the thermal discharge and is mildly impacted; and station eight is on the east bank of the river, downstream from the thermal discharge but not impacted by the thermal dischage.

Water Quality

Water quality parameters were sampled for all stations: DO (range 6-10), pH (approx. 8), Temperature (range 26° - 42°C), Conductivity, metal and non-metal contaminants.

Vertebrates

Fish were collected at all sampling stations except station 6 (the outfall of ashbasin six, not a natural stream). Fish were captured using electroshock and nets. Collection started downstream of the sampling area and worked upstream.

Recreational species and those more than four centimeters in length were weighed, measured, examined for external peculiarities, and released. Those fish less than four centimeters were preserved for later identification and examination (primarily shiners).
Examples of fish caught and environment (not all inclusive):

Cooler Waters	Warmer Waters
Quill-Back	Shiners
Yellow Carp	Sunfish (Redbreast, Green)
Catfish (Yellow, Brown, Channel)	Catfish (Yellow, Brown)
Bass (Rock, Large/Smallmouth)	Smallmouth Bass
Sunfish (Redbreast, Green)	Common Carp
Gizzard Shad	
Minnows	
Shiners	
Suckers	
Pumpkinseed	

The most significant difference between the cooler and warmer water was the numbers of fish collected rather than the types. Colder waters had significantly more fish than warmer waters. Station three had few if any fish present. Station 5B and 7 also had significantly lower numbers than did the reference stations and station 5A which received reverse flow.

Invertebrates

Macroinvertebrates (insect larvae, pupae, worms, chironomids, bivalves, snails, beatles, etc.) were collected at all stations but station six. The macroinvertebrates were captured in the riffle areas by kicking up the substrate and collecting the loose substrate and organisms in a fine mesh dipnet placed immediately downstream of the disturbed area. All invertebrates were preserved for later enumeration and identification. Depth and flow for the riffle areas sampled were recorded using a universal wading rod.

Examples of macroinvertebrates collected and environment (not all inclusive):

Cooler Waters	Warmer Waters
Riffle Beatles	Dominated by Chironomids
Mayfly Larvae	Riffle Beatles
Bivalves	Water Pennies
Snails	
Chironomids	
Water Pennies	

As with the fish sampling, the macroinvertibrates collected from the benthos demonstrated significant differences in numbers of organisms, particularly station three where again all but nothing was collected. The most significant difference between impact and reference stations was the dominance of the impacted stations by chironomids and only a few token representatives of the other species.

Field Evaluation:

The final report of this years sampling will not be available for several months. Field observations lead me to believe that the impact of Brunner Island Steam Electric's thermal discharge on the Susquehanna River is local and not irreparable. If the plant were to shut down today, the lateral and upstream migration of organisms into the previously impacted area would be relatively quick. This is exemplified in stations 5A and 5B.

During normal flow years stations 5A and 5B are thermally impacted. This year the river flow was extremely low allowing a split flow of cold water from ash basin six; half of the flow traveled back upstream through station 5A and hugging the west side of station 5B. The fish and macroinvertebrate populations in these areas were very different from last year. Though the invertebrate population was still dominated by chironomids, a strong showing of less tolerant species was present. The areas also supported the cooler fish species.

There is little to nothing present at station three, the end of the thermal discharge channel, all life has vacated for the summer to cooler climates (sounds like August in D.C.).

Potential Concerns not Investigated:

There is a possibility that some species, i.e. bass, are spawning just upstream from the PP&L plant and below the York Haven Hydroelectric plant (there is a dam at this point with no passage for fish). The eggs may float downstream and be caught either in the cool water intake or in the plants thermal plume. The effect of this (if there is any) on potential recruitment of these species is unknown.

Other:

Brunner Island had a cold shock kill this past January 1991. It was not a large kill, approx. 200 fish, but it has prompted the facility to take further procedural and potentially technological steps to eliminated the cold shock kills. The facility recently completed a study of all fish kills that have occurred at the plant since 1977. The results demonstrate that since the fish comfort system was put in place on Unit 3 the number, frequency, and severity of fish kills has dropped significantly. The facility has since adopted some additional protective procedures and is considering installing a comfort system for both Units 1 and 2 as well. The station anticipates these measures will eliminate all future kills excepting those that result from severe emergency shutdowns. Bob Domermouth will send me a copy of their study and new procedures.

Attachment C
Facilities Reviewed In Depth (from Section 2.3)*

Permit #	Facility Name	Receiving Water	Contact Person	Telephone #(s)	Thermal Discharge Limits ** (Y/N)	Discharge Limits Above 100° F (Y/N)	History of Noncompliance or Complaints (Y/N)
CT0003093	N.E. Utilities (Norwalk Harbor)	Long Island Sound	Mr. R.A. Reckert, V.P. Mr. Nicholas Lanzalotta	(203) 665-5315 (203) 665-5657	Y	Y	N
CT0003115	N.E. Utilities (Montville Station)	Thames River	Mr. R.A. Reckert, V.P. Mr. Nicholas Lanzalotta	(203) 665-5315 (203) 665-5657	Y	Y	N
CT0003263	Millstone Nuclear Power Station	Long Island Sound	Mr. R.A. Reckert, V.P. Mr. Nicholas Lanzalotta Dr. Bill Renfro	(203) 665-5315 (203) 665-5657	Y	Y	N
CT0003883	Middletown Station	Connecticut River	Mr. R.A. Reckert, V.P. Mr. Nicholas Lanzalotta	(203) 665-5315 (203) 665-5657	Y	Y	N
MA0003557	Boston Ed-#1 Pilgrim Plt	Cape Cod Bay	Mr. Robert Anderson, Biologist	(617) 849-8935	Y	Y	N
MA0005339	Holyoke Water-Mt Tom Station	Connecticut River	Mr. R.A. Reckert, V.P. Mr. Nicholas Lanzalotta	(203) 665-5315 (203) 665-5657	Y	Y	N
ME0000272	Central ME Power-Yarmouth	Casco Bay	Mr. Jim Wazlaw, Dir. Env. Comp.	(207) 623-3521	Y	Y	N
ME0002569	Maine Yankee Atomic Power Co.	Montsweag Bay (Bailey Cove)	Mr. David Sturniolo, Principal Engineer	(207) 882-6321 Ext. 5189	Y	Y	N
NH0020338	P.S.Co. of NH-Seabrook	Atlantic Ocean	Mr. Ken Dow, Env. Scientist	(508) 779-6711 Ext. 2634	Y	N	N
NJ0005550	Oyster Creek Nuclear	South Br. Forked River	Mr. James Vouglitios, Mgr. Env. Ctrl.	(609) 971-4021	Y	Y (T^0 diluted)	N
NY0001015	Nine Mile Point Nuclear Station	Lake Ontario	Mr. Hugh Flanagan, Mgr. Env. Protec.	(315) 349-2428	Y	Y	N
NY0005924	Far Rockaway Power Station	Mott Basin	Mr. Madison Milhous, Mgr. Env. Dept. Mr. Chris Gross	(516) 391-6133 (516) 391-6097	Y	Y	N

* All facilities have approved or applications under review for 316(a) variances
** According to the Permit Compliance System (8/90)

Attachment C
Facilities Reviewed (from Section 2.3)* (continued)

Permit #	Facility Name	Receiving Water	Contact Person	Telephone #(s)	Thermal Discharge Limits ** (Y/N)	Discharge Limits Above 100° F (Y/N)	History of Noncompliance or Complaints (Y/N)
PA0008281	PP&L Brunner Island	Susquehanna River	Mr. Bob Domermuth Env. Mgr.	(215) 770-4849	N	N	N
MD0001511	Baltimore Gas and Electric Co.	Salt Peter Crk.	Mr. Jerry Warner, Senior Engineer Ms. Melissa Wieland	(410) 787-5379 (410) 787-5114	Y	Y	N
MD0002399	BG&E Calvert Cliffs	Chesapeake Bay	Mr. Jerry Warner, Senior Engineer Ms. Melissa Wieland	(410) 787-5379 (410) 787-5114	N	N (not numerical)	N
MD0002658	PEPCO Chalk Point Gen. Station	Patuxent River	Mr. David Bailey, Mgr. Water Quality	(202) 331-6533	N	N	N
IL0002224	Commonwealth Edison, Dresden	Illinois River	Mr. Jeff Smith, Supervisor, Water Quality	(312) 294-4450 Ext. 4435	N	N	N
IN0000132	NIPSCO, Bailey Generating Station	Lake Michigan	Mr. Charles Kern, Dir. of Env. Affairs	(219) 647-4938	N	N	N
MI0001686	Deco-St. Clair Plant	St. Clair and Belle Rivers	Mr. Art Heidrich, Admin. Env. Protection	(313) 237-7021	N (variance not required, facility is grandfathered)	N	N
MI0004464	Lansing BWL-Eckert Station	Grand River	Ms. Gail Peterson, Env. Engineer	(517) 371-6366	N	N	N
MN0000892	NSP-Riverside Plant	Mississippi River	Mr. Jim Bodensteiner, Reg. Analyst	(612) 330-5972	Y	N	N
MN0002011	Ottertail Power Co.	Ottertail River	Mr. Terry Graumann, Env. Engineer	(218) 739-8407	N	N	N

* All facilities have approved or applications under review for 316(a) variances
** According to the Permit Compliance System (8/90)

Attachment C
Facilities Reviewed (from Section 2.3)* (continued)

Permit #	Facility Name	Receiving Water	Contact Person	Telephone #(s)	Thermal Discharge Limits ** (Y/N)	Discharge Limits Above 100° F (Y/N)	History of Noncompliance or Complaints (Y/N)
MN0004006	NSP-Prairie Island Plant	Mississippi River	Mr. Jim Bodensteiner, Reg. Analyst	(612) 330-5972	Y	N	N
OH0001112	Clev. Elec. Illuminating Co.	Lake Erie	Mr. Al Gephart	(216) 447-3202	N	N	Y
OH0001121	Elec. Ill. Ashtabula	Lake Erie	Mr. Al Gephart	(216) 447-3202	N	N	Y
OH0009261	Dayton Power & Light Co.	Great Miami River	Mr. Dave Duwel, Mgr. Env. Mgmt Mr. Scott Arentson	(513) 227-2564 (513) 227-2147	N	N	Y
WI0001589	Wis. Power & Light Edgewater	Lake Michigan	Mr. Tom Hunt, Env. Scientist Mr. Ken Koele, Plant Manager	(608) 252-3237 (608) 252-3237	N	N	N
MO0000043	UE-Rush Island Power Plant	Mississippi River	Mr. Michael Bollinger, Super. Engineer Mr. Frank Putz	(314) 554-3652	N renewal (variance not requested)	N	N
NE0000418	OPPD Fort Calhoun Station	Missouri River	Mr. Bill Neal, Mgr. Env. Affairs	(402) 636-2302	Y	Y	N
NE0111635	OPPD Nebr. City Station	Missouri River	Mr. Bill Neal, Mgr. Env. Affairs	(402) 636-2302	Y	Y	N
MT0000396	Montana Power Co.- Bird/Corett	Yellowstone River	Mr. Jim Stilwell, Env. Engineer	(406) 723-5421 Ext. 3360	Y	Y	N
WY0003115	Dave Johnston Plant	North Pletle River	Mr. Alan Dugan, Env. Engineer	(307) 436-3712	N	N	N

* All facilities have approved or applications under review for 316(a) variances
** According to the Permit Compliance System (8/90)