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Exelon Nuclear

April 29, 2002

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Environmental Protection Plan Operating Report Appendix B to Facility License No. NPF-11 and NPF-18

Attached is the 2001 Exelon Generation Company (EGC), LLC, LaSalle County Station, Annual Environmental Operating Report for the Environmental Protection Plan as required by Section 5.4 of Appendix B to the Facility License No. NPF-11 and NPF-18.

This report includes information required by the following subsections of Appendix B.

3.1	Plant Design and Operation
4.2.1	Vegetative Integrity on Cooling Pond Dike
5.4.1	EPP Noncompliances and the Corrective Actions to Remedy Them
5.4.2	Non-routine Reports

Eighteen copies of this report are being submitted in accordance with Regulatory Guide 10.1, "Compilation of Reporting Requirements For Person's Subject To NRC Regulations."

IE25

Should you have any questions concerning this letter, please contact Mr. Glen T. Kaegi, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

Glen T. Kaegi
Regulatory Assurance Manager
LaSalle County Station

Attachment

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - LaSalle County Station

LaSalle County Station
Environmental Protection Plan

2001 Annual Environmental Operating Report

Introduction

Presented below is a summary of environmentally related activities at LaSalle County Station for the year 2001. The summary reveals no significant environmental impacts as a result of station operation.

Plant Design and Operation

No changes were made in station design or operation, nor any tests or experiments performed, which have been classified as an unreviewed environmental question per the Environmental Protection Plan, Subsection 3.1.

On September 25, 2001, a modification was made to National Pollutant Discharge Elimination System (NPDES) Permit No. IL0048151, Outfall 001 - Cooling Pond Blowdown, to include a new sub-stream, Water Softener Regenerant Waste. This change accommodated installation of a new water softener unit under design change package (DCP) 9900443. The unit softens flush water for chemical feed lines that introduce biocide and scale inhibiting chemicals into the condensers. The water softener minimizes or eliminates scaling tendencies in these lines, making chemical feed to the condenser a more efficient process. The regenerant waste from the softener is directed to the Lake Screen House sump, which discharges to the Circulating Water System at the Lake Screen House forebay where it enters as an outfall input. The water softener regenerant waste has no significant effect on Outfall 001. The permit modification also changed the name and address of the NPDES permittee to: Exelon Generation Company, LLC, Generation Support, 4300 Winfield Road, Warrenville, Illinois 60555. The name of the NPDES facility was also changed to Exelon Generation Company, LLC.

On July 21, 2001, a fish kill was identified on the station Cooling Lake, which resulted in a Non Routine Report. A fish count performed by the Illinois Department of Natural Resources (IDNR) District Biologist indicated that 94,567 fish were killed. A review of IDNR fish management practices was performed to determine if an unreviewed environmental question existed. This review is submitted as an enclosure to this report. The results of the review indicated that fish populations were not significantly affected by the kill. Additionally, an Unreviewed Environmental Question was determined not to exist as a result of the fish stocking practices performed by the IDNR.

Vegetative Integrity on Cooling Pond Dike

The vegetative integrity on the cooling pond dike was inspected in accordance with LaSalle County Station Surveillances LTS-1000-5, 'Minor Dike Inspection' and LTS-1000-32, 'Major Dike Inspections'. Inspections during 2001 were completed on April 12, June 22, August 24, September 26, and October 20. The results of the inspections determined that the vegetative growth on the LaSalle Cooling Pond Dike was in good condition. Small trees and shrubs were found on the various exterior dike toe areas and on the interior dikes. However, this growth has not impacted the integrity of any of the dikes and will be trended during the year 2002 monthly dike inspections. Action requests have been initiated to remove the extraneous growth and to correct various other minor dike discrepancies.

EPP Noncompliances and Corrective Actions Taken to Remedy Them

No Environmental Protection Plan noncompliances occurred during 2001.

During 2001, LaSalle County Station experienced two NPDES noncompliances. The events were submitted to the Illinois Environmental Protection Agency (IEPA) in accordance with Standard Condition 12 of the station's NPDES Permit No. IL0048151. Neither of these noncompliances endangered health or the environment.

Non Routine Reports

Non Routine Report #1 (Status)

On November 2, 1999, during removal of outdoor underground storage tanks for the old filling station, a waste oil tank was found to have leaked. Notifications were made to the National Response Center (Incident No. 504538), Illinois Emergency Management Agency (IEMA) (Incident No. 992477), and the Nuclear Regulatory Commission. Immediate actions were taken to ensure the safety of personnel and the environment. Sampling of the released liquid was performed, and free product was removed from the hole to the maximum extent practicable. No radiological materials were involved. Subsequent analysis identified the presence of chlorinated solvents and heavy metals. In accordance with State environmental Leaking Underground Storage Tank regulations, a 20 Day Certification, 45 Day Report, and Free Product Removal Report were submitted to the IEPA. A Site Classification Work Plan was submitted to IEPA on March 27, 2000, which was conditionally approved on June 27, 2000, outlining station actions for characterizing the underground release. Site classification activities began with the installation of monitoring wells around the release area and core sampling of the ground on October 25-27, 2000. Well development and groundwater sampling were completed on January 11, 2001. On December 10, 2001, a revised Site Classification Budget was submitted to IEPA to address concerns from their conditional approval. Also, a Site

Classification Completion Report was submitted documenting the results of the groundwater monitoring and core sampling. The site was classified as "NO FURTHER ACTION," since the release did not threaten human health or the environment. IEPA concurrence and approval of this report is expected in 2002.

Non Routine Report #2

On July 21, 2001, a fish kill was identified on the station Cooling Pond. The initial estimate was reported as approximately 2000 fish, mostly Gizzard Shad. The Illinois Department of Natural Resources (IDNR) was notified, and an ENS notification to NRC was also made. The IDNR District Biologist arrived later that day and began a fish count. The final count was 94,567 fish killed. A review of IDNR fish management practices was performed, as discussed under the Plant Design and Operation section of this report.

Review of the IDNR 2001 Lake Management Status Report for LaSalle Cooling Pond

Overview:
The IDNR Lake Management Status Report (LMSR) provides a summary of the harvest regulations, annual fish management activities, an evaluation of the fall survey relative to the Lake Management Plan for each species, and recommendations for the future. LaSalle Cooling Pond continues to provide a good sport fishery in spite of fish kills that occurred in July of 2000 and 2001. The knowledge and dedication of the IDNR Fisheries Manager is reflected throughout the report. His efforts to provide the public with a quality fishery are limited only by his available time and resources. He is interested in partnering with Exelon to ensure that his management to maximize the sport fishing opportunities is consistent with the primary purpose of the cooling pond.

Regulations:
There were no changes to regulations in 2001. The 18" size limit and a daily creel of one fish are appropriate for largemouth and smallmouth bass given their limited reproduction and rapid growth.

The current regulation on striped, white or hybrid striped bass limits the daily creel to 3 fish over 17 inches. This regulation was designed to protect the larger fish and allow them to reach trophy size. Striped bass and their hybrids over 5 lbs. are less tolerant of high temperatures and were some of the first victims in the July fish kills in 2000 and 2001. This regulation should be revised to encourage harvest of the larger fish. Hybrid striped bass not only provide one of the most popular sport fish, they are also one of the most effective controls on shad populations. The management strategy for hybrid striped bass in this cooling lake needs to be changed to a put-grow-take fishery instead on creating a trophy fishery.

Fish Management Activities Completed with Evaluation Success:
The following discussion is limited to changes or additions to the previous year's report. The July 2001 fish kill was reported in addition to the 2000 fish kill. A copy of the 2001 fish kill report was included as a separate document. That report estimated a total of 94,567 fish of which 96% were gizzard shad. The total value of fish lost was $25,498.95. The maximum temperature reported on 7/23/01 by the IDNR was 120° F in the discharge canal and dissolved oxygen levels ranged from 6.2 to 18.8 ppm. The LMSR also referenced the temperature and dissolved oxygen profiles preformed by SEA Inc. on July 24, 2001. An electrofishing survey on 1/11/01 was successful in collecting 17 large striped bass hybrids that confirmed that the July 2000 fish kill did not eliminate all the larger hybrids.

Fish stockings in 2001 were similar to previous years with the exception that no hybrid striped bass were stocked. Stockings included:

- 19,620 smallmouth bass approximately 4.0 to 4.8"

- 44,477 largemouth bass approximately 3.7 to 4.0"
- 58,500 blue catfish approximately 5.0" in March
- 9,511 blue catfish approximately 5.5" in September

The discussion of the fall survey pointed out the problems of not having a DC electrofishing boat to conduct the survey and the limitations of the AC electrofishing boat due to the pond's high conductivity. This was the first reference to an increase from 800 to 1400 umho in LaSalle Cooling Pond over the last 10 years. These discussions also highlight the problems in interpreting data on catch-per-unit effort over several years. Sampling efforts were not consistent for the type of electrofishing boat, day vs. night collections, and one vs. two dippers collecting the fish.

The sample in the discharge canal on 1/09/02 is particularly interesting due to the collection of the large blue catfish. The incredible growth of the blue catfish suggests this species may be well adapted to the cooling pond environment and could provide a unique trophy fishery.

Lake Management Plan Progress:

Largemouth Bass:

As reported in the previous year, the lack of recruitment and population declines possibly related to gas bubble disease and secondary bacterial infections were characterized as major problems for largemouth bass. The fall survey was dominated by young-of-year largemouth from stocked fish. Although 2000 was described as a strong year class they were not well represented as 1+ fish in the 2001 survey. Older age groups were not well represented in the survey and if this is a true indication of their abundance, it suggests there may be a problem for largemouth bass that needs investigation.

Smallmouth Bass:

Unlike largemouth bass, smallmouth bass seem to be doing quite well in LaSalle Cooling Pond. It appears they are reproducing and exhibiting high growth rates. They do not appear to have been impacted by gas bubble disease. Smallmouth are popular with anglers and annual stockings are justified to keep them as an important part of the fishery. In the 2000 creel survey smallmouth ranked second in the number of fish caught (combination of # harvested plus # released).

Striped Bass Hybrids:

The fish kills in July of 2000 and 2001 have impacted larger striped bass hybrids. Although these fish are more vulnerable to heat stress as they get larger, they are one of the most effective predators on shad. Populations of gizzard and threadfin shad have increased in 2000 and 2001. Although shad were the largest component of the fish kill in 2001, shad are still abundant and have a very high reproductive potential. Strong shad year classes often occur in years following a major kill and can be anticipated for 2002. Predatory fish are one of the best ways to keep shad populations in check. The population of striped bass

hybrids however is at one of the lowest levels in recent years. In addition to the fish kills in 2000 and 2001, they were not stocking in 2001, and were stocked at about 1/3 and ½ of the normal stocking rate in 2000 and 1999 respectively. Stocking at the recommended stocking rate of 10/ acre or 20,500 fish should be encouraged in 2002. Striped bass hybrids are also an important sport fish and ranked third in the pounds of harvested fish in the 2000 creel survey.

Blue Catfish:
As discussed in the Fish Management Activities, the blue catfish represent a unique opportunity for expanding the sport fishery and adding another effective shad predator. The potential of blue catfish as a species well adapted for cooling ponds warrants further study on the incredible growth rates and survival of this species. Blue catfish may be an innovative and important addition to this cooling pond.

Channel Catfish:
Although channel catfish were not discussed in this section, their abundance and condition factors suggest they are well adapted to LaSalle cooling pond. They have a high thermal tolerance, are a popular sport and food fish, and are effective shad predators. Channel catfish ranked first as the most harvested fish, and the total pounds harvested in the 2000 creel survey.

Bluegill:
Bluegills are doing exceptionally well in LaSalle Cooling Pond and ranked second in the total pounds harvested in the 2000 creel survey. They have fast growth rates and are reaching a size that is attractive to anglers. Continued stocking are encouraged since this is a species that can adapt to the warm temperatures in a cooling pond environment.

Gizzard shad and threadfin shad:
Threadfin were collected in record numbers in 2000 and 2001. It appears that threadfin may be making up a larger portion of LaSalle's shad population in the last few years. This may have implications for the fishery and for plant operations. From a plant operations perspective, the smaller threadfin may not pose as great a threat to intake traveling screens. Although there have been cases in some southern states where threadfin have caused problems on traveling screens. As direct competitors with gizzard shad, the threadfin may reduce the total number of gizzard shad. It is possible that the warmer lake temperatures may be a selective pressure toward threadfin. Gizzard shad comprised about 96% of the fish kill in July of 2001, but threadfin did not appear to be a major part of the kill. Threadfin are much more sensitive to lower temperatures and succumb at temperatures below 45°F.

Threadfin shad should have a positive influence on the sport fishery. Their smaller size makes them available as prey for most sport fishes. Threadfin shad should benefit growth rates of smaller bass. Unlike threadfin, gizzard shad can

reach sizes where they are only vulnerable to the largest predators and are therefore more difficult to control.

Black Crappie and White Crappie:
The four to six inch crappie stocked in 1998 appeared in the creel in 1999 and 2000. Crappies are one of the most popular fish with Illinois anglers. The good growth rates of these fish may be related to the abundance of threadfin shad. Stocking crappie at these sizes is a good way to maintain a put-grow-take fishery in a cooling pond. However, crappies have a lower temperature tolerance than many of the other species, and generally do not reproduce well in cooling ponds. Stocking of these fish is recommended only if there is recognition that they may be lost during warmer than usual summers, and that they are not a normal component in a cooling pond community.

Recommendations for Observed Problem Trends:

A. Continue to stock 40,000 – 4" largemouth bass fingerlings annually. This is a good recommendation since there is no evidence of reproduction. As discussed in the preceding section, attention may also need to be directed toward identifying why largemouth bass are not doing well in LaSalle Cooling Pond.
B. Stock 20,000 striped bass hybrids annually contingent upon agreement with Exelon. Striped bass hybrids are an effective shad predator and their stocking should be encouraged. This is especially critical for 2002 since their abundance appears to be low. However, the harvest regulations should be changed in 2003 or 2004 to encourage greater harvest of larger striped bass hybrids since the larger fish are more sensitive to heat stress.
C. Stock 20,000- 3" smallmouth bass annually. LaSalle is very unique in providing a high quality smallmouth fishery and continued stockings are recommended. This is especially critical since there appears to be problems with the largemouth bass.
D. Stock bluegill fingerlings when available. Bluegill has been another success story for LaSalle and stocking should be continued.
E. Periodically, monitor the temperature and dissolved oxygen levels in July and August. Also discussed was a recommendation for gas saturation monitors in the discharge canal for January and February. This recommendation is based upon a need for more information about how various factors in a heavily loaded cooling pond may affect the fishery during the two most critical seasons. Temperatures during summer extremes will exceed lethal limits in many sections of the pond. When temperatures reach stressful levels, the amount of oxygen the water can hold is also reduced creating additional stress. Increased information on both of these factors would be helpful in managing for a fish community than can survive these conditions. During winter, the colder water entering the intake holds more dissolved gases. When this water is quickly warmed the dissolved gases become supersaturated and effervescence may occur in the discharge canal. Fish are attracted to the discharge

canal by the warmer temperatures, and some fish such as largemouth bass may be experiencing a gas embolism from these supersaturated waters.

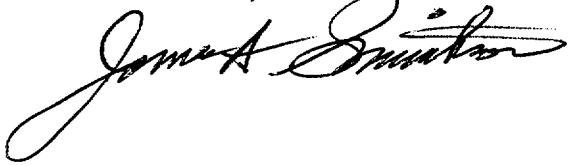
F. The same sample regime that was used in 2000 will be used at least every three years. Creel should be conducted at least every 10 years. This recommendation reflects the limited resources available to the IDNR. For effective management and assessment of a cooling pond with fish growth rates as high as LaSalle's, all sampling regimes should be consistent and may be needed more frequently than annually. There are several bright spots in the LaSalle fishery and conditions that support them should be better documented. This would be valuable information as more cooling lakes and ponds receive higher heat loads. Creel surveys are very resource intensive and a frequency of only once every ten years is not very useful as a fish management tool. The information from such a survey would be useful in evaluating management strategies for only the previous 3 to 4 years.

G. To increase catch near the handicap pier, the IDNR fisheries manager will work with Seneca High School FFA, Exelon, and the Nuclear Regulatory Committee in obtaining permission for the FFA to place a permanent fish structure in from of the pier. This is a no-regrets recommendation. It provides an opportunity to involve local schools in a public benefit project that should improve fishing and should not adversely impact the operation of the cooling pond.

H. The IDNR fisheries manager would like to continue stocking both the blue catfish if they are available and striped bass hybrids. This recommendation should be strongly supported. The initial stocking of blue catfish in LaSalle suggests this may be a great species for a heavily loaded cooling pond. Additional stockings and monitoring of blue catfish in a cooling pond are needed to confirm the limited data currently available. As discussed earlier, striped bass hybrids are recommended as a species to help control shad populations. The abundance of striped bass hybrids is currently low and at a time when shad populations are increasing. Good control of the shad population could reduce the cost of operating the shad control nets at the plant intake.

I. The IDNR fisheries manager would like to start having an annual meeting with Exelon in the winter where both sides could express any concerns. This recommendation reflects an interest in involving Exelon as a partner in managing the fishery. The IDNR realizes the value of the cooling pond fishery, and as an active partner in the management Exelon will likely have more support from the IDNR when extreme conditions result in damage to the fishery. The IDNR recognizes the primary purpose of the cooling pond and wants to ensure the management to provide the best public fishing is consistent with the pond's primary purpose.

Jim Smithson, AFS Certified Fisheries Scientist #1412, SEA Inc. 2/10/02



Exelon Nuclear

LASALLE COUNTY STATION

ENVIRONMENTAL REVIEW OF JULY 2001 FISH LOSSES

PURPOSE

The purpose of this review is to determine the environmental impact of the July 2001 LaSalle County Station fish loss event and to determine if an Unreviewed Environmental Question exists with regard to the fish management practices currently established in the LaSalle County Station Cooling Lake.

BACKGROUND

On July 27, 2001, dead fish were observed on the LaSalle County Station Cooling Lake. This event was reported to the Illinois Department of Natural Resources (IDNR) and to the Nuclear Regulatory Commission (NRC). The results of the IDNR fish count are listed in Attachment 1.

During the period of July 20-26, 2001, Units 1 and 2 were operating in Mode 1 at full power. Six Circulating Water Pumps were running to provide a circulation in the Cooling Lake of approximately 1.2 million gallons per minute. Two Lake Makeup Pumps were providing approximately 60,000 gallons per minute of makeup water to the Cooling Lake from the Illinois River. Blowdown to the Illinois River was operating at approximately 39,000 gallons per minute.

Review of average Circulating Water Inlet Temperatures for the period July 20-26, 2001 showed that three temperature peaks occurred:

- 98.1°F on July 21, 2001, 0121-0200 and 0221-0240
- 97.8°F on July 22, 2001, 1941-2030
- 98.2°F on July 24, 2001, 2001-2010 and 2051-2250

These temperature peaks were above the upper lethal temperatures for most of the fish species living in the lake, with the exception of temperature acclimated juvenile Bluegill. As shown in Attachment 1, Gizzard Shad (Non-Game Fish) made up 96% of the mortalities, followed by Carp and Smallmouth Buffalo (Commercial Fish) at 2.6%, and lastly Game Fish at 1.4%. Based on the distribution of the species that perished, the resultant impact on the State's aquatic life resources was considered minimal.

The Cooling Lake is classified by the State of Illinois as a treatment facility for the dissipation of waste heat. The station's NPDES Permit No. IL0048151 issued by the Illinois Environmental Protection Agency contains provisions reflecting this classification. In accordance with the permit, no state or federal water quality standards are applicable to the lake itself. Effluent standards are applied only to the process streams discharging into the lake. Effluent, thermal, and chemical standards are applied to the lake blowdown effluents to the Illinois River. None of these standards were violated during this period.

The fish losses were attributed to high lake temperatures. Hot summer air temperatures, high dew points and low wind speeds combined to preclude efficient heat exchange on the Cooling Lake, resulting in an increase in temperatures above the upper lethal temperatures for most fish species living in the Cooling Lake.

A similar event occurred on July 18, 1988, which resulted in approximately 1,200 dead shad. This event was reported to the NRC in a special report dated August 17, 1988.

Because of the extent of the 2001 kill, this environmental review was performed to determine if currently established fish management practices for The LaSalle County Station Cooling Lake were within the environmental licensing basis for the station.

ENVIRONMENTAL IMPACT OF THE FISH LOSSES

The Illinois Department of Natural Resources (IDNR) performed an annual fish survey of the LaSalle Cooling Lake on October 23-30, 2001. The results of this survey are being published in the IDNR's "Lake Management Status Report – LaSalle Cooling Lake 2001". Exelon hired a consultant, SEA, Inc., to accompany IDNR on its annual survey and overview IDNR's report. The results of this overview are discussed in an SEA, Inc. report titled "Results of Temperature and Dissolved Oxygen Survey on LaSalle Cooling Pond on July 24, 2001".

The SEA, Inc. review indicated the LaSalle Cooling Pond continues to provide a good sport fishery in spite of the fish losses that occurred in July of 2000 and 2001. Smallmouth bass, blue catfish, bluegill, threadfin shad, and gizzard shad populations were doing quite well. However, largemouth bass populations showed lack of recruitment and population declines. These adverse trends were possibly related to gas bubble disease and secondary bacterial infections, rather than excessive heating in the lake. These conditions would most likely occur in the winter in the Discharge Canal.

Summer fish die offs in 2000 and 2001 did have an impact on the number of large striped bass hybrids. Although these fish are more vulnerable to heat stress as they get larger, they are one of the most effective predators of shad. After the larger members of this species perished during the summer, populations of both gizzard and threadfin

shad had increased. Aggressive stocking of predatory striped bass hybrids was recommended to control these shad populations.

Although shad fatalities made up the largest component of the 2001 event, they are still abundant and have a very high reproductive potential. Gizzard shad comprised about 96% of the mortalities from the July 2001 event. Threadfin shad did not appear to makeup a major part of this population. The warmer lake temperatures appeared to be a selective pressure toward favoring the reproduction of threadfin versus gizzard shad. This was seen as a positive influence on the lake, since the smaller size of the threadfin shad makes them available as prey for most of the other predatory fish in the lake.

Based on the survey conducted by the IDNR, the extent of the July 2001 die off did not significantly decimate overall fish populations in the lake. Nevertheless, the event did contribute to a partial loss of the predator – prey balance in the lake. A series of recommendations has been proposed by IDNR to help restore this balance. SEA, Inc. was supportive of most of these recommendations. Exelon is working with IDNR to implement these recommendations to the extent practicable.

ENVIRONMENTAL LICENSE BASIS REVIEW

The purpose of this review was to determine if an Unreviewed Environmental Question existed with respect to the following:

1. The occurrence of periodic fish die offs on the LaSalle Cooling Lake, and
2. The fish management and stocking practices of IDNR.

This review only encompasses the non-radiological environmental licensing basis for the LaSalle County Station.

ENVIRONMENTAL BASIS DOCUMENTS

The Environmental Protection Plan, Appendix B of Operating Licenses NFP-11 and NPF-13, Section 3.1, describes the non-radiological environmental licensing basis documents that should be referred to when determining if an Unreviewed Environmental Question exists. These include the following:

- Environmental Protection Plan
- Final Environmental Statement
- Supplements to the Final Environmental Statement
- Environmental impact appraisals

- Atomic Safety and Licensing Board (ASLB) decisions

The National Environmental Policy Act of 1969 contains provisions for tiering environmental documents to avoid unnecessary duplication of paperwork and redundancy. The sub-tiered environmental documents reviewed are listed in the References and Attachment 2, Sequence of Events, sections of this report.

LICENSING BASIS REVIEW OF PERIODIC FISH DIE OFFS

On November 3, 1973, Commonwealth Edison Company (CECo) submitted an application for Construction Permits to the Atomic Energy Commission (AEC) for the construction of LaSalle County Station, Units 1 and 2. Included in the application was the Environmental Report – Construction Permit Stage (ER-CP). This original proposal called for two 1100 MWe units with provisions for the possible inclusion of up to 3000 MWe of additional capacity. Based on this design, a "T" shaped 4480 acre cooling lake with an 11 day travel time was proposed.

CECo was committed from the very beginning of the project to work with State and local authorities in developing the areas of the site which were not occupied by the lake or facility structures for whatever use those authorities deemed most valuable to the public. Also, considerable design effort was undertaken to enhance the lake's value to the public. ER-CP, Section 6.6.2.2, described that CECo embraced a multiple use concept for the lake and proposed the development of a lake management plan to design a sport fishery adapted to the chemical and physical aspects of the lake. The lake was to be stocked with warm-water game fish. The value of the lake for recreational purposes depended in part on its ability to support fish. CECo consultants maintained that major Illinois game fish could thrive and reproduce in the lake.

ER-CP, Section 6.6.2.2, also discussed the potential for partial fish die offs. Restocking was not expected to be required because remaining populations would provide additional growth to equalize the poundage removed. However, in practice, supplemental stocking of selected species would occasionally be needed to restore the lake predator – prey balance. ER-CP, Section 6.6.1.4.2, discussed the impacts of lake temperature and dissolved oxygen on fish populations. It was expected that there would always be certain zones on the cooling lake that would provide the necessary life cycle temperatures required by the fish. Therefore, a total kill was deemed almost inconceivable. However, partial die offs were seen as sometimes beneficial to thinning down an over-populated and stunted fishery.

On July 11, 1973, CECo reached a settlement with interveners to reduce the size of the permanent site to 2970 acres. The smaller site would have a 2190 acre cooling lake with a 5.5 day travel time and would NOT be developed as a sport fishery due to the higher projected temperatures in the lake. On September 15, 1973, Atomic Safety and Licensing Board (ASLB) Initial Decision LBP-73-27 (6AEC645) was issued, which

recognized this settlement. CECo continued to commit to use of the smaller lake for camping, picnicking, and perhaps boating. At this point, the recreational use of the lake as a fishery was removed from the station's licensing basis.

On March 5, 1975, CECo Environmental Affairs informed the station that though there was no commitment to supply sport fishing, it was considered advantageous to stock desirable species of fish in the LaSalle Cooling Lake to prevent rough fish from developing an unstable, unmanaged population. This could be done at nominal cost, with the cooperation of the State. At this point, CECo began to pursue the development of a lake management plan with the Illinois Department of Conservation outside the licensing process. This was completely consistent with both CECo's original ER-CP commitment of embracing a multiple use concept for the lake, as well as the Atomic Licensing Appeal Board's Decision ALAB-193 (7AEC423) of April 15, 1974 stating it was essential that all reasonable measures be undertaken to accomplish making the cooling lake the important recreational asset promised by CECo at the outset. The ALAB was convinced that all such measures must be taken by CECo. The AEC was also obligated by the ALAB to ensure that no possible recreational use was laid to rest unless there has been a compelling demonstration that any public health risks were unavoidable. Later, NRC turned over to the State of Illinois responsibilities for monitoring and mitigation of Cooling Lake parameters for determining which recreational activities could be performed, as discussed in the current Environmental Protection Plan, Appendix B to the Operating Licenses, Section 2.1.

Based on the above review, the expectation that occasional fish die offs would occur during peak temperature periods in the summer is within the environmental licensing basis for the station. Exelon continues to carry forward CECo's commitment to maximize multiple uses for the lake by stocking predatory sport fish to control rough fish populations to avoid operability concerns, while at the same time providing a secondary benefit of recreational fishing to the public.

LICENSING BASIS REVIEW OF IDNR STOCKING PRACTICES

Under CECo's original Construction Permit submittal, the ER-CP contained discussions as to the types of fish appropriate for stocking in the Cooling Lake. ER-CP, Supplement VI, AEC Question 4 lists the type of warm water fish suitable for stocking in the cooling lake. Comparison of this list to the historical stocking by IDNR of the LaSalle Cooling Lake indicated that these were consistent. However, with removal of the fishery commitment on July 11, 1973 and ASLB concurrence of this settlement on September 15, 1973, the adequacy of fish stocking practices was removed from the station's licensing basis.

A consultant, EA Engineering, Science, and Technology, Inc., reviewed the stocking practices of the IDNR in a report titled "Assessment of the LaSalle County Station Cooling Pond". EA Engineering's review of IDNR stocking and lake management

practices found that these were appropriate for the Cooling Lake. The IDNR stocks warm water predatory sport fish to control populations of rough and forage fish. This is considered one of the best ways to control the shad populations, which made up 96% of the Summer 2001 fish kill. IDNR adjusts size limits, daily creels, and the types and numbers of fish to be stocked in response to the conditions they find during their annual surveys. Fish surveys showed that shad populations were found to be elevated after the 2000 and 2001 summer fish kills. This was due to die off of some of the larger predators in the lake. However, the Summer 2001 fish kill also acted in the positive direction, reducing shad populations to approximately half of their 2000 levels.

INDR's fish stocking practices were next reviewed from the standpoint of creating excessive reportable incidents. The EPP, Section 4.1, requires 24 hour reporting of fish kills to NRC, and does not differentiate between NPDES regulated kills in the Illinois River and non-NPDES regulated kills in the Cooling Lake. However, notifications to IDNR of a Cooling Lake fish kill will trigger the more limiting 4 hour notification to NRC in accordance with 10 CFR 50.72(b)(2)(xi).

EA Engineering believes that the LaSalle Cooling Lake has reached a point where fish kills should be expected every summer. These summer die offs are a necessary part of a multi-pronged approach to control the Gizzard Shad populations in the lake. Based on the projected frequency of these summer die offs, the desirability for having these events to occur from a lake management standpoint, the lack of NPDES regulatory constraints in the Cooling Lake, and the establishment of fish populations in the artificial Cooling Lake through stocking practices rather than through natural processes, the necessity for NRC reporting of these events should be re-examined. However, based on the above review, an Unreviewed Environmental Question does not exist as a result of IDNR's stocking practices.

Exelon
Nuclear

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REFERENECES

1. Environmental Protection Plan, Appendix B to Operating Licenses NFP-11 and NFP-13.

2. NUREG-0486, Addendum No. 1, Final Environmental Statement related to operation of LaSalle County Nuclear Power Station Unit Nos. 1 and 2, Commonwealth Edison Company, May 1981 (FES-OL).

3. NUREG-0486, Final Environmental Statement related to operation of LaSalle County Nuclear Power Station Unit Nos. 1 and 2, Commonwealth Edison Company, November 1978 (FES-OL).

4. Environmental Report – Operating License Stage, LaSalle County Nuclear Power Station Unit Nos. 1 and 2, Commonwealth Edison Company, November 1978 (ER-OL).

5. 7 AEC 423, ALAB-193, April 15, 1974.

6. 7 AEC 288, March 18, 1974.

7. 6 AEC 821, ALAB-153, October 19, 1973.

8. 6 AEC 645, September 5, 1973.

9. Final Environmental Statement related to the LaSalle County Nuclear Station, Commonwealth Edison Company, February 1973 (FES-CP).

10. LaSalle County Station Environmental Report, Commonwealth Edison Company, November 1971 (ER-CP).

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ATTACHMENT 1

LaSalle County Station Fish Kill Count by IDNR July 21-26, 2001

Species	Size Group	Game Fish
Striped Bass Hybrid	5.0 Lb	238
Smallmouth Bass	3.0 Lb	93
Stizostedion Species (Walleye)	3.0 Lb	24
Channel Catfish	1.5 Lb	345
White Bass	0.5 Lb	12
Bluegill	0.2 Lb	13
Freshwater Drum	2.0 Lb	610
Yellow Bass	0.5 Lb	4
Yellow Bullhead	0.3 Lb	6
TOTAL		1,345

Species	Size Group	Non-Game Fish
Gizzard Shad	1.5 – 3.0 inches	90,800
	TOTAL	90,800

Species	Size Group	Commercial Fish
Carp	4 Lb	1279
Smallmouth Buffalo	10 Lb	1143
	TOTAL	2,422

TOTAL ALL FISH 94,567

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ATTACHMENT 2

USE OF THE LASALLE COOLING LAKE FOR RECREATIONAL FISHING - SEQUENCE OF EVENTS

November 3, 1971

Commonwealth Edison Company (CECo) submitted an application for Construction Permits to the Atomic Energy Commission (AEC) for the construction of LaSalle County Station, Units 1 and 2. Included in the application was the Environmental Report – Construction Permit Stage (ER-CP). This original proposal called for two 1100 MWe units with provisions for the possible inclusion of up to 3000 MWe of additional capacity. Based on this, a "T" shaped 4480 acre cooling lake with an 11 day travel time was proposed.

CECo was committed from the very beginning of the project to work with State and local authorities in developing the areas of the site which were not occupied by the lake or facility structures for whatever use those authorities deemed most valuable to the public. Also, considerable design effort was undertaken to enhance the lake's value to the public. Section 6.6.2.2 describes that CECo embraced a multiple use concept for the lake and proposed the development of a lake management plan to design a sport fishery adapted to the chemical and physical aspects of the lake. The lake was to be stocked with warm-water game fish. The value of the lake for recreational purposes depended in part on its ability to support fish. CECo consultants maintained that major Illinois game fish could thrive and reproduce in the lake.

Section 6.6.1.4.2 discusses the impacts of lake temperature and dissolved oxygen on fish populations. It was expected that there would always be certain zones on the cooling lake that would provide the necessary life cycle temperatures required by the fish. Therefore, a total kill was deemed almost inconceivable. However, partial kills were seen as sometimes beneficial to thin down an over-populated and stunted fishery. Monitoring of the lake water quality (Section 6.6.2.4.2) and biota (Section 6.6.2.4.4) was to start during the lake fill-up period and continue throughout the construction period.

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January 17, 1972

AEC Directorate of Licensing Letter asked questions about the lake. In ER-CP, Section 13.0 (Supplement IV), CECo responded to these questions.

In AEC Question 1, CECo committed that if no governmental agency would assume responsibility for developing and maintaining the lake recreational facilities, CECo would assume this responsibility. However, the Company was confident that an appropriate State or local governmental agency would eventually develop the site for recreation.

In AEC Question 2, CECo explained that the lake management plan would consist of a program to develop a balanced fishery that would adapt to the projected chemical, physical and biological aspects of the lake. A major portion of this program included the placing of fish attractors in the physical design of the lake basin. These would include deeper pools, gravel areas, sand bars, brushpiles, and artificial cover to promote fish propagation. Another portion would include stocking the lake with sport fish during lake fill-up, followed-up by fishery surveys. The adequacy of the lake management and monitoring programs would be assured by the use of experts in the respective scientific fields of concern. CECo stated that whether or not the lake would be available for public recreational purposes was subject to local option (i.e. an appropriate State or local governmental agency).

In AEC Question 3, CECo committed to having a fisheries and wildlife management program regardless of whether or not the cooling lake was used for public recreation. CECo consultants maintained that under that planned lake development program, there would be an improvement in water quality in the lake, and that the lake would support a better quality biota than the Illinois River.

In AEC Question 5, CECo was challenged to explain the advantages and disadvantages constructing a single large cooling lake for the proposed 2200 MWe construction plus the possible 3000 MWe additional capacity, versus constructing the lake in two stages, i.e. building a 2200 MWe lake initially and adding to it later when the 3000 MWe additional capacity was needed. CECo explained that there were no strong economic advantages to constructing the lake either way. However, other considerations pointing to construction of the full lake in one

single operation included one-time disruption of local traffic patterns, single planning and implementation of recreational facilities and management programs without disruption and ecosystem stress resulting from phase two construction, and the Illinois Commerce Commission reason stated in the Certificate of Public Convenience and Necessity issued to CECo to build the station.

February 14, 1972

Environmental Impact Report: Supplemental Information to the LaSalle County Environmental Report – Supplement II – Batelle Columbus Laboratories report was issued. This report provided CECo's perspective of the NEPA cost-benefit Analysis, which included the recreational benefits of the cooling lake sport fishery.

May 17, 1972

An AEC Directorate of Licensing Letter asked questions about the lake. In ER-CP, Section 14.0 (Supplement VI), CECo responded to these questions.

In AEC Question 1, CECo provided its rationale selecting a cooling lake, when other cooling systems, such as cooling towers or spray canals, might require less land. In addition to its functional superiority, the cooling lake was the only cooling method that contributed an important recreational asset for the public without any adverse environmental impact. CECo stated that it was irrevocably committed to do whatever was necessary to assure that the lake would accommodate a good sports fishery. Studies, by two independent consultants confirmed this potential for a good fishery. CECo again committed to making the lake available to the public for recreation, even if no governmental agency participated.

In AEC Question 4, CECo provided its rationale for maintaining that the proposed lake would support a desirable fish population and be a recreational asset, given that the makeup water from the Illinois River did not support a desirable fish population. Studies by two independent consultants were cited which utilized experiences from other cooling lakes to make projections as to the water quality and feasibility for establishing a sports fishery. One study did state that the aquatic ecosystem effects of increasing generation from 2200 to 5200 MWe to the 4480 acre cooling lake without any supplemental cooling would likely be severe unless at least 20% of the lake could be kept at approximately 95°F or below.

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July 26, 1972	The Draft Environmental Statement – Construction Permit (DES-CP) for LaSalle County Station was issued by the AEC.
October 11, 1972	CECo commented on the Draft Environmental Statement – Construction Permit (DES-CP) for LaSalle County Station.
February 18, 1973	The Final Environmental Statement – Construction Permit (FES-CP) for LaSalle County Station was issued by the AEC. In Section V.C.3.b, AEC indicated that many aspects of the cooling lake were potentially detrimental to developing a successful fishery management (sustained high temperatures, poor water quality, introduction of undesirable fish species, and general lake morphology). The staff believed that this was technically feasible, but that significant inputs of effort and capital may be required. A definitive managerial program would be required to achieve the desired characteristics. Consequently, Condition 7.a required CECo to submit a lake management program, which assured that the lake would be a recreational asset. Staff approval of this program was required prior to issuance of the construction permits. Factors that were recommended for inclusion into the plan were listed. In Section XII.B, AEC states that the 4480 acre lake was only being evaluated for two unit (2200 MWe) operation. AEC believed that this level of operation would have adverse effects on the recreational aspects of the lake, but that these effects could be overcome by adequate lake management activities. With four unit (5200 MWe) operation, these effects would be more severe and would probably require that supplemental cooling be employed to maintain lake viability, especially during full power operations in the summer. In Section XII.E, AEC states that if fish mortalities prove to be a problem due to thermal shock and / or gas bubble disease after the fishery resource was established, CECo would be required to 1) restrain fish from the discharge area (e.g. by means of a fish screen) or 2) replace the lost fish by means of increased stocking. AEC agreed with the EPA concerning the potential high lake temperatures and the destructive influence these may have on development of a successful sport fishery, especially during 100% power operations during the summer. Data provided CECo assumed only a 72% capacity factor. There was no

commitment to maintain such capacity factors during the summer. AEC also challenged one of the studies conducted by CECo independent consultants, stating that their discussions with the Illinois Department of Conservation (IDOC) indicated that fish in the lake being compared to LaSalle exhibited stress and slowed growth in certain species. Also small fish kills had been noted on this lake that were tentatively ascribed to stress factors (e.g. high temperatures and low dissolved oxygen). Also, a relatively high "natural" mortality in this lake was being made up by natural reproduction. Low populations of plankton and benthic invertebrates (fish food) suspected due to the high lake temperatures served to hamper sustaining large populations of small fish.

In Section XI, B.2.a, AEC lists the recreational potential of the Cooling Lake as an Environmental Benefit in the NEPA Cost-Benefit Analysis.

July 11, 1973

Interveners had contended that the 6868 acre site with a 4480 acre cooling lake involved an excessive use of acreage and that the proposed lake would not be successful as a viable sport fishery. After months of negotiations, a CECo reached settlement with the interveners to reduce the permanent site to 2970 acres. The smaller site would have a 2190 acre cooling lake and would NOT be developed as a sport fishery.

July 18-20, 1973

Evidentiary hearings open to the public were held by the Atomic Safety and Licensing Board for the receipt of additional evidence on health and safety matters and for the presentation of evidence by CECo on the environmental issues.

September 5, 1973

Atomic Safety and Licensing Board (ASLB), Initial Decision (LBP-73-27) (6AEC645) was issued. Based on the smaller cooling lake, AEC re-evaluated its original recommendations in the FES-CP. Staff concluded that the smaller cooling lake was still the most superior cooling method. CECo continued to commit to use of the smaller lake for camping, picnicking, and perhaps boating. AEC concluded that assuming proper monitoring was performed, boating could further enhance the recreational value of the lake. The staff also concluded that management of the smaller lake without the sport fishery would be less difficult from the standpoint of minimizing potential human health hazards.

CECo evaluated the cooling lake as a potential source for disease, and indicated that the incidence of infectious and non-infectious diseases in fish would be no greater than what would occur in any natural lake or stream in the area. No known reports of clinical diseases in humans either directly or indirectly traceable to water discharge from any steam-electric system in the United States could be found. Various public health agencies were contacted, who concluded that little evidence of cooling lake parasitism existed because more research was needed.

AEC conducted its own study on the potential for the lake to become a source of disease and nuisance and concluded that pathogens could occur in the lake and that there was a potential for these to infect fish in the lake an Illinois River, waterfowl, other animals, and human beings.

The ASLB concurred with AEC's conclusion that the lake could pose a potential health hazard, but also felt that in all probability it would not end up as such. Nevertheless, the ASLB stated that CECo should carry out a pathogen monitoring program and should preclude boating until the program has continued for an appropriate time to show that no health hazard exists. Afterwards, the program should continue monitoring on an appropriate scale for the life of the plant and contain appropriate actions in the event undesirable conditions exist. The ASLB authorized the issuance of construction permits for LaSalle County Station Units 1 and 2, containing a condition to implement this pathogen monitoring program after filling of the lake commenced and during plant operation.

September 10, 1973	Construction Permits CPPR-99 and CPPR-100 were issued. Each contained Condition 3.E.3, which stated, "The Applicant shall implement a monitoring program to determine the quality of the lake water after filling commences and during plant operation. Adequate steps must be taken to insure that the lake does not become a public nuisance or health hazard. Before filling of the lake commences, the Applicant must obtain Staff approval of a management program which assures the lake does not become a public nuisance or health hazard.".
October 19, 1973	Atomic Safety and Licensing Appeal Board (ALAB), Memorandum and Order (ALAB-153) (6AEC821) was issued to review the ASLB initial decision and record in accordance with

established practice. No exceptions to the decision had been filed by any of the parties. Review by the ALAB determined that a remand to the ASLB was required for further consideration of three questions. One of these questions involved ASLB's land-use impact with regard to the cooling lake. ALAB said that in the wake of the settlement and reduction of the size of the cooling lake, ASLB's findings regarding the potential for using the lake for boating (and possibly swimming) appeared to be in doubt. In Finding No. 77, after referring to the public health advantages of eliminating the fishery, ASLB had stated that though some possibility of spread of disease remained, proper monitoring could detect a trend in this direction and appropriate steps could be taken to control it without threatening the achievement of the other objectives of the lake. In Finding No 78, however, ASLB had discussed at some length AEC's evaluation of potential problems due to algal blooms and pathogenic organisms posed by the cooling lake, and then concluded that while in all probability the lake will not be a public health hazard, CECo should carry out the pathogen monitoring program proposed by the AEC and should preclude boating until the program has continued for an appropriate time to show that no health hazard exists. To this end, ASLB had inserted a construction permit condition. These various findings left the ALAB wondering what the ASLB was determining with respect to whether the public *will* or *might* be able to use the lake for recreational purposes. ALAB requested that ASLB clarify these questions and perform a new balancing under NEPA of the revised recreational benefit of the lake versus withdrawal of the land from agricultural production.

March 18, 1974	Atomic Safety and Licensing Board (ASLB), Supplemental Initial Decision (LBP-74-14) (7AEC288) was issued in response to the remand from the ALAB. ASLB reiterated its wording from Finding No. 77 and clarified that the "other objectives of the lake" referred to providing a heat sink for the power plant and a source of emergency cooling water for the reactors, rather than any additional recreational objectives. ASLB explained that Finding No. 78 was a more detailed discussion of the remaining degree of potential health hazard and the nature of the steps that must be taken to monitor and control it. ASLB reiterated the need for CECo to carry out the pathogen monitoring program proposed by the AEC and discussed the environmental condition imposed on the construction permits to ensure this happened.

With regard to ALAB's uncertainty as to whether the ASLB determined that the general public *will* (rather than *might*) be able to use the lake for recreational purposes, it was clear that the area around the lake *could* be used for picnicking, although the ASLB could not predict if the public would choose to do so. Further recreational uses (i.e. boating and swimming) were in limbo pending the outcome of the pathogen monitoring program. Consequently, ASLB considered picnicking as the only recreational benefit of the lake in its initial decision NEPA cost-benefit balance. ASLB considered this a meager benefit that cast very little weight into the balance. Consequently, ASLB revised its NEPA cost-benefit balance to completely ignore the recreational benefits of the lake, assigning the 2200 MWe power generation as the sole benefit.

April 15, 1974

Atomic Safety and Licensing Appeal Board (ALAB), Decision (ALAB-193) (7AEC423) was issued to review the ASLB supplemental decision. The single benefit which ASLB placed on the scales in making its NEPA balance (2200 MWe power production) had relatively little to do with the land use issue before the board. The issue was not whether LaSalle should be constructed for the purpose of fulfilling a demonstrated need for power, but rather whether the facility should employ a cooling lake instead of some alternative cooling method which would not entail the diversion of such a large quantity of land from agricultural pursuits to the generation of electricity. Giving due regard to feasibility, the primary (if not the single) alternative appeared to be cooling towers. However, based on the economic and energy saving benefits of the cooling lake versus cooling towers, as well as the finding that the land for the cooling lake would not be required to meet domestic needs and modest exports of agricultural products, ALAB accepted ASLB's finding that NEPA considerations did not, in this instance, mandate the replacement of the lake with some other feasible cooling system which might utilize appreciably less land.

ALAB went on to say that they were disturbed by the seemingly progressive de-emphasis over the course of the proceeding of the recreational potentiality of the cooling lake. After the size of the lake was reduced and the use for sport fishing was abandoned, AEC had recommended that the ability of the smaller lake to support a recreational fishery and other recreational

activities should no longer a necessary element of the benefits of the project. Nothing in the ASLB's supplemental initial decision reflected a belief that it was essential that all reasonable measures be undertaken to accomplish making the cooling lake the important recreational asset promised by CECo at the outset. The ALAB was convinced that all such measures must be taken by CECo. The AEC was also obligated to ensure that no possible recreational use (including boating and swimming) is laid to rest unless there has been a compelling demonstration that any public health risks were unavoidable. AEC was to closely police the monitoring activities called for by the ASLB and make an informed judgment as to whether a resourceful and vigorous lake management program could make the land in question of benefit to the public as well as to CECo. If there was a potential, then AEC was to require CECo to promptly institute and maintain such a program with a view towards providing the widest feasible range of recreational uses.

January 19, 1975 — The licensing branch of the AEC became the Nuclear Regulatory Commission (NRC) per the Energy Reorganization Act of 1974.

March 5, 1975 — In a letter to the LaSalle Station Manager from Environmental Affairs, the results of the ASLB and ALAB decisions were discussed. The letter states that a revised park plan was created which included facilities for camping, picnicking, field sports, boating and fishing (although CECo was not required to provide fishing). Swimming was not provided for in the plan due to liability, safety, and health reasons. The letter states that the pathogen monitoring program will delay opening of the lake to the public since monitoring during maximum thermal input (Both units) must be done and a subsequent concurrence by concerned agencies as to the validity of the results obtained. However the opening of the park itself was not limited in any such way.

With regard to fishing, though there was no commitment to supply sport fishing, it was considered advantageous to stock desirable species of fish in the lake to prevent rough fish from developing an unstable, unmanaged population. This could be done at nominal cost, with the cooperation of the State.

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April 15, 1976	Letter from V. Randolph (Illinois Department of Public Health (IDPH)) to A.O. Courtney (CECo). IDPH responded to a request for assistance from CECo in planning a program to demonstrate that no hazard to public health would result from utilizing the proposed cooling lake for boating. An opinion as to the feasibility of monitoring the water for specific pathogenic organisms was also solicited. IDPH recommended that Illinois River Makeup, Condenser Intake, and Condenser Discharge be monitored for coliform and fecal coliform initially on a weekly basis as an indicator of pollution or contamination. Results could be compared to water quality standards, as well as other sampling stations along the Illinois River, to asses water bacteriological quality. IDPH also believed that monitoring for specific pathogens was not feasible and would serve no public health purpose. The intended recreational use of the lake for boating did not realistically provide a direct mode of transmission for a viable pathogen from the lake to a potential victim. IDPH stated that pathogenic bacteria if introduced into the lake would not come from CECo, but from the Illinois River due to the presence of municipal sewage. Finally, IDPH disagreed with the concept that heating water increases a potential health concern, since generally, pathogens do not multiply in an environment outside a suitable host or victim.
April 22, 1976	LaSalle County Station Specification 691-1 for Construction of Shoreline and Boating Facility for Recreation Area was issued.
April 27, 1976	Letter from J.P. McCluskey (CECo) Environmental Affairs to J. Jackson (NRC). CECo transmitted a proposed Cooling Lake Monitoring Program in accordance with Condition 3.E.3 of Construction Permits CPPR-99 and CPPR-100. This plan was based on input from the IDPH letter of April 15, 1976. The plan called for weekly sampling of Illinois River Makeup, Condenser Intake, and Condenser Discharge for total and fecal coliform for two years after the lake becomes operational. Boating would be prohibited until the monitoring program demonstrated that no health hazard existed. Action levels were established based on water quality standards to increase sampling frequencies and to secure public access to the lake.

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June 4, 1976	Letter from R.L. Bolger (CECo) to Mr. Youngblood (NRC). CECo provided additional information to clarify aspects of its proposed Cooling Lake Monitoring Program based on discussions held with NRC on May 4, 1976. CECo steadfastly maintained that based on operating experience from the Dresden, Powerton, and Kincaid cooling lakes, noxious algae growth would not occur. Also, historical Powerton and Dresden data showed that total bacteria counts trended downward as the plants continued to operate. Therefore, the proposed LaSalle program was revised to indicate that upon completion of the initial sampling phase, an evaluation would determine the need for continued monitoring. CECo would continue to include for fecal streptococcus monitoring as part of the program in response to NRC's expressed interest. CECo clarified that fishing and swimming were expressly excluded from the recreation area commitment. The lake would be posted to prohibit swimming. Fishing would be prohibited and posted as such until completion of at least a full year of Unit-2 operation. Afterwards, if a decision was made to allow fishing in the lake, CECo would seek NRC review and approval. The revised Cooling Lake Monitoring Program added sampling for Fecal Streptococcus. The period of the monitoring program was clarified to sample and analyze weekly for the period beginning after the completion of lake filling and ending one year after the second unit became operational. At that time, a determination would be made as to the efficacy of continuing the program. An additional sampling location at the end on Interior Dike No. 3 was added.
September 15, 1976	Letter from R.L. Bolger (CECo) to Mr. Youngblood (NRC). CECo provided additional information to clarify aspects of its proposed Cooling Lake Monitoring Program based on discussions held with NRC on July 27, 1976. Upon completion of the initial phase of monitoring, CECo would submit a detailed proposal to NRC recommending the degree of public usage for the cooling lake. The Illinois River Sampling Stations to be used for comparison were listed.
December 13, 1976	Letter from V.A. Moore (NRC) to B. Lee (CECo). NRC found the final Lake Monitoring Program acceptable with the following conditions and comments: 1) Monitoring for nuisance

	algal growths would not be required, 2) Although NRC proposed meeting General Water Quality standards for fecal coliform in the lake, which would provide protection for both primary and secondary contact activities, CECo committed to the more stringent bacteriological standard for public health. NRC would accept any applicable criteria based on classification of the lake waters by the State, 3) Collection of data and analysis of bacterial quality should not begin until the lake was filled to its anticipated operating level and pumping of water through plant systems has begun in order to collect data comparable with operational phase data,
January 21, 1977	Letter from G.A. Abrell (CECo) to V.A. Moore (NRC). CECo provided comments to certain of the conditions specified by NRC in the Lake Monitoring Program. The Illinois Department of Public Health was clarified as the proper State agency for relevant communication and program coordination, rather than the Illinois Pollution Control Board. Also, CECo recommended that increased monitoring should occur only when fecal coliform levels from those sample points located on the lake (LSH Intake Canal and Dike 3) increased above the action levels.
April 4, 1977	Letter from V.A. Moore (NRC) to B. Lee (CECo). NRC concurred with the Lake Monitoring Program modifications and clarifications proposed by CECo.
May 10, 1977	CECo issues the Environmental Report – Operating License Stage (ER-OL). Appendix 5.1.B incorporates the final Lake Monitoring Program and associated correspondence.
May 12, 1977	The ER-OL and FSAR were docketed by NRC. NRC operational safety and environmental reviews were initiated at this time.
June 20, 1977	CECo Environmental Affairs considers developing a fish management program using sport fish, which could 1) reduce populations of undesirable non-sport fish by introducing a predator, and 2) begin building a base for a public sport fishery at a later time once the possibility for pathogens developing in fish living in the lake being transmitted to humans during handling or consumption has been discounted.

July, 1977	Filling of the lake began.
March 27, 1978	Draft Environmental Statement – Operating License Stage (DES-OL) NUREG–0437 was issued by the NRC. CECo's recreational commitment to date was summarized. NRC recognized that the recreational potential of the lake was reduced when the size of the lake was reduced. Once the cooling lake was filled and in operation, the actual level of recreational use (i.e. primary or secondary water contact) would be determined by the State's public health standards – the better the water quality, the higher the allowable level of water contact. CECo had indicated the desire to wait until the end of the first year of Unit 2 operation before proposing to NRC that the lake be opened to the public for secondary water contact sports (specifically boating, fishing, picnicking). NRC noted that CECo expressly excluded swimming (a primary water contact sport) as a possible recreational use. This was contrary to Atomic Safety and Licensing Appeal Board (ALAB) Decision (ALAB-193) (7AEC423) which stated that no possible recreational use (i.e. primary or secondary water contact) be laid to rest unless there was a compelling demonstration that any public health risks are unavoidable. NRC required that after the first year of Unit 2 operation, CECo was required to submit for review and approval a recreational use plan for the LaSalle cooling lake. The plan should reflect the water quality, as determined by data from the monitoring programs. As warranted by the bacterial data, the recreation use plan should include provisions for primary water contact sports (e.g. swimming) and secondary water contact sport (e.g. boating and fishing), or non-water contact activities. The plan should also include action levels based on bacterial data for limiting or cessation of activities, as well as for their resumption. This plan must be approved by the staff prior to any public use of the cooling lake. In Section 10, NRC continued to give no weight to the recreational benefit of the cooling lake in its NEPA Cost-Benefit Analysis.
May 16, 1978	Letter from R. Monzingo (CECo), Environmental Affairs Fishery Biologist, to File dated June 12, 1978. First initial stocking of the lake with fish was performed.

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June 2, 1978	Letter from C. Reed (CECo) to NRC Director, Division of Site Safety and Environmental Analysis. CECo provided comments to the Draft Environmental Statement (DES-OL). In addition to editorial comments, CECo noted NRC's requirement to consider of all possible recreational uses of the lake including primary water contact sports (swimming and water skiing) within the limits of public health risks. CECo pointed out that due to the reduction in lake size, there was no area of shoreline that could reasonably be developed into a safe swimming beach. The question of public safety and liability associated with this activity put an unwarranted burden on the ratepayers. Also, water skiing required boats with high horsepower engines operating at speeds which would greatly increase wave action and water turbidity. These conditions would lessen the full utilization of the lake for secondary water contact sports such as canoeing, rowing, sailing, and fishing. CECo also requested correcting the start time for the Lake Monitoring Program as beginning after the lake is filled to its anticipated operating level and pumping of water through plant systems begins. This was consistent with the letter from V.A. Moore to B. Lee dated December 13, 1976.
November 7, 1978	Final Environmental Statement – Operating License Stage (FES-OL) NUREG-0486 was issued by the NRC. NRC dispositioned CECo's comments on the DES-OL stating that based on the Atomic Safety and Licensing Appeal Board (ALAB) Decision (ALAB-193) (7AEC423) would still require that CECo consider all possible recreational uses of the cooling lake. However, in developing the recreational use plan, CECo should weigh all potential significant costs (such as public safety and liability, increased rate-payer burden, and degradation of water quality), along with the potential benefits of providing the public with a recreational area. NRC took note of CECo's concerns. However, they pointed out that with 1500 feet of shoreline adjacent to the designated recreation area and an average lake depth of 15 feet, there appeared to be adequate shoreline for various recreational uses and the lake should have enough depth to prevent resuspension of bottom sediments due to powerboat operation. NRC also corrected the start time for the Lake Monitoring Program as CECo recommended.

	In the Summary and Conclusions section of the report, NRC stated under Item 6.e that after the first year of operation of Unit 2, CECo would submit to NRC for review and approval a recreational use plan for the station Cooling Lake. This plan must be approved by NRC prior to any public use of the Cooling Lake.
July 30, 1979	A letter from D. Kenney (IDOC) to J.H. Hughes (CECo) proposed that CECo partially re-allocate some of the funds for the LaSalle recreation area to its other recreational facilities at Collins, Dresden, and Powerton stations in order to 1) increase the number of recreation man-days, 2) avoid duplication of existing public and private recreational facilities, and 3) maintain a balanced regional recreation program with an optimum blend of camping and waterfowl hunting. IDOC recommended LaSalle provide day-use facilities for boating, fishing, waterfowl hunting, and picnicking. Development would include a 120-unit parking area, three boat ramps, and a landscaped picnic area.
September 5, 1979	A letter from L.O. DelGeorge (CECo) to D.R. Muller (NRC) proposed that the recreational facilities earlier envisioned by CECo be modified in accordance with IDOC recommendations. It was the position of the State of Illinois that LaSalle was not the proper setting for camping and other overnight recreational activities. The State concluded that the LaSalle facility would best serve the public interest as a day-use only facility for boating, fishing, and potential water fowl hunting. A proposed revision to the ER-OL was submitted.
October 30, 1979	A letter from D.R. Muller (NRC) to D.L. Peoples (CECo) accepted the modifications to the recreation plan submitted by CECo. NRC noted CECo's original commitment to build a recreational facility for fishing, boating, hunting, and overnight camping. Although this commitment was mentioned in the NEPA cost-benefit balance in the FES-CP and ASLB Initial Decision (LBP-73-27) (6AEC645) on September 5, 1973, NRC observed that ASLB Supplemental Initial Decision (LBP-74-14) (7AEC288) on March 18, 1974 specifically deleted the recreation plan from the cost-benefit consideration. Consequently, there was no licensing condition on the size or type of recreation facility in the Construction Permits for Units 1 and 2. Therefore, NRC felt it was clear that the nature of the recreational use of the LaSalle cooling

lake and adjacent land was not a major consideration in the ASLB's decisional process, although such use might be considered to represent a societal benefit. NRC recognized that the recreation facility would be day-use only, while expanding facilities at some of the other stations. A fish hatchery was also included in the proposed program. NRC had discussed the modified program with CECo and IDOC at a meeting on August 1979. CECo was to commit the same amount of financial resources to the modified plan as the original program. Therefore, NRC concurred with the modified plan. Since the change resulted in a net benefit to the public and CECo had met its previous recreational commitment, NRC saw no reason to reopen the hearing process based on the change. Therefore, the draft page to the ER-OL was not incorporated.

July 30, 1980 — A Letter from T.E. Hemminger (CECo) Environmental Affairs to R.R. Dlesk (CECo) Operational Analysis Department (OAD) initiated the Pathogen Monitoring Study and transmitted a copy of the finalized Lake Monitoring Program agreed to by CECo and the NRC.

November 12, 1980 — OAD initiated weekly sampling for the Pathogen Monitoring Study at LaSalle Station.

January 23, 1981 — Letter from L.O. DelGeorge (CECo) to B.J. Youngblood (NRC). In Attachment 1, CECo submitted proposed Environmental Technical Specifications for Units 1 and 2. These, with limited exceptions, incorporated monitoring requirements either imposed as conditions in the Construction Permits or as put forth in the FES-OL. Section 4.2.2 delineated specifications for the Cooling Pond Coliform Monitoring Program. The results of the monitoring program were to be summarized, analyzed, and reported to NRC within 120 days following its completion. The results were to be used to assist in determining what recreational use can be made of the cooling pond.

In Attachment 2, CECo requested the following modifications to the Lake Monitoring Program for pathogens: 1) Allow sampling from the shore rather than 50 feet out from a boat, 2) Change the sample frequency from a minimum 5 samples per month with a minimum sampling interval of 3 days, to 1 sample per week with a minimum sampling interval of 3 days, and 3)

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	Terminate currently ongoing sampling to be restarted within 30 days after completing Unit 1 fuel load.
October 2, 1981	Letter from L.O. DelGeorge (CECo) to A. Schwencer (NRC). CECo forwarded a summary of Unit 1 Plant Readiness Review issues that had been discussed at previous meetings with NRC. Table V.B states that CECo provided input to Technical Specifications, Appendix B, (Environmental Technical Specifications) in January 1981 and had received no formal NRC response. A new Environmental Protection Plan was expected during the week of 9/21/81.
October , 1981	CECo received a revised and reformatted draft copy of an Environmental Protection Plan (EPP), Operating License, Appendix B. This would replace the Environmental Technical Specifications.
November 2, 1981	Letter from C.E. Sargent (CECo) to A. Schwencer (NRC). CECo commented on the proposed Environmental Protection Plan (EPP). CECo recommended deleting Section 4.2.1, Page 4-1, Bacteriological Monitoring. This issue was referred to in Item 3 of Subsection 2.1, Aquatic Issues. As stated in this section, this aquatic issue is the responsibility of the State of Illinois and has been address in correspondence between the NRC and the State. The State had been apprised of NRC's intent not to include this monitoring and mitigation requirement in this facility license. NRC would rely on the State for the establishment and conduct of this program. The bacteriological monitoring program in Section 4.2.1 would only be useful to the State as they carried out their responsibilities to determine if there was a hazard or permissible public uses for the cooling pond. Therefore, the State of Illinois should develop their own program to carry out their responsibilities.
April 17, 1982	Letter from D.G. Eisenhut (NRC) to C. Reed (CECo). Unit 1 is issued Facility Operating License NPF-11. The EPP was issued as Appendix B to this license. Section 4.2.1, Page 4-1, Bacteriological Monitoring, was removed. At this point, monitoring and mitigation requirements for the Cooling Lake became the responsibility of the State of Illinois and were removed from the licensing basis. This was considered acceptance by the NRC of the items listed in the November 2, 1981 letter from C.E. Sargent (CECo) to A. Schwencer (NRC) and

	acknowledgement by NRC that the State of Illinois rather than NRC determines acceptable public uses for the Cooling Lake. At this point, FES-OL Summary and Conclusions Item 6.e was considered no longer applicable.
December 16, 1983	Letter from D.G. Eisenhut (NRC) to C. Reed (CECo). Unit 2 is issued Facility Operating License NPF-18. The EPP is Appendix B to this license.
February 5, 1985	Letter from G. Diederich (CECo) LaSalle Station Manager to J.H. Hughes (CECo) Environmental Affairs Manager. LaSalle Station proposed a plan to open the Cooling Lake to fishing by employees only.
March 18, 1985	Letter from J.H. Hughes (CECo) Environmental Affairs Manager to G. Diederich (CECo) LaSalle Station Manager. Additional recommendations are made for the Employee fishing privilege plan, including 1) Maintaining a winter refuge for fish in the CW discharge Canal, 2) Adding walleye to the list of catch and release fish, and 3) Make "catch and release" mandatory to keep the population of top predators numerous.
June 28, 1985	Letter from J.W. Comerio (IDOC) to J.H. Hughes (CECo). IDOC submitted a Proposed Fish and Wildlife Management and Development Plan for the LaSalle Cooling Lake (LaSalle Fish and Wildlife Area). A fish population had been developed through stocking the lake consisting of warm water game fish, moderate numbers of rough fish, and a forage base dominated by gizzard shad. General conditions included no limit on outboard motor horsepower, no primary contact sports, day use access only (sunrise to sunset), no boat access October through February, and no trespass beyond marked areas.
August 5, 1985	Letter from J.H. Hughes (CECo) Environmental Affairs to G.J. Diederich (CECo) LaSalle Station Manager. This letter contained Environmental Affairs (EAD) comments on IDOC's proposed Recreational Development plans. EAD recommended that lake access and facility development should proceed in two phases.

September 23, 1985	Letter from S.A. Keller (IEPA) to Mr. Berle (IDOC). IEPA forwarded to IDOC pertinent water quality data from the LaSalle Cooling Lake, as well as a list of process wastestreams that input into the lake. IEPA stated that the available water quality data reviewed suggested that the lake could support a recreational fishery.
October 2, 1985	CECo System Materials Analysis Department (SMAD, formerly OAD) collected the last weekly sample for the Pathogen Monitoring Study at LaSalle Station.
October 8, 1985	Memo from C.L. McDonough (CECo-EAD) to R. Dlesk (CECo-SMAD). The LaSalle Pathogen Monitoring Program was officially terminated.
March 10, 1986	Letter from C.M. Allen (CECo) to H.R. Denton (NRC). CECo proposed amendments to the EPPs to remove redundant reporting of NPDES violations to both the NRC and the State of Illinois. It also provided information to support termination of the fog and ice monitoring program.
April 22, 1986	Letter from J.W. Comerio (IDOC) to J.H. Hughes (CECo). IDOC submitted a revised Fish and Wildlife Management and Development Plan for the LaSalle Cooling Lake (LaSalle Fish and Wildlife Area). General conditions remained the same except no boat access October through March.
May 21, 1986	Letter from J.H. Hughes (CECo) to J.W. Comerio (IDOC). CECO provided final comments on the revised Fish and Wildlife Management and Development Plan. None of these comments affected fishing activities.
June 18, 1986	Letter from E.G. Adensam (NRC) to D.L. Farrar (CECo). NRC approved Operating License Amendment Nos. 43 to NPF-11 and 24 to NPF-18 to remove redundant reporting of NPDES violations to both the NRC and the State of Illinois and terminate the fog and ice monitoring program.

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July 18, 1986	Letter from R.E. Ohezem (IDOC) to T. Gould (CECo). IDOC submitted a draft lease for managing the LaSalle Cooling Lake and Recreation Area.
August 18, 1986	Lease Agreement #422A was approved by the Governor. The lease was for a term of 25 years.
August 21, 1986	Letter from M.B. Witte (IDOC) to T. Gould (CECo). IDOC forwarded Approved Lease Agreement #422A to CECo. As of this date, the LaSalle Lake and Recreation Area were open to the public.
August 17, 1988	Letter from G.J. Diederich (CECo) LaSalle Station Manager to A.B. Davis (NRC). CECo submitted its first special report involving dead fish in the Cooling Lake observed on July 18, 1988. Per DVR 01-01-88-060, the die-off was attributed to high water temperatures and / or low oxygen concentrations in some of the fish refuge areas. The majority of the fish were cool water species stocked on an experimental basis in the lake. IDOC was asked to limit or suspend stocking of cool water fish.

Assessment of the LaSalle County Station Cooling Pond

Prepared for:

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March 2002

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1. Fish Stocking

Fish stocking in the LaSalle Cooling Pond began in 1978 soon after the reservoir was filled with water pumped from the Illinois River. Initially, the only species stocked were largemouth bass and bluegill. After the research fish hatchery became operational in 1981 species of fish being raised at the hatchery began to be introduced into the reservoir. These species included smallmouth bass, walleye, muskellunge and hybrid striped bass. The first hybrid striped bass stocking occurred in 1981 and continued in 1985, 1990, 1992-1995 and 1998-2000. The last planned stocking of walleye and muskellunge occurred in 1987 and 1988, respectively. In 1986, the cooling pond was opened to the public for fishing and in 1994, after the research studies were complete, ComEd leased the fish hatchery to the Illinois Department of Natural Resources (IDNR). The IDNR hatchery at LaSalle provides fish to cooling reservoirs and other areas that are open to the public. Over time there have been some unscheduled releases from the hatchery however they have been minor in nature.

The IDNR continues to stock fish into the LaSalle Cooling Pond. As shown in Table 1, for the five year period from 1997 through 2001, the following species were stocked, largemouth bass (241,283), smallmouth bass (111,288), blue catfish (138,574), hybrid striped bass (39,464), bluegill (267,676), and both black and white crappie (25,361). Largemouth bass and smallmouth bass were stocked in each of the five years whereas hybrid striped bass were stocked in only three years (1998-2000) as were bluegill (1997, 1998 and 2000). Blue catfish were stocked in 1999 and 2001 while crappie were stocked only in 1998. Hybrid striped bass were stocked to provide a trophy fishery and to help control the gizzard shad populations. The total number of striped bass stocked since 1981 is 160,274 (1981 to 1995 - 120,810 and 1998 to 2000 - 39,464).

The IDNR has always managed the LaSalle Cooling Pond with the understanding that the primary purpose for the reservoir is to serve as a heat sink for LaSalle Station. Inherent in this understanding, was the knowledge that thermal caused mortality events would occasionally occur. The opportunity to provide multiple uses by opening the cooling pond to the public for recreation has been supported by the State, the Company, and the NRC.

The IDNR has managed the cooling pond through daily catch limits, size limits, limits on fishing gear and by stocking. The management plans have been adjusted as necessary based on changes in the cooling reservoir. All of the stakeholders are aware that the more continuous operation of both units and the power uprates have increased the temperature maximum and duration of higher temperatures. The conditions present in the reservoir are no longer conducive for coolwater fish species such as walleye and muskellunge and these species are no longer stocked.

The IDNR decision process takes into consideration the temperature regime and the shad populations. The stocking of hybrid striped bass and the recent introduction of blue catfish were based on their use of shad as a primary food source and their contribution to the recreational fishery. They are aware that larger striped base hybrids will in all likelihood experience thermal caused mortality, but feel there is value to the continued stocking of this fish. The rationale being, the smaller fish can still contribute to the recreational fishery and help reduce the shad populations. Discussions are ongoing about stocking additional species that are more temperature tolerant. The IDNR have established a daily creel for

striped, white or hybrid striped bass of ten fish with no more than three over 17 inches in length. The creel limit for largemouth or smallmouth is one fish daily with an 18-inch minimum limit. These limits help keep fish that feed on shad, in the reservoir longer and at a larger size.

In 2002,the IDNR fisheries manager for the reservoir indicated that they would like to annually stock 40,000 4-inch largemouth bass fingerlings, 20,000 3-inch smallmouth bass fingerlings, and 20,000 hybrid striped bass fingerlings. Bluegill and blue catfish will be stocked when fingerlings were available. Marking studies conducted in the 90's showed that although some natural reproduction of both basses occurs, supplemental stocking is required to maintain the populations.

The LaSalle Cooling Pond can still provide a fishery for fish species, which are more tolerant of higher water temperatures. The recent stocking efforts and future plans are appropriate for this reservoir. They are no longer stocking true coolwater species and are exploring the stocking of more appropriate species. Exelon should continue to review the reservoir management plans and work with the IDNR to implement approved plans. The IDNR continues to be interested in stocking hybrid striped bass but it should be on an experimental basis considering the new temperature regime.

Due to the maintenance and operational problems high numbers of shad at the intake can cause, it is to the Station's advantage to continue to stock hybrid striped bass since they will help control the shad populations. The Company should investigate if the IDNR will provide a letter that will release Exelon from any liability associated with any thermal related fish mortality events of species stocked on an experimental basis. A similar letter was provided by the IDNR for the Braidwood Cooling Pond soon after stocking began at that facility.

2. LaSalle Cooling Pond Fish Community

Fish populations surveys also began soon after the 2058 surface acre-cooling pond was filled in 1978. Monitoring was conducted by a number of groups including ComEd Environmental Services, Southern Illinois University and by the Illinois Department of Natural Resources. Initial surveys were more intensive and designed to monitor the development of the fish community. When the Units became operational (1982 and 1984) the program expanded to provide data on the gizzard shad population. The IDNR program is designed to provide information on sport fish and to a lessor extent, the forage base (primarily shad). Currently the IDNR conducts fall surveys and makes supplemental observations when they collect fish for sport show exhibits during early January.

IDNR

IDNR provided data for the five-year period from 1997 through 2001. The main focus during this time period was on the major sport species largemouth bass, smallmouth bass, channel catfish, bluegill and hybrid striped bass. The IDNR evaluates the fisheries data by comparing catch per unit effort (CPUE), Proportional Stock Density (PSD), Relative Stock Density (RSD) and Relative Weight (Wr). Both PSD and RSD use length frequency distribution data, which can be used to evaluate the structure and condition of sport fish populations. The PSD index represents the percentage of "stock length" fish in a population that are equal to or longer than a "quality length". For bass the IDNR uses 8 inches as the stock length and 12 inches as the quality length (PSD = number fish that are of 12 inches or greater divided by the number of fish that are 8 inches or greater times 100). The RSD is similar but it allows

the calculation of more than one index because there can be more than one size group of interest in the management of a fish population. The length categorization system can use up to five size groups: stock, quality, preferred, memorable and trophy. Once PSD and RSD goals are developed for a population that population can be periodically monitored and management measures taken as needed. Both PSD and RSD are centered on larger fish. They focus on monitoring and management of catchable size fish and any fish smaller than stock lengths do not enter the calculations. The Relative Weight index is used to evaluate a fish's relative health or well being. It compares the measured weight with an expected weight based on a species specific length weight relationship.

Largemouth bass

The table below compares catches per hour, PSD, RSD 14 (RSD 14 = % of 8 inch fish that are also 14 inches or greater) and Wr for largemouth bass for the last five years. The IDNR management CPUE goal is 60+ fish per hour which was obtained in three of the last five years (2001, 2000 and 1997 although the majority of the individuals collected were less than 12 inches in length. The PSD goal is 40-60 % and the RSD 14 goal is 25-35 %. These goals were met in all years except 2000. Relative weight values close to a hundred are thought to reflect optimal health and utilization of the food resources for a given population and when considerably less than 100 may reflect problems in food availability or/ feeding relationships. The IDNR goal for Wr is 90 to 110. Based on Wr values ranging from 96.2 to 120.8 the largemouth bass population is in good condition.

Largemouth Bass					
	2001	2000	1999	1998	1997
CPUE	99	95	8	21	191
PSD	63.6	3.8	58.3	80.0	62.5
RSD 14	28.0	1.8	58.3	40.0	25.0
Wr	113.4	120.8	112.4	96.2	98.4

In overview, the largemouth bass population is being maintained by the stocking program due to the lack of spawning, and nursery habitat (loss of aquatic vegetation), which reduced successful natural reproduction. Those fish that are present have plenty to eat as shown by the high relative weight values. Although numbers of smaller fish are within the goal, due in large part to the stocking program, the number of larger fish are lower than desired, which is one of the reasons there is a daily creel limit one 18 inch bass. The IDNR note that they have observed bacterial infections on largemouth bass (although not smallmouth bass) collected from the discharge canal in January. ComEd and SIU made a similar observation in the 80's. IDNR suggests that if this is a common occurrence it could result in reduced numbers of larger fish. Largemouth bass is considered a warmwater fish and in one study is reported to have an upper incipient lethal temperature of 36.8° C (98.2 ° F) for adult fish acclimated at a temperature of 30° C (86° F). The upper incipient lethal temperature is the lowest temperature at which 50 % of a group of fish will die of heat stress over a fairly long time period, usually a week.

Smallmouth bass

The table below compares catches per hour, PSD, RSD 14 and Wr for smallmouth bass for the last five years. The IDNR management CPUE goal of 60+ fish per hour was obtained in each of the last five

years. For smallmouth bass the PSD goal is 40-60 % and the RSD 14 goal is 20-30 %. These goals were not met in 1997 and in 1998 the PSD (38.1) was under the goal. The goals were met in the remaining years. The IDNR goal for Wr is 90 to 110. Since 1999 Wr has been in the 90's and above goal whereas in 1997-8 the values were in the 80's and below goal. Relative weights have been good in the last five years and have improved in the last three years. Although the values for these four indices were lower in 2001 then in 1999 and 2000, they were higher than in 1997 and 1998 (except for CPUE). In 1997 neither unit was operating and in 1998 only one unit was operational (starting in late August). As the units came back on line, the temperatures increased, which resulted in an increasing forage base and an improvement in the smallmouth bass population.

Smallmouth Bass					
	2001	2000	1999	1998	1997
CPUE	61	119	111	76	127
PSD	71.2	85.2	78.3	38.1	17.3
RSD 14	33.0	33.5	45.7	21.2	7.7
Wr	95.5	97.6	93.8	83.2	81.2

Smallmouth bass have been doing well in the cooling pond because the early life stages appear to have been able to take advantage of the habitat provided by the riprap. Natural reproduction has been successful and is aided by the IDNR stocking program. The abundant forage base and the extended growing season due to the thermal input resulted in an increased growth rate in recent years. Smallmouth bass are sometimes classified as coolwater fish however they are tolerant to relatively high temperatures. In recent years they are more often categorized as warmwater fish. Upper incipient lethal temperature for adult smallmouth bass is near 35° C (95° F).

Bluegill

The table below compares catches per hour, PSD, RSD 7 and Wr for bluegill for the last five years. CPUE has been variable for the four years for which data is available (no data for 1998). The IDNR CPUE management goal of 60-300 fish per hour was obtained in three of the years. In 1997 and 2000 CPUE was at the low end of the goal range and in 1999 at the high end. In 2001 (CPUE = 43) the goal was not reached. For bluegill the PSD goal is 20-40% and the RSD 7 goal is 10-15 %. Both goals were exceeded in 2001 and the PSD goal was exceeded in 2000. The goals were not met in the other years. The IDNR goal for bluegill Wr is 90 to 110. Wr values were above 106 for the four years for which data is available. Relative weights have been above goal in most years indicating a population in good condition.

Bluegill					
	2001	2000	1999	1998	1997
CPUE	43	63	282	N/A	62
PSD	41.2	60.2	7.2	N/A	10.8
RSD 7	18.8	4.3	5.1	N/A	0.0
Wr	106.9	112.3	112.2	N/A	112.2

Bluegills are important as both a recreational fishery and as a forage base for many of the other sport species. The IDNR stated that the bluegill in the LaSalle Cooling Pond were doing better than most

cooling reservoirs. Bluegills are temperature tolerant and should continue to contribute to the sport fishery. The upper incipient lethal temperature for bluegill adults is 37° C (98.6° F) for fish acclimated at 33° C (91.4° F) according to the literature.

Catfish

The table below compares catches per hour, PSD, RSD 14 and Wr for channel catfish for the last five years. Data for 1998 is not available because poor weather conditions limited the sampling effort. The channel catfish CPUE has increased in each of the last three years and exceeded the CPUE goal of 5-15 fish. The PSD goal of 40-70% was reached in 1997 and 2001, was well below goal in 2000, and was somewhat better in 1999. The goal for channel catfish Wr is 90-110 and was met in each of the years for which data is presented.

Channel Catfish					
	2001	2000	1999	1998	1997
CPUE	80	55	37	N/A	3
PSD	55.4	8.4	20.5	N/A	60.2
Wr	95.0	93.4	95.8	N/A	96.2

Channel catfish is popular bottom orientated sport species that is highly tolerant of warm temperatures. Upper incipient lethal temperatures are reported as high as 38° C (100° F) for this species. IDNR began stocking another species of catfish; the blue catfish in 1999 followed up by another stocking in 2001. Ken Clodfelter (IDNR) indicated that during January 2002 he collected five blue catfish in the discharge canal. Two of these fish weighed 10-11 pounds and one weighed 23 pounds. These fish were stocked in 10/99 at 4.8 inches. These fish were stocked in an attempt to provide a trophy species that would do well in warmwater. It appears that could be a possibility. Blue catfish feed on or near the bottom and to a lessor extent in midwater. It is an opportunistic feeder eating a variety of foods including shad.

Striped bass hybrid

Striped bass hybrid was another fish that was stocked to provide a trophy fishery and because their primary diet is gizzard and threadfin shad. They are difficult to collect by electrofishing except when they are congregating in confined areas such as the discharge canal. They can be collected in gillnets but again areas where the nets can be set to optimize collection are limited. The IDNR data is limited due to these sampling limitations. Based on the 2000 creel survey (third most harvested fish by weight) and observations by the concessionaire, the IDNR has indicated that striped bass hybrids are an important part of the recreational fishery. Striped bass hybrids were among the fish that were killed in 2000 and 2001 during periods of elevated water temperatures. In 2000 IDNR counted 1256 fish averaging six and one half pounds and in 2001 they reported 238 averaging five pounds. The SIU research program, (the LaSalle hatchery was originally constructed to support this program) included stocking and monitoring striped bass hybrid and other cool water species in the Collins and Dresden Cooling Ponds. As a result of these studies the conclusion was reached that if there was water available below 95 F coolwater species could contribute to a cooling reservoir recreational fishery. The possibility of continuing to stock striped bass hybrid should be investigated due to its importance as a sport fishery and use of shad as a primary food source.

Shad

Shad populations in the cooling pond are of interest to both the IDNR and Exelon. Shad are the primary forage base that supports many of the sportfish in the cooling pond but they can also cause operational problems. The IDNR sampling program in 1997 and 1998, due to poor sampling conditions, did not try to collect shad; they concentrated on sport fish. Clodfelter did make the observation that the numbers of shad in 1997 and 1998 were low compared to the most recent years. The table below presents the shad CPUE's (fish per hour) for 1999-2001. Although the IDNR fall program does not focus primarily on shad, the program results can provide an indication of the status of the shad population. Populations of a forage species (low on food chain) are expected to be larger than the predator community and more variable as they respond to food limitations, other environmental limitations and predator pressure.

CPUE			
	2001	2000	1999
Gizzard shad	108	451	71
Threadfin shad	344	645	12
Gizzard shad x threadfin shad hybrid	46	0	0
Total shad	498	1,096	83

The shad population is driven by the temperature regime in the cooling pond. The higher temperatures results in a larger population of plankton which the shad eat, results in a longer growing season for shad (as well as other species) and an increased growth rate. During the nearly two year period (9/96-8/98) when both units were off, the shad population would have not had the advantages brought about by residing in a heated waterbody. Although, as shown below there can be too much of a good thing. After Unit One returned to service in 8/98 and Unit Two in 4/99 the shad populations began to increase. The data from the last three years indicates that the shad population is now comprised of two shad species gizzard shad and threadfin shad. In 2001 gizzard x threadfin hybrids were also collected. The shad catch per hour was 83 in 1999, climbed to 1096 in 2000 and in 2001 was 498, an elevated although reduced level. The reduced level in 2001 was the result of a fish kill in July 2001. The IDNR reported that an estimated 90,800 shad weighing at least 2000 lbs were lost.

The addition of threadfin shad to the shad community although not expected is not surprising. Threadfin are a southern species (natural upper range is southern Illinois), which can not survive northern winters without a constant source of heated water. A cooling reservoir can provide that environment. When ComEd began to open the cooling ponds for recreation the IDNR were interested in stocking threadfin into the Edison cooling ponds to increase the forage base. However, due to the problems gizzard shad caused at the intakes in some of the ComEd cooling ponds, ComEd stopped allowing the practice. LaSalle Cooling Pond received one stocking of 2000 threadfin shad in May 83 but the stocking was probably unsuccessful since only Unit One was in commercial service. Any threadfin that may have been in the cooling pond would not have survived the 96-97 and 97-98 winter periods when there was no thermal input to the reservoir.

The current population is a result of a threadfin shad population in the Illinois River and Des Plaines Rivers. Monitoring programs conducted at facilities upstream of the LaSalle river intake have

recorded threadfin shad annually since 1998. It would appear that they were stocked at some locality, which resulted in their introduction into the upper Illinois Waterway. It would appear that there are enough thermal inputs to the river system to enable threadfin shad to survive over the winter.

Early life stages of threadfin and gizzard shad enter the cooling reservoir, in late spring and the summer months, when water is pumped from the river during spawning and developmental periods. The traveling screens located at the river screen house only screen out larger fish. Both gizzard and threadfin shad will survive and reproduce in the cooling pond in most years. If thermal extremes, either high or low, occur such that the populations are reduced or eliminated shad will be reintroduced with the river water.

The upper incipient lethal temperature for gizzard shad was 35.7° C (96.3° F) in one study and 36.5° C (97.7° F) in another (differences probably related to acclimation temperatures). The preferred temperature of gizzard shad is 22°-23° C (72 to 74° F). Gizzard shad will suffer cold shock mortality at 1 - 2.2 ° C (34 to 36° F). The preferred temperature of threadfin shad is 34°-36° C (93.2 to 96.8° F). At 10 to 13 ° C (50 to 55.4° F) threadfin become stressed and few survive 4.4 ° C (39.9° F).

Water Temperature

Fred Bevington from LaSalle Station provided available hourly water temperature data by unit (from each units thermal sensors) for the period 1998-2001. The data was processed to obtain daily minimum and maximum temperature values for Unit One, Unit Two and both units combined. In addition, daily minimum and maximum water temperatures were provided (from chart recorders) for 1996 through July 1998.

Table 2 provides the minimum and maximum temperatures for 1996 through July 1998 as read from the charts. The minimum water temperatures during the winter of 96/97 were 31.0, 30.5, and 33.0° F during December, January and February, respectively. During the same winter months in 97/98, the temperatures were <30.0, 31.0 and 34.0° F, respectively. The maximum recorded temperature in 1997 occurred in August (87.5 ° F). Neither unit was operating during these periods.

Table 2 also presents the minimum inlet (at the cooling pond intake) and the maximum outlet (discharge to the cooling pond) temperatures for the units combined, by month for the August 1998 through 2001 period. The combined **minimum** yearly **inlet** water temperature was recorded in January for 1999, 2000, and 2001 (44.8° F, 45.2° F, and 48.5° F, respectively). Neither unit was in-service during the winter of 1998. At the other end of the temperature range, the **maximum** yearly **outlet** water temperature, although occurring during the summer, did not always occur in the same month. In 1998, with one unit operating, a maximum outlet temperature of 106.2° F was recorded in August. This was the first month of operation in 1998 for the unit. In 1999 the combined maximum temperature was 122.0° F, in 2000 the temperature was 120.6° F and in 2001 it was 126.9° F. In 1999 and 2001 the maximum water temperature was reached in July, while in 2000 it occurred in August although the July temperature was similar (120.2° F).

The temperature sensors for the units' usually do not record identical temperature values. Unit One often has the higher valve. The table below presents the highest **maximum inlet** (at the Intake) temperature recorded by either sensor for 1998-2001 from June through September. The highest

maximum inlet temperatures, in the last four years, occurred during 2001 in July and August. In the last three years temperatures at the intake were in the mid to high 90's during some part of the summer. Except for refuge area such as the borrow pits, the coolest water temperature in the cooling pond during these periods will be at the cooling pond intake.

Maximum Inlet Temperature (° F)				
	1998	1999	2000	2001
June	N.A.	93.3	86.8	92.5
July	N.A.	96.9	94.1	98.9
August	84.0	92.3	92.0	97.5
September	79.8	87.2	94.5	88.6

3. Gizzard Shad Control

Cooling reservoirs can provide excellent conditions for a number of forage and predator species to grow and multiply. In the period when cooling ponds like LaSalle's were being designed, the designers did not anticipate that fish could thrive in the environment. Forage fish, like gizzard and threadfin shad produce large numbers of young when conditions are favorable.

Small young of the year gizzard shad, have been a problem at intakes structures in cooling reservoirs, that were designed without an escape route for fish that end up in front of the screens. LaSalle's intake canal is a classic example. During times when shad have moved to the cool side of the pond, the configuration of the reservoir funnels them into the intake canal. The fish move into the canal and when they get to the dead end, they tend to congregate (especially the smaller fish), rather then move back up the canal against the 1-fps or more current. Shad make runs on the intake structure and can impact all the screens or a bank of screens. This can occur over a short time period or the run can be prolonged occurring over a longer period. Shad can overflow the trash basket resulting in their reimpingement, adding to the numbers of live shad being collected on the screens. In many cases the differential pressure on the screens becomes so great that the shear pins shear and/or a portion of the screen collapses.

The shad movements appear to be related to temperature and behavioral responses. Shad runs at facilities that were part of the old ComEd system occurred from spring through early fall. The fish that were most often involved in travelling screen plugging and damage have been 2 to 4 inches in length. Threadfin shad add to the problem because they are small, with a maximum size of six inches and a life span of three years. Gizzard shad grow that large in one year and can reach more than 14 inches with a life span of seven years. Gizzard shad outgrow the problem stage in one year however those that remain become reproducing adults. Within two years they are to big to serve as forage for the predators usually associated with cooling ponds such as largemouth bass, bluegill, channel catfish, and white bass. The majority of the gizzard shad the IDNR sampled in fall 2000 were 4.7 to 6.3 inches and in 2001 the majority were in the 5.1 to 6.7 inch range. As expected the threadfin shad were smaller, with the majority ranging from 2.8 to 3.5 inches in 2000 and 3.1 to 4.3 inches in 2001.

The current control of shad at LaSalle is based on physically keeping fish away from the intake by using a barrier net. Nets were successful used at what was the Public Service of Indiana's Gibson Plant. After review of other options and based on the Gibson success, ComEd installed nets at the

Collins and LaSalle Cooling Ponds. The entire Collins Cooling Pond was treated twice with a fish toxicant before a decision to use nets was made. Although numbers were reduced for a short time, ComEd continued to look for more successful approaches.

Nets were installed at LaSalle in 1982. They were originally made of Nylon with 1/2 inch mesh but were modified numerous times as ComEd staff gained experience. The final design included a 3/8 inch mesh net comprised of polyethylene because it keep smaller fish out, was more buoyant and was somewhat more resistant to biofouling. To provide redundancy a double barrier net system was used. The Gibson plant system was based on a triple barrier net system. In the 1993, as part of a cost savings initiative a decision was made to dispense with the second net at LaSalle.

In addition to the net(s) at LaSalle, a system was installed which used electricity to shock fishes congregating in the intake area. The concept was that by shocking the shad as they made a run on the intake, they would be dispersed so that the school would be more spread out when they reached the screens. This would spread the fish over more screen surface. The system has been used occasionally. I do not know how effective it has been.

Shad control approaches fall under the following classifications: behavioral mechanisms, diversion systems, physical barrier, biological, chemical, and temperature.

Behavioral systems depend on the response of fish to light, air bubbles, sound including noise and variable frequency sound generators or a combination of these responses. The responses vary by species and are not always consistent. Over time the individual fish may no longer respond as expected. These systems would not be a dependable alternative in a closed environment like a cooling pond. To be most effective, the fish should be able to leave the area after they have encountered a behavioral system (on a river they would move up or downstream). In a cooling pond they have no where to go and over time will keep encountering the system and may no longer respond to it.

A diversion system depends on diverting the fish away from the intake to an escape route. Unless you can divert the fish into the blowdown canal this system would also not work in a closed system. Diversion systems are another application of a physical structure in the water, which depend on a barrier (usually screens) and a current to move the fish in a predetermined direction.

Physical barriers prevent shad from reaching areas of concern. The barrier is effective if it keeps the fish out or reduces their numbers to the extent that the travelling screens can handle the load. Barriers include nets and leaky dikes. As long as they are properly installed and maintained, they will reduce the numbers of fish reaching the intake.

Biological control depends upon the stocking of predator fish(s) at high enough numbers to reduce the population through predation. Predators need to eat both the young fish (which are in the highest numbers) and feed upon the reproducing adult shad. Most of our freshwater predators feed upon fish they can swallow whole which is why adult gizzard shad have few predators. Striped bass is a predator, which will eat all size shad. Conditions in cooling ponds can be so favorable that more shad are produced they can be handled by the predators. Predator fish help control the shad population, but in the prolific cooling pond environment, they should be only one of the tools being used.

Chemical control using a fish toxicant like rotenone can be used to reduce the numbers of shad. In a totally closed system a toxicant could be used to kill all the shad as well as other fish. Toxicant application could be used to reduce the shad numbers in a given area, such as the area between the net and the intake. This technique was used to supplement the barrier nets at Collins. It was more necessary at that facility because the nets were not installed year round or maintained at the same level as the LaSalle installation. In order to use a fish toxicant in any water (public or private) in Illinois, it must be approved by the IDNR and applied under their direction (in most situations by them). If the whole pond was treated, blowdown to the river would need to be stopped until the poison dissipated or was detoxified by another chemical (potassium permanganate or chlorine for rotenone). If the intake canal was treated, the flow would need to be reduced as much as possible, in order to help controls costs by reducing the amount of chemical needed. The applicator will need to maintain the concentration at the low level needed to kill shad without reaching higher level concentrations, which will kill all the fish. Passage through the condensers should speed up the breakdown of the chemical but precautions may need to be taken to reduce impact on fish residing in the discharge canal. Timing of the toxicant application needs to be considered. Timing factors relate to water temperature, stage of shad life cycle, public access and power demand. The dead fish can cause their own problems if they are pulled into the intake faster then can be handled. The majority however should float to the surface and then sink to decompose on the reservoir bottom.

Temperature controls are usually natural and occur during the winter. In natural waters shad will experience mortality due to cold water temperatures. In LaSalle Cooling Pond this will not occur unless both units are down for an extended period, which is highly unlikely. During the last three winters, the lowest water temperature in the reservoir was in the mid to high 40's. These temperatures are above the 34 to 40° F temperatures at which shad will experience cold shock. The high water temperatures that the reservoir now obtains during the summer will provide a level of shad control. The shad die off in the summer of 2001 supports this statement. The upper incipient lethal temperature for gizzard shad is in the range of 96 to 98° F. These temperatures were reached in the reservoir in each of the last three years and in 2001 these temperatures were reached at the intake. Threadfin shad are more temperature resistant and will survive at higher temperatures than gizzard shad.

Shad control at LaSalle Cooling Pond should be accomplished using a multi-prong approach.

First and primary, because it provides predictable protection, is the use of a physical barrier to keep shad away from sensitive areas. This system as long as it is maintained, will protect the intake year round from any undesirable fish. The present system of one net and backup shocker system appears to have been effective since late 1993, when the station moved from a two net to one net system. The cleaning schedule should be reevaluated to insure that the net would stay in place when needed. The rate and amount of biofouling should be evaluated to see if the increased water temperatures year round will increase biofouling on the net.

The secondary approaches include temperature and stocking of predators will help reduce the numbers of shad. The summer water temperatures in most years will cause some amount of shad mortality. Continuation of fish stocking with an emphasis on fish species that are less sensitive to thermally enriched water will provide for recreational opportunities and reduce shad. An effort should be made to obtain a letter from the IDNR that states that Exelon will not be held responsible for thermal mortality events with experimental stocked fish (to include stripped bass hybrids). Such a letter was

provided by the IDNR when the Braidwood Cooling Pond was stocked with striped bass. The water temperatures in the cooling pond have reached levels where fish mortality events should be expected every summer. The magnitude will vary depending on the temperature level obtained, the duration of the thermal event, the temperature to which the fish have been acclimated and how long the refuge areas can provide refuge. During a particular thermal event, increased temperatures and/or reduced levels of dissolved oxygen will over time reduce the amount of refuge area available. Stocked fish will be among the fishes that are killed. The reduction of shad numbers due to temperature and stocking will vary from year to year depending upon each year's circumstances.

The other secondary approach is chemical control. This approach could be used most easily to reduce the shad numbers in given areas such as the intake canal. Treating the whole pond at once would be expensive and require no blowdown to the river for at least some period of time. If a whole pond treatment was desired, arrangements would need to be made in advance to obtain the quantities of toxicant needed. Treating small or large areas will require the direct involvement of the IDNR. Although shad can be targeted, some non-targeted fish will also be impacted until the concentration is diluted to the levels that effect only shad. Rotenone efforts are not permanent due to reintroduction of shad with water pumped from the river and the high probability that some shad that survive the treatment. Treatments will most likely need to be repeated annually. An annual program would probably consist of two treatments, one targeting adults in the spring and one targeting young of the year later in the year.

A program designed for shad control should also include inspections of the traveling screen and fish removal systems to ensure they are operating as designed. Inspection items should include: are the sprays oriented correctly, is the water pressure adequate to remove debris, how easy is it for fish to drop behind the screens, is the trash basket effective in retaining fish and are procedures in place so that the baskets are dumped as soon as necessary to prevent spillage back into the intake forebay.

Table 1. Summary of Fish Stocked into LaSalle Cooling Pond 1997- 2001.

	Fish Species					
	Largemouth bass		**Smallmouth bass**		**Blue Catfish**	
Year	Number	Size (inches)	Number	Size (inches)	Number	Size (inches)
2001	44,477	3.7 - 4.0	19,620	4.0 - 4.8	68,011	5.0 - 5.5
2000	63,796	2.8 - 4.1	20,580	3.8 - 4.0	---	---
1999	50,175	2.5 - 4.5	24,531	3.8 - 4.0	70,563	4.8
1998	41,176	3.6 - 5.5	22,166	3.6 - 3.7	---	---
1997	41,659	3.7 - 4.5	24,391	2.7 - 4.0	---	---
Total	241,283		111,288		138,574	

	Striped Bass Hybrid		**Bluegill**		**Crappie**	
Year	Number	Size (inches)	Number	Size (inches)	Number	Size (inches)
2001	---	---	---	---	---	---
2000	7,360	7.0	35,200	1.2	---	---
1999	11,524	2.0	---	---	---	---
1998	20,580	1.75	192,576	1.0	25,361	4.0
1997	---	---	39,900	1.2	---	---
Total	39,464		267,676		25,361	

Table 2. Monthly Minimum and Maximum Temperatures (° F) Units Combined.

	1996*		1997*		1998*	
	Minimum Temp.	Maximum Temp.	Minimum Temp.	Maximum Temp.	Minimum Inlet	Maximum Outlet
January	31.5	52.5	30.5	37.0	31.0	42.5
February	30.0	47.5	33.0	39.0	34.0	45.0
March	35.0	51.0	34.0	49.0	32.0	59.0
April	48.0	63.0	38.0	59.0	47.5	60.0
May	54.5	79.0	48.5	67.5	55.0	83.0
June	70.5	89.5	59.0	84.0	60.0	91.0
July	70.0	89.0	69.0	85.5	75.0	90.0
August	74.5	94.0	68.0	87.5	76.5	106.2
September	59.0	88.5	62.0	82.0	73.1	105.0
October	48.5	68.0	46.0	69.0	60.0	96.8
November	32.0	49.0	<30.0	57.9	53.3	90.8
December	31.0	36.0	<30.0	40.0	46.8	90.0

	1999		2000		2001	
	Minimum Inlet	Maximum Outlet	Minimum Inlet	Maximum Outlet	Minimum Inlet	Maximum Outlet
January	44.8	84.5	45.2	90.3	48.5	88.9
February	47.4	91.6	49.9	94.9	48.6	93.7
March	48.0	94.2	57.3	98.3	53.2	98.2
April	56.6	95.9	57.2	102.8	59.6	100.6
May	66.2	110.6	71.1	104.9	69.3	111.3
June	77.5	120.9	68.1	111.5	70.4	118.1
July	83.9	122.0	84.1	120.2	82.5	126.9
August	81.3	119.5	83.4	117.9	82.6	124.9
September	72.0	110.9	72.6	120.6	71.0	116.3
October	60.8	104.0	63.2	107.1	57.2	109.2
November	53.5	94.1	59.7	99.5	58.1	105.4
December	47.2	96.2	46.8	93.7	48.0	95.0

* January 96 through August 98 temperatures from chart recorder.

Notes: Underlined values indicate only one unit was operating.
No units were operating from late September 1996 through late August 1998.