BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the matter of:	)	
	)	AS 99-5
Petition of Abbott Laboratories	)	(Adjusted Standard-Water)
For Adjusted Standard From	)	
35 Ill. ADM. CODE 302.208 and 304.105	)	

NOTICE OF FILING

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

G. Brent Manning, Director
Department of Natural Resources
524 South Second Street, Suite 400
Springfield, Illinois 62706

Caryn H. Nadenbush
Assistant Counsel
Division of Legal Counsel
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P. O. Box 19276
Springfield, Illinois 62794-9276

PLEASE TAKE NOTICE that on February 16, 1999, I have filed Abbott Laboratories' Amended Petition for Adjusted Standard, a copy of which is herewith served upon you.

Respectfully submitted,

ABBOTT LABORATORIES

By: _____
Alan P. Bielawski
One of Its Attorneys

Alan P. Bielawski
SIDLEY & AUSTIN
One First National Plaza
Chicago, Illinois 60603
(312) 853-7000 (phone)
(312) 853-7036 (fax)

CERTIFICATE OF SERVICE

A copy of the foregoing AMENDED PETITION FOR ADJUSTED STANDARD of Abbott Laboratories was served upon the following by first-class mail today.

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

G. Brent Manning, Director
Department of Natural Resources
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Alan P. Bielawski

Dated: February 16, 1999

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the matter of:	)	
	)	AS 99-5
Petition of Abbott Laboratories	)	(Adjusted Standard-Water)
For Adjusted Standard From	)	
35 Ill. ADM. CODE 302.208 and 304.105	)	

AMENDED PETITION FOR ADJUSTED STANDARD

On November 12, 1998, Abbott Laboratories ("Abbott Labs") filed an adjusted standard petition requesting relief from the Illinois Pollution Control Board's ("Board") regulations at Ill. 35 Admin. Code 302.208(g) and 304.105. By Order dated December 17, 1998, the Board directed Abbott Labs to file an amended petition responding to the Board's request for additional information to support the issuance of adjusted standards. In response to the Board's Order, Abbott Labs obtained additional information to support the issuance of adjusted standards, and has incorporated the information in this amended petition.

* * *

Pursuant to sections 27 and 28.1 of the Illinois Environmental Protection Act ("Act") [45 ILCS §§ 5/27 - 5/28] and 35 Ill. Adm. Code part 106, subpart G, Abbott Labs petitions the Board to promulgate adjusted standards that would apply to the discharges of chlorides and total dissolved solids ("TDS") from Abbott Labs' Abbott Park facility, in Lake County, Illinois.

This amended petition sets forth the factual and legal bases for Abbott Labs' requests. In accordance with 35 Ill. Adm. Code § 106.706, Exhibits 1 and 2, attached hereto, provide the affidavits of Jeffrey Smith (Abbott Labs) and Gregory Seegert (EA Engineering, Science and Technology) in support of Abbott Labs' Amended Petition for Adjusted Standards.

Abbott Labs waives a hearing on this amended petition pursuant to 35 Ill. Adm. Code § 106.705(j).

I. INTRODUCTION AND BACKGROUND

A. Description of Company

Abbott Labs is an Illinois corporation with headquarters located at Abbott Park, in Lake County, Illinois. The Abbott Park facility consists of approximately 608 acres of property. Abbott Labs' principal business is the discovery, development, manufacture and sale of a broad and diversified line of health care products and services. Abbott Labs employs approximately 15,000 people in Illinois and approximately 55,000 worldwide. Products manufactured at the Abbott Park facility include pharmaceutical and nutritional products, and hospital and laboratory products. Abbott Park also maintains a number of research and development facilities.

B. Description of Abbott Park

The Abbott Park site consists of 44 buildings, 8 miles of roadways, and 10 miles of sidewalks. To support the manufacturing operations, administration offices, and research and development facilities, the Company operates a utilities plant for the production and distribution of steam, process water, chilled water, distilled water, and compressed air.

The Abbott Park site contains a series of interconnected ponds, which are depicted in Attachments 1 and 2. These ponds serve several purposes. First, they provide retention of site storm water runoff to control flooding of neighboring properties and receiving waters. Second, they function as a reservoir for re-circulating non-contact cooling water for various utility systems. Finally, the ponds provide equalization and settling treatment of site storm water runoff and utility-related wastewater.

In terms of size and function, Ponds 1, 2, 3, 4 and 5 are most significant. Collectively, these ponds have a combined surface area of 31.8 acres and a storage volume of 190.9 acre-ft. There are also six relatively smaller ponds that collect site runoff from various locations on the Abbott Park site. These "finger" ponds are also interconnected and eventually discharge into Ponds 1 through 5. The flow through the pond system is depicted on Attachment 2.

The pond system has two discharge points that are covered by an NPDES permit (NPDES Permit No. IL0066435). Outfall 001 emanates from a pond level control structure on the outlet of Pond 1. Discharges from Outfall 001 are intermittent and typically occur only during periods of heavy precipitation.[1] Outfall 002 serves as the primary discharge point for the Abbott Park pond system. This outfall is located on the overflow weir of Pond 5, approximately one mile downstream and south of Outfall 001. The average daily flows through Outfall 002 for each

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[1] On average, discharges from Outfall 001 occur 10 to 20 days per year.

month in 1997 and 1998 is provided on Attachment 3.[2] The receiving water body for Outfalls 001 and 002 is the Middle Fork of the North Branch of the Chicago River ("Middle Fork"). (The locations of Outfalls 001 and 002 are depicted in Attachments 1 and 2.)

C. **Sources Contributing to Runoff Ponds**

1. **Utility Operations**

Attachment 4 identifies the five utility-related wastewater streams that discharge to the area runoff ponds and their respective sources of supply. These include non-contact cooling water (avg. discharge 9800 gpd); well pump bleed-off water (avg. discharge 9000 gpd); cooling tower blowdown (avg. discharge 76700 gpd) ; water treatment backwash water (avg. discharge 8250 gpd); and reverse osmosis reject water (avg. discharge 20294 gpd). As shown on Attachment 4, each utility wastewater stream discharges into Pond 1, with the exception of the cooling water blowdown from AP 33, which discharges into Pond 2. Attachment 4 also provides the results of sampling of TDS and chlorides concentrations in the utility wastewater streams. Operations of the utility facilities are relatively constant over the course of the year, except that greater quantities of cooling water are needed, and consequently discharged into the ponds, during summer months. Therefore, the contribution of TDS and chlorides from utility operations to the runoff ponds is relatively constant throughout the year, except during summer months when greater quantities of TDS and chlorides are discharged to the ponds.

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[2] Attachment 3 also presents the results of a calculation of the TDS and chlorides loadings discharged from Outfall 002, based on the discharge flows and concentrations of these constituents measured in the effluent.

2. Road Salting Operations

The concentrations of TDS and chlorides in the runoff ponds are heavily affected by winter salting operations. As discussed above, the Abbott Park site comprises 608 acres of property which drain storm water into the runoff pond system. Additional storm water runoff comes from an approximately 7 acre stretch of Illinois Highway 43 (Waukegan Road) located directly east of the Abbott Park site. Winter salting of the site's roadways, parking lots and sidewalks, as well as the salt load flowing onto the Abbott Park site from road drains on Highway 43, contribute to elevated TDS and chloride levels in the ponds during winter and spring months. In Northern Illinois, as in most northern urban areas, sodium chloride and calcium chloride salts are commonly used to melt accumulations of snow and ice on pavements and sidewalks. These salts cause an increase in TDS and chlorides concentrations in receiving waters when mixed with runoff from melting snow and ice.

At Abbott Park, as winter progresses and deicing becomes necessary, TDS and chlorides concentrations in the runoff ponds rise as salt loadings from storm water runoff migrate through the pond system. These circumstances are reflected in Attachment 5, which presents TDS and chlorides data from samples taken from the runoff ponds and the Middle Fork in December 1998 and January and February 1999. The December 1998 samples were collected before the major snow storm that occurred in early January 1999. The 1999 samples were collected following the storm, and associated salting operations.[3] The sampling data show that

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[3] Although Abbott Labs attempted to obtain samples from each location during each sampling effort, some of the smaller runoff ponds were too frozen to sample in January and February 1999 (continued...)

TDS and chlorides concentrations at all sampling locations generally were significantly higher following the snow storm. The data also show that the increases in concentrations were greatest at the Pond 8 inlet, Pond 8 and Pond 10, the sampling locations closest to Highway 43, and most likely to be affected by Highway 43 runoff. Finally, the data show that as late as one month after the storm, TDS and chlorides concentrations in Ponds 4 and 5 were much lower than in "upstream" ponds, reflecting the fact that water flowing through the pond system is retained in each pond before it travels to the next and eventually is discharged from the system.

3. Relative Contributions to Abbott Park Ponds

Using monthly rainfall amounts for 1997 and 1998, Abbott Labs calculated the runoff which would be expected to flow into the pond system from pervious and impervious areas within Abbott Park and from Highway 43, to compare these flows to the flows contributed from its the utility operations. These comparisons, which are presented on Attachment 6, show that, on average, about 80% of the flow into the pond system is from runoff. To determine the relative contribution of TDS and chlorides from the utility operations versus runoff, Abbott Labs calculated the total TDS and chlorides loadings discharged through Outfall 002 based on the average daily discharge flows and the concentrations of TDS and chlorides measured in the effluent for each month in 1997 and 1998. (See Attachment 3.) Abbott Labs then calculated the loading contributions to the pond system from the utility discharges, again using average discharge flows and TDS and chlorides concentration data obtained from samples of utility

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[3] (...continued)
Also, samples were not obtained from the Pond 8 inlet and the location upstream from Outfall 001 during the December 1998 sampling effort because of insufficient flows at these locations.

discharges to the ponds. (See Attachment 7.) The comparison, which also is presented on Attachment 7, shows that the utility operations contribute only about 15% of the total TDS loading to the pond system and only 2.24% of the chlorides loading.

D. Impact on NPDES Permit Compliance

Attachments 8-11 depict the concentrations of TDS and chlorides in the effluent discharged from the Abbott Park facility in recent years. As these attachments illustrate, during the mid to late winter months, the Abbott Park facility experiences episodic noncompliances with regard to TDS and chlorides effluent limits included in the NPDES permit for the facility.[4] As previously explained, the contributions of TDS and chlorides to the ponds from the utility operations are relatively minor. The only seasonal variation in utility operations and discharges to the runoff ponds occur during summer months, when increased quantities of cooling water are discharged. Nonetheless, as shown on Attachments 8-11, Abbott Park typically does not experience TDS or chloride noncompliances during the summer, which supports the conclusion that the TDS and chlorides exceedences are not caused by the utility operations. Rather, the exceedences occur as a result of winter salting operations, generally after the deicing materials have had an opportunity to find their way into, and travel through, the pond system . The extent to which TDS and chlorides concentrations exceed NPDES permit limits is a function of seasonal snowfall amounts and the corresponding amount of salt applied to the roads and sidewalks.

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[4] The current permit limits for these constituents are 500 mg/l for chlorides and 1000 mg/l for TDS. These limits were incorporated into Abbott Labs' permit as water quality-based effluent limits because the Middle Fork of the North Branch of the Chicago River has been categorized as having a 7Q10 of zero. Therefore, Abbott Labs is not afforded the benefit of mixing.

II. ADJUSTED STANDARDS FOR THE ABBOTT PARK FACILITY

A. Legal Requirements For Promulgating An Adjusted Standard

Section 28.1(a) of the Act authorizes the Board to promulgate adjusted standards to replace generally applicable requirements. Where the regulations of general applicability do not specify a level of justification required for a petition to qualify for an adjusted standard, as is the case here, Section 28.1(c) provides that the Board may grant Abbott Labs' petition upon a showing that:

> 1. Factors relating to Abbott Labs are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to Abbott Labs;
>
> 2. The existence of those factors justifies an adjusted standard;
>
> 3. The requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and
>
> 4. The adjusted standard is consistent with any applicable federal law.

415 ILCS § 5/28(c). To assist the Board in making these findings, Abbott Labs must file a petition that contains the information required by 35 Ill. Admin. Code § 106.705.

The remainder of this Amended Petition and the Attachments and Exhibits provide the justification necessary for the Board to satisfy these requirements and render its decision on Abbott Labs' amended petition. Part B describes the standards that Abbott Labs seeks to have adjusted and identifies their related federal statute. Part C contains the language of Abbott Labs' proposed adjusted standard. Part D explains how the factors relied upon in adopting the generally applicable standards for chlorides and TDS differ from those applicable to Abbott Labs, and

provides the justification for Abbott Labs' proposed adjusted standards. Part E discusses the technical constraints and economic impediments that prevent compliance with the generally applicable standards at Abbott Park. Part F explains why the adjusted standards are consistent with federal law. Part G responds to the Board's inquiry regarding whether the adjusted standards are needed on a year-round basis. Abbott Labs submits that the information set forth in these parts provides ample justification for the Board to grant this amended petition.

B. Description Of Standards To Be Adjusted

The Board's regulations prohibit any discharge that would cause or contribute to a violation of any water quality standard. 35 Ill. Admin. Code § 304.105. The waters into which the Abbott Park facility discharges, the Middle Fork of the North Branch of the Chicago River, are classified as General Use Waters. The General Use Water quality standard for TDS is 1000 mg/l and for chlorides is 500 mg/l. 35 Ill. Admin. Code § 302.208(g). The Board's water quality standards were promulgated, in part, to implement the Clean Water Act.

C. Proposed Adjusted Standard

Abbott Labs is requesting an adjusted standard from Sections 304.105 and 302.208(g) of the Board's regulations, to the extent those regulations apply to the discharge of TDS and chlorides from Abbott Labs' Abbott Park facility into the Middle Fork of the North Branch of the Chicago River, from the point of discharge from that facility to the intersection of the river with Route 176.[5]

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[5] The distance from Outfall 002 to the intersection of Route 176 and the Middle Fork is about 2000 feet.

Specifically, Abbott Labs proposes the following adjusted standard for adoption by the Board:

> The General Use Water quality standards for chlorides and total dissolved solids contained in Section 302.208(g) shall not apply to the Middle Fork of the North Branch of the Chicago River which receives discharges from the Abbott Park, Illinois facility of Abbott Laboratories, from the point of discharge from that facility to the intersection of the Middle Fork of the North Branch of the Chicago River with Route 176. Instead, this water shall comply with a chlorides standard of 750 mg/l and total dissolved solids standard of 1500 mg/l. In addition, the effluent standards for chlorides and total dissolved solids from the Abbott Park facility shall not exceed the following limits:

Constituents	Storet Number	Concentration Mg/l
Chlorides	00940	750
Total Dissolved Solids	70300	1500

D. The Factors Relating to Abbott Labs Are Substantially and Significantly Different from the Factors Relied Upon in Adopting Section 302.208.

The factors relating to Abbott Labs are substantially different from the factors relied upon by the Board in adopting the General Use Water quality standards for chlorides and TDS. In adopting the chlorides and TDS standards, the Board stated the following:

> Chloride. Chlorides are tolerated by aquatic life in relatively high concentrations; Professor Lackey, a recognized expert in fish biology, testified that 500 mg/l would be a safe limit, and there was no substantial dispute. This value will also, according to the evidence, protect against any serious problems in drinking water. The undesirability of an overly tight chloride standard is underlined by the high cost of chloride removal as well as the relatively innocuous nature of the material.

Total Dissolved Solids. This level of 1000 mg/l too is based largely on Dr. Lackey's testimony, confirmed by other witnesses and by McKee and Wolf, that aquatic life should not be harmed.

See in re Water Quality Standards Revisions, R-71-14, at 3-760 and 3-762 (Opinion of the Board, March 7, 1972). The Board adopted standards that, in its view, would be sufficiently protective of aquatic life and public water supplies under all circumstances. However, as discussed below, specific factors relating to Abbott Labs demonstrate the chlorides and TDS concentrations in Abbott Labs' effluent do not adversely affect aquatic life. In addition, because the Middle Fork is not used as a source of drinking water, Abbott Labs' effluent does not impact public water supplies.

a. **Aquatic Life**

i. **July 1998 Study**

In July 1998, Gregory Seegert of EA Engineering, Science and Technology conducted a biological and habitat survey of the Middle Fork in the vicinity of the Abbott Park outfalls. (The survey and Mr. Seegert's affidavit are attached as Exhibit 2). The survey consisted of a field investigation of the habitat and fish and benthic community in the Middle Fork at the Abbott Park discharge locations, and immediately downstream, and an assessment of the relevant scientific literature related to the biological effects of TDS and chlorides. With regard to habitat, Mr. Seegert observed that the Middle Fork in the area of the Abbott Park outfalls is an urban, low gradient, channelized, depositional stream, which he rates as poor. The fish and macro invertebrate community he observed was typical of what he would have expected to find in a stream with these habitat characteristics located in Northern Illinois. For this reason, Mr. Seegert

concluded that the fish and macro invertebrate community were limited by habitat, not water quality, constraints. Thus, Mr. Seegert's study supports the finding that discharges from Abbott Park do not adversely affect aquatic life.

With regard to specific adjusted standards which would be appropriate for the Abbott Park discharge locations, Mr. Seegert relies upon the findings of studies conducted by Reed and Evans, which conclude that for Illinois fishes, maximum permissible concentrations of 800 mg/l chlorides and 1300 to 1750 mg/l TDS are reasonable standards for Illinois streams. Based on the results of the EA survey and relevant scientific literature, Mr. Seegert concludes that the adjusted standards proposed by Abbott Labs are reasonable and will not harm aquatic life.

ii. **Future Studies**

In its December 17, 1998 Order, the Board requested that Abbott Labs include in its amended petition further information concerning the quantitative impact on the receiving stream due to its discharge. In an attempt to respond to the Board's request, Abbott Labs calculated the total mass loadings of TDS and chlorides discharged to the Middle Fork from Outfall 002. (See Attachment 3.) Abbott Labs also sampled the Middle Fork upstream and downstream of Outfall 002 on December 21, 1998, January 25, 1999 and February 1, 1999. While the results of these sampling efforts, which are presented on Attachment 5, show a significant increase in TDS and chlorides concentrations at all sampling locations following the January 1999 snow storm, a comparison of the TDS and chlorides concentrations in the Middle Fork upstream and downstream of the Abbott Park discharge reveals that there is little, if any, impact on TDS and chlorides concentrations due to Abbott Lab's discharge. However, as

indicated previously, permit exceedences involving TDS and chlorides generally occur in late winter or early spring, after snow runoff has had an opportunity to work its way through the pond system. Thorough and comprehensive data regarding TDS and chlorides concentrations in the Middle Fork does not yet exist. For this reason, as a condition to the issuance of adjusted standards, Abbott Labs proposes to continue to monitor the concentrations of TDS and chlorides in the Middle Fork on a monthly basis for a period of one year.

In addition, to better quantify the biological impact of its discharge, and to confirm Mr. Seegert's conclusions regarding the lack of impact caused by discharges from Abbott Park, Abbott Labs proposes to supplement the investigation conducted by Mr. Seegert as follows. Once in early, and again late, in spring, Abbott Labs would sample fish and benthos in the Middle Fork upstream of Outfall 001, below Outfall 002 and at the Route 176 intersection. This additional investigation would allow a quantitative comparison of biotic impacts, during the time of year when there is likely to be flow upstream of Outfall 001[6], and at a time when TDS and chlorides concentrations should be at their highest levels. Such a comparative study should provide a clearer understanding of the impacts, if any, associated with discharges from Abbott Park. Again, Abbott Labs proposes that these additional studies be undertaken as conditions to the issuance if the requested adjusted standards.

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[6] Although Mr. Seegert had planned to sample upstream of Outfall 001 during last summer's investigation, there was no flow upstream, and therefore sampling was not feasible.

b. Public Water Supply

As previously mentioned, the Middle Fork of the North Branch of the Chicago River is not used as a source of drinking water. Thus, to the extent protection of public water supplies was a factor on which the Board relied in adopting the generally applicable standards for chlorides and TDS, that factor is not applicable here.

E. Technical And Economic Constraints To Achieving Compliance

Because the use of salt for deicing purposes clearly is responsible for the permit exceedences experienced by Abbott Labs, Abbott Labs has investigated whether there are available alternatives to using salt, and whether treatment options exist to reduce the concentrations of TDS and chlorides in the Abbott Park effluent. As discussed in this section, there are no reasonable compliance alternatives available short of issuing the requested adjusted standards.

1. Alternate Deicing Strategies

The Abbott Labs grounds crew maintains roadways, parking lots and sidewalks to minimize the hazards of snow and cold during the winter months. The practice of applying salt on the roadways, parking lots, and sidewalks is a demonstrated and accepted strategy for successfully reducing injuries due to slip and fall and automobile accidents. Approximately 114 acres of roadway, parking lots and sidewalks are maintained. In the 1996 to 1997 winter season, 57.6 inches of snow were recorded between the months of November and April. Approximately 1000 tons of salt was used during that winter by Abbott Labs. During the 1997 to 1998 winter season, a total of 42.5 inches of snow was recorded between the months of November through March;

approximately 840 tons of salt were used. At a cost of about $35 per ton, Abbott Labs spent about $35,000 for salt in 1996-97, and $29,000 in 1997-98.

In order to reduce the amount of salt it uses, Abbott Labs has explored various alternate deicing strategies. For example, for a period of time the grounds crews used a mixture of salt and sand. However, this approach proved to be impracticable in that it caused increased debris and contamination to be tracked into Abbott Labs' facilities and had an adverse impact on the cleanliness of product manufacturing areas. Many of Abbott Labs' products are extensively regulated under cleanliness standards imposed by the U.S. FDA. The sand also caused turbidity increases in the runoff ponds.

Abbott Labs also has investigated using deicing materials that do not contain chlorides. It identified one compound, calcium magnesium acitate (CMA), which is commercially available. As indicated above, rock salt cost about $35 per ton. CMA cost about $2,817 per ton. The application rate for salt is 8 ounces per square yard, whereas the rate given for CMA is 10 pounds per 1,000 square feet. Thus, the cost per acre for deicing purposes is $42 for salt and $591 for CMA. In other words, the cost of deicing materials for the winter of 1996-97 would have been $490,000 had Abbott Labs used CMA, rather than the $35,000 it paid for salt. More importantly, unlike chlorides-based deicing materials that create heat to melt snow or ice, CMA merely changes snow and ice to a slushy solution, and is therefore less effective and potentially less safe. Finally, the Illinois Department of Transportation has confirmed that it will continue to use salt for roadway deicing purposes. Thus, even if it were economical or practical for Abbott Labs to switch from using salt, given the significant contribution of Highway 43 runoff to the

chlorides and TDS loading in the Abbott Park ponds, the Abbott Park facility would likely continue to experience difficulties maintaining compliance with existing TDS and chlorides limits during winter months.[7]

2. Treatment Options

Abbott Labs also has investigated various treatment options to maintain year-round compliance with the TDS and chlorides permit limits. None appear practicable. First, routing the entire discharge to the local sanitary district is not an option. Section 5.01(b) of the North Shore Sanitary District Ordinance Relating to Sewers and Sewer Systems (January 7, 1998) specifically precludes discharging "[a]ny unpolluted water including, but not limited to, uncontaminated non-contact cooling water, storm water, surface and groundwaters, roof run-off ...." to the District.

In theory, it would be possible to treat the effluent before it is discharged to the Middle Fork and route the resultant waste stream to the North Shore Sanitary District. To meet existing permit limits for TDS and chlorides, the least costly treatment option would entail installation and operation of a reverse osmosis treatment process preceded by an ultrafiltration system. Capital costs for installation of such a treatment system would run approximately $750,000, and the annual O&M costs would be approximately $500,000. Assuming an average annual flow of 750,000 gallons per day, and that 37% of the water treated by the reverse osmosis system would be concentrated reject wastewater, the one time permit fee for routing treatment

[7] Attachment 5 shows that the highest concentrations of TDS and chlorides in the pond system during the recent sampling exercise were found at the Pond 8 inlet, which is the point at which Highway 43 runoff first enters the system.

wastewater to the North Shore Sanitary District would be $832,500.[8] In addition, Abbott Labs would be required to pay a user fee to the North Shore Sanitary District of $82,125, based on the $0.30 per 1000 gallons discharged user fee charged by the District.

In addition to cost considerations, the reverse osmosis treatment process simply concentrates the TDS and chlorides present in the untreated water and produces a waste stream that still must be disposed of in some manner. The TDS and chlorides present in the wastewater would simply pass through the biological treatment processes of the POTW and ultimately discharge to a receiving water. This approach would not produce any net environmental benefit; it would simply displace the area impacted by the discharges.

F. Consistency With Federal Law

Federal law requires that states adopt water quality standards that are protective of the designated uses of the navigable waters involved. See 33 U.S.C. § 1313(c). The Middle Fork is designated as a General Use Water. Provided that standards authorized in accordance with the Board's adjusted standard procedures do not prevent or interfere with the designated use, such standards are consistent with federal law. As shown herein, the proposed adjusted standards are protective of aquatic life and would not interfere with any other uses designated for General Use Waters. Thus, the proposed adjusted standards are consistent with federal law.

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[8] The North Shore Sanitary District charges $3.00 per gallon discharged on a daily basis as a permit fee, or 0.37 x 750,000 x $3.00/gal. = $832,500

G. Duration of Adjusted Standards

In its December 17, 1998 Order, the Board requested that Abbott Labs clarify whether the adjusted standards should be in effect throughout the year or only during winter months. Although salting operations normally occur during late fall, winter and early spring, as previously explained, the impact of those operations on the TDS and chlorides concentrations in the Abbott Park effluent may be significantly delayed. As shown on Attachment 6, the average retention period for water flowing through the pond system may be as long as 185 days. Therefore, the effects of salting operations in March may not be manifested until as late as August or September. In effect, the only months during which there would be a high level of certainty that salting operations would not cause permit exceedences are October and November. Under the circumstances, Abbott Labs believes it is appropriate that the adjusted standards be in effect throughout the year.

III. CONCLUSION

Abbott Labs' petition should be granted because:

1. factors relating to Abbott Labs are substantially different from the factors relied upon by the Board when it adopted 35 Ill. Adm. Code § 302.208(g):

> (a) a survey conducted on the Abbott Park receiving waters demonstrates that the amount of chlorides and TDS in Abbott Labs' effluent does not adversely affect aquatic life;
>
> (b) the Middle Fork of the North Branch of the Chicago River is not used as a source of drinking water and therefore current chlorides and TDS discharges are protective of public water supplies;

2. studies show that a 750 mg/l chlorides concentration level and a 1500 mg/l TDS concentration level would not be harmful to fish;

3. to require Abbott Labs to comply with the requirements of Section 302.208(g) would result in a substantial hardship to the Abbott Park facility, with no corresponding environmental benefit; and

4. the requested adjusted standards will be protective of the uses of the receiving stream, and, therefore, are consistent with federal requirements.

Pursuant to 35 Ill. Admin. Code § 106.706, Abbott Labs submits the Affidavit of Jeffrey Smith in verification of the facts asserted herein. In the event the Board grants the adjusted standard, Abbott Labs respectfully requests the Board to instruct the Illinois Environmental Protection Agency to modify the chlorides and TDS levels set forth in Abbott Labs' NPDES permit consistent with the limits established in the adjusted standard.

Respectfully submitted,

ABBOTT LABORATORIES

By: _____
One of its Attorneys

Dated: February 16, 1999

Alan P. Bielawski
SIDLEY & AUSTIN
One First National Plaza
Chicago, Illinois 60603
(312) 853-7000 (phone)

Exhibit 1

EXHIBIT 1

AFFIDAVIT OF JEFFREY P. SMITH

I, Jeffrey P. Smith, do hereby state and attest to the following:

1. I am the Manager for Lake County Environmental Water Compliance for Abbott Laboratories and have held that position for slightly more than one year. I have personal knowledge of the facts set forth in the foregoing petition.

2. I have read the foregoing petition and state that the facts asserted therein are, to the best of my knowledge, true and accurate.

Jeffrey P. Smith
Manager, Lake County Environmental Water Compliance

Subscribed and Sworn to
before me this 16th day of
February, 1999.

Notary Public

"OFFICIAL SEAL"
KASANDRA K. WREN
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 4/6/2002

Exhibit 2

EXHIBIT 2

AFFIDAVIT OF GREGORY L. SEEGERT

I, Gregory L. Seegert, do hereby state and attest to the following:

1. I am employed by EA Engineering, Science and Technology ("EA"), 444 Lake Cook Road, Deerfield, Illinois as Chief Ichthyologist. My educational background and professional experience are presented in my resume which is attached to this affidavit.

2. In July 1998, EA conducted a biological and habitat survey of the Middle Fork of the North Branch of the Chicago River (the "Survey") on behalf of Abbott Laboratories. I had lead responsibility for conducting the Survey.

3. The Survey and the conclusions and opinions derived from the Survey are described and presented in the attached report entitled "Results of a Biological and Habitat Survey of the Middle Fork of the North Branch of the Chicago River" (the "Report"). The information and conclusions presented in the Report are true and accurate to the best of my knowledge, and the opinions presented therein are mine.

Gregory L. Seegert

SUBSCRIBED AND SWORN to
before me this 10th day of
November, 1998.

Bruce M. Zessar
Notary Public

"OFFICIAL SEAL"
BRUCE M. ZESSAR
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 3/20/99

C:\WINDOWS\TEMP\DOC1.WPD November 6, 1998 (12:58pm)

★ Professional Profile

Gregory L. Seegert
Chief Aquatic Biologist

Mr. Seegert is a senior scientist at EA's office in Deerfield, Illinois. His areas of special expertise are aquatic toxicology and aquatic ecology. In his 25 years of experience in these areas, Mr. Seegert has conducted studies throughout the Midwest and much of the East and Southeast. He is a recognized expert on biocriteria and biological sampling methods to assess impacts to aquatic life. He works regularly with the private sector and regulatory agencies in designing and implementing bioassay and aquatic biological studies. He has designed and directed numerous studies investigating the effects of water intakes and discharges on aquatic life. Issues regularly addressed by Mr. Seegert include entrainment at hydroelectric facilities, 316a & b, aquatic toxicology, bioaccumulation, endangered species, and ecological risk. Mr. Seegert is the Chief Ichthyologist at EA.

Education

M.S.; University of Wisconsin- Milwaukee; Zoology; 1973
B.S.; University of Wisconsin-Madison; Zoology; 1970

Training

EA Toxicity Reduction Evaulation Training; 1989
EA Expert Witness Training; 1990
EA Project Manager Training; 1997

Experience

Aquatic Ecology—Designed, conducted, managed, and reviewed aquatic studies throughout the East, South, and Midwest. Recognized expert on the distribution of fishes and fish taxonomy, biocriteria, and IBI theory and implementation. Worked on small streams, wetlands, large rivers (e.g., Ohio, Wabash, Mississippi), ponds, reservoirs, and the Great Lakes. Worked with numerous utilities in studying the effects of thermal discharges on aquatic life. Evaluated impingement and entrainment losses of aquatic organisms and the effects of construction and flow alterations on salmonids. Directed a large multidisciplinary study of Pool 5A of the upper Mississippi River sponsored by the St. Paul District, U.S. Army Corps of Engineers. Regularly conducts surveys of endangered fishes. Instructor at two workshops on fish ID.

Environmental Toxicology—Conducted numerous acute and life cycle bioassays to determine the effects of effluents and of numerous individual organic and inorganic chemicals on aquatic organisms. These tests involved a wide variety of freshwater and marine fish and macroinvertebrates. On behalf of Cincinnati Gas and Electric, evaluated the effects of ash pond and cooling tower blowdown on aquatic organisms. Designed and conducted laboratory and field studies at two Ashland Oil refineries. For the Minnesota Pollution Control Board, evaluated the effects of chlororganics from the St. Regis paper plant at Sartell on aquatic life and human health. Directed two 28-day dioxin blouptake studies at a Champion International paper mill in Quinnesec, Michigan. At this same site, directed a long-term research and development effort to assess and mitigate impairment of the flavor of fish in the receiving waterbody.

Mining Studies—Directed all aquatic and water quality activities associated with a two-year, $1 million study designed to assess the impacts of New Source coal mining in West Virginia. In conjunction with this study, developed a unique system of ranking the biological resources of each waterbody, developed detailed methodologies to monitor the aquatic environment before, during, and after mining, and ranked all the fishes of West Virginia with regard to their susceptibility to coal mining. Directed a five-year study of

issues related to effluent quality, sedimentation, tissue contamination, loss of spawning habitat, alterations in flows, and rates of recolonization at the site of a proposed copper/zinc mine in Wisconsin. Directed and currently managing a long term study to evaluate biological recovery following the pumpout of a flooded coal mine in Ohio.

Water Quality—As part of EIS studies sponsored by Region III, EPA, evaluated water quality—related impacts on aquatic life and human health caused by coal mining throughout West Virginia. For Region II, EPA, determined the extent to which water quality in various New Jersey and Pennsylvania rivers was affected by municipal effluents.

Hydropower Development—Evaluated effects of hydropower development on aquatic life at numerous sites throughout the Midwest and Southeast. Designed and conducted population surveys of various fish species to evaluate impacts on these species. Measured entrainment rates and entrainment mortality at various sites and assessed the impact of these losses on resident and migratory warmwater and coldwater fishes. Evaluated effects of flow alterations and flow reductions on stream fishes.

Critical Reviews—On behalf of various companies and trade associations (e.g., American Petroleum Institute), conducted detailed reviews of various state and federal technical and regulatory documents. Several of these reviews have led to extensive revisions in the subject document. Chlorine-related literature is an area of particular expertise and, as a result, Mr. Seegert's expertise has been solicited regularly by EPA, various states, and numerous industrial clients.

EIS Studies—Used matrix analysis to evaluate the recommendations contained in the GREAT II (Great Rivers Environmental Assessment Team) report for the Mississippi River. For the Louisville District, U.S. Army Corps of Engineers, reviewed the effects of pool level alterations in the Ohio River on terrestrial organisms. As part of a generic EIS, developed methodologies for conducting aquatic studies in wetlands.

Professional Affiliations

American Fisheries Society (National Society and three State Chapters)
American Society of Ichthyologists and Herpetologists
Wisconsin Society of Ornithology

Selected Publications and Presentations

Seegert, G.L. (B.M. Burr, D.J. Eisenhour, K. M. Cook, C.A. Taylor, R.W. Sauer, E.R. Atwood, co-authors). 1996. Nonnative fishes in Illinois waters: What do the records reveal? *Trans. Ill. Acad. Sci.* 89:73-91.

Seegert, G.L. (B.M. Burr, K. M. Cook, D.J. Eisenhour, K.R. Piller, W.J. Poly, R.W. Sauer, C.A. Taylor, E.R. Atwood, co-authors). 1996. Selected Illinois fishes in jeopardy: New records and status evaluations. *Trans. Ill. Acad. Sci.* 89:169-186.

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Seegert, G.L. (R.B. Bogardus, co-author). 1980. Ecological and environmental factors to be considered in developing chlorine criteria, *in* Water Chlorination: Environmental Impact and Health Effects, Vol. 3 (R.L. Jolley, ed.). Ann Arbor Science, Ann Arbor, Michigan.

Seegert, G.L. (A.S. Brooks, J. Vande Castle, and K. Gradall, co-authors). 1979. The effects of monochloramine on selected riverine fishes. *Trans. Am. Fish. Soc.* 108:88-96.

The fish community of the Chippewa River and Dells Pond near Eau Claire, WI. Presented at WI AFS meeting. January 1998. Eau Claire, WI.

Entrainment and impingement studies at two power plants on the Wabash River in Indiana. Presented at EPRI Clean Water Act Section 316(b) Technical Workshop. September 1998. Berkeley Springs, WV.

Status and application of biocriteria. Presented at the TAPPI Environmental Conference. April 1998. Vancouver, BC.

Improvements to the Pigeon River following modernization of the Champion International Mill. Presented at the TAPPI Environmental Conference. May 1997. Minneapolis, MN.

Improvements to the Pigeon River folloiwng modernization of the Champion International Mill. Presented at the TAPPI Biological Symposium. October 1997. San Francisco, CA.

Geographic and historic changes in Ohio River Fish Communities. Presented at the Ohio River Fisheries Conference. January 1997. Cincinnati, OH.

Small mammals of the Ohio River floodplain in western Kentucky and adjacent Illinois. 1982. Trans. Kentucky Acad. Sci. Co-authored by R.K. Rose.

Factors in the design of chlorine toxicological research. 1982. In: R.L. Jolley, ed. Water chlorination: environmental impact and health effects, Vol. 4, Ann Arbor Science, Ann Arbor, Michigan. Co-authored by J.A. Fava.

Low level chlorine analysis by amperometric titration. 1979. J. Water Poll. cont. Fed. 51:2636-2640. Co-authored by A.S. Brooks.

WAPORA, Inc. 1978. Review of the Mattic and Zittel paper: site-specific evaluation of power plant chlorination. Project 218. Submitted to Edison Electric Institute, Washington, D.C.

A preliminary look at the effects of intermittent chlorination on selected warmwater fishes. 1978. Pages 95-110. In: R.L. Jolley, H. Gorchev, and M. Hamilton eds., Water chlorination: environmental impact and health effects, Vol. 2. Ann Arbor Science. Ann Arbor, Michigan. Co-authored by A.S. Brooks.

The effects of intermittent chlorination on coho salmon, alewife, spottail shiner, and rainbow smelt. 1978. Trans. Am. Fish. Soc. 107:346-353. Co-authored by A.S. Brooks.

Dechlorination of water for fish cultures: a comparison of the activated carbon, sulfite reduction, and photochemical methods. 1978. J. Fish. Res. Bd. Can. 35:88-92. Co-authored by A.S. Brooks.

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The effects of intermittent chlorination of rainbow trout and yellow perch. 1977. Trans. Am. Fish. Soc. 106:278-286. Co-authored by A.S. Brooks.

The effects of intermittent chlorination of the biota of Lake Michigan. 1977. Special Report #31, Center for Great Lakes Studies, University of Wisconsin. Milwaukee, Wisconsin. Co-authored by A.S. Brooks.

The effects of a 30-minute exposure of selected Lake Michigan fishes and invertebrates to residual chlorine. 1977. Pages 91-99. In: L.D. Jensen, ed. Biofouling control procedures: technology and ecological effects, Marcel Dekker, Inc., New York, New York. Co-authored by A.S. Brooks.

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The effects of intermittent chlorination on selected Great Lakes fishes. 1977. Presented at the 38th Midwest Fish & Wildlife Conf. Dec. 5-8, 1975. Dearborn, Michigan. Co-authored by A.S. Brooks.

Toxicity of chlorine to freshwater organisms under varying environmental conditions. 1976. Pages 277-298. In: R.L. Jolley, ed. Proceedings of the Conference on Environmental Impact of Water Chlorination, October 22-24, 1975, Conference 761096. Oak Ridge National Laboratory. Oak Ridge, Tennessee. Co-authored by A.S. Brooks.

The Beaver Dam River. 1976. Pages 210-213. In: D.D. Tessen, ed. Wisconsin's favorite bird haunts. Wisconsin Society for Ornithology. Green Bay, Wisconsin.

The effects of a 30-minute exposure of selected Lake Michigan fishes and invertebrates to residual chlorine. Presented at the Biofouling Workshop. June 16-17, 1975. Johns Hopkins University. Baltimore, Maryland. Co-authored by A.S. Brook and D.O. Latimer.

The effects of heat on plasma potassium levels, hematocrit, and cardiac activity in the alewife, common shiner, and two other teleosts. Presented at the 16th Conf. on Great Lakes Research. April 16-18, 1973. Huron, Ohio. Co-authored by C.R. Norden.

The effects of lethal heating on plasma potassium levels, hematocrit and cardiac activity in the alewife (Alosa pseudoharengus) compared with three other teleosts. Pages 154-162. In: Proc. 16th Conf. Great Lakes Res. International Association Great Lakes Res.

Numerous presentations at state, division, and national American Fisheries Society Meetings. Topics have included:

- General fish surveys
- Threatened and endangered species surveys
- Thermal assessments
- IBI protocols
- Large river sampling methods
- Toxicity studies
- Use attainablity
- Biological variability
- Habitat assessment

Presentations annually at the national American Society of Ichthyologists and Herpetologists meeting since 1991.

Results of a Biological and Habitat Survey of the Middle Fork of the North Branch of the Chicago River

Prepared for:

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13527.01

September 1998

To assess possible impacts associated with the discharge of slightly elevated concentrations of chlorides and TDS, fish, benthic, and habitat surveys of the Middle Fork of the North Branch of the Chicago River were conducted on 14 July 1998. Sampling during the summer or early fall is generally preferred because flows during this period are usually low and stable and fish movement is minimal. The information below describes where and how sampling was conducted and the results of the surveys.

METHODS

SAMPLING LOCATIONS

Three stream locations were established; one just upstream of Outfall 001, one at Atkinson Road between Outfalls 001 and 002 (Location 2), and one at the railroad bridge downstream of Outfall 002 (Location 3). However, lack of water prevented the location upstream of Outfall 001 from being sampled.

FISH SAMPLING

At the remaining two locations, fish were sampled using a 10' long seine with 3/16" mesh. Sampling was conducted until no new species were collected. All fish collected were identified, counted, and checked for external anomalies (lesions, fin erosion, etc.).

MACROINVERTEBRATE SAMPLING

The benthic community was assessed by a combination of sweep netting and hand picking at each of the two locations. At each location, all available habitats were sampled and a minimum of 40 person minutes was expended at each location. Macroinvertebrates were identified to genus or species except for oligochaetes, flatworms, and bryozoans, and each taxon was characterized as abundant, common, uncommon, or rare.

HABITAT

The habitat at each stream location was scored using IEPA Stream Habitat Assessment Procedure (SHAP).

RESULTS

FISH

The two locations yielded 9 species of fish. Both areas were dominated by members of the sunfish family (4 species), with goldfish and black bullhead also being common (Table 1). The weedy area upstream of Atkinson Road yielded a number of central mudminnows, while the area downstream of Outfall 002 yielded several gizzard shad and bluegill. Both areas yielded a combination of young-of-the-year (YOY), juvenile, and adult fish. No external anomalies were noted among the 44 fish collected at Location 2, whereas 2 of the 64 fish at Location 3 had eroded fins.

HABITAT

Based on SHAP scores, the habitat at both Locations 2 and 3 would be rated as fair (SHAP=68 and 79, respectively). However, except for Metric 9 (Bank Vegetative Protection) which was ranked as good or excellent, the other 14 metrics were rated as poor or fair. The stream is channelized throughout the study area, riffles are absent, hard substrates are uncommon, and the entire area is heavily silted. Because of the channelized nature of the stream, the lack of hard substrates, lack of appreciable current velocity, excessive siltation, and considerable amounts of urban trash, we believe the habitat at both locations is best characterized as poor.

BENTHOS

A total of 39 macroinvertebrate taxa was collected from the study area on 14 July 1998 (Table 2). As was the case with the fish community, the benthic community was dominated by taxa preferring low gradient depositional streams and/or those tolerant to a variety of environmental disturbances (Ohio EPA 1987). Taxa richness at Locations 2 and 3 was nearly identical (28 and 29 taxa, respectively). Midges, though not numerically abundant, were the most diverse group, being represented by 6 taxa at Location 2 and 7 taxa at Location 3 (Table 2). The abundance and diversity of oligochaetes (aquatic earthworms), isopods (sow bugs), and amiphipods (scuds), decapods (crayfish), and chironomids (midges) were similar at the two locations. Leeches were common at Location 2 but uncommon at Location 3. Flatworms, sponges, mayflies, and caddisflies were either restricted to or more common at Location 3 compared to Location 2, whereas the reverse was true for odonates, hemipterids, and gastropods. EPT (Ephemeropterans, Plecopterans, and Trichopterans) taxa were found only at Location 3, downstream of Outfall 002.

DISCUSSION

The fish community was dominated by lenthic species (those preferring lake-like conditions). No true stream (lotic) species were present. Also, several of the species present (e.g., central mudminnow, goldfish, fathead minnow and green sunfish) are tolerant to a variety of disturbances (Ohio EPA 1987). Species such as these are common in low gradient, urban, channelized streams and we attribute their abundance to the poor habitat conditions. The lack of high velocities and hard substrates effectively preclude most darters and many minnows and suckers. The high amounts of silt, clay, and other depositional material preclude any species requiring clean substrates for either feeding or spawning. Thus, the species that are present, as well as those that are absent, in the Middle Fork are the result of habitat conditions rather than a result of water quality conditions. The current fish community of the Middle Fork is consistent with what we expect in a small, low gradient, channelized, and highly depositional stream.

Fishes that inhabit the Middle Fork are tolerant not only to rigorous habitat but also to higher than normal chloride concentrations. For example, goldfish, fathead minnow, and bluegill all rank in the lower 50 percentile in terms of their sensitivity to chlorides (US EPA 1988). Largemouth bass are also tolerant to chlorides (Reed and Evans 1981) and gizzard shad, given their anadramous nature, certainly are chloride-tolerant. Based on their tolerance to chlorides, we do not believe the proposed modest increase in the chloride limit to 750 mg/l poses any risk to the

current fish community. Laboratory studies on Illinois fishes conducted by Reed and Evans (1981) reached a similar conclusion. They stated that "maximum permissible concentrations of 800 mg/l chloride (and 1000 mg/l sulfate) are more reasonable standards based on the results of the study".

With regard to TDS, Reed and Evans (1981) found 14-day LC50 values of 13,000-17,500 mg/L for three common Illinois fishes (channel catfish, bluegill, and largemouth bass). They stated that "total dissolved solids concentrations are not a sensitive indicator of acute toxicity for fishes". Applying an application factor of 0.1 to the acute toxicity values reported by Reed and Evans yields values of 1300-1750 mg/L. Thus, we conclude that the TDS limit of 1500 mg/L requested by Abbott for the Middle Fork is reasonable.

The locational differences in presence/absence or numerical abundance of macroinvertebrates presented previously appear to be primarily related to habitat differences rather a result of outfall water quality. For example, the presence of odonates at Location 2 but not at Location 3 is simply a result of aquatic macrophytes (which odonates prefer) being fairly common at Location 2, but absent at Location 3. Similarly, the abundance of caddisflies at Location 3 compared to their near absence at Location 2 is almost certainly the result of gravel/cobble substrate and a small area of swift water being present at Location 3 versus being nearly absent at Location 2.

Most biologists equate EPT taxa with good water quality with the general rule being the more EPT, the better the water quality. On this basis, water quality would seem to be better at Location 3 than at Location 2. Even if the observed difference is more a reflection of habitat differences between the two locations rather than differences in water quality, the presence of EPT taxa at Location 3 and not at Location 2 clearly indicates that water quality below Outfall 002 is sufficient to support EPT taxa. The only possible effect of high chloride levels from 002 was the sparse abundance of snails at Location 3 compared to their high abundance at Location 2. US EPA (1988) reported that the snail Physa (=Physella) gyrina was quite sensitive to chlorides. Thus, the absence of Physella at Location 3 may be a response to elevated concentrations of chlorides. On the other hand, it may simply be a response to the habitat differences described previously. Overall, however, we found the macroinvertebrate community at both locations to be typical of what would be expected for an urban, channelized, low gradient, depositional stream in northern Illinois.

Given the expected and rather ordinary nature of both the fish and macroinvertebrate communities in the Middle Fork of the North Branch of the Chicago River, we see no biological basis for not increasing the chloride and TDS water quality criteria to the levels requested.

REFERENCES

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_____. 1989. Biological criteria for the protection of aquatic life: Volume III.

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Reed, P. and R. Evans. 1981. Acute toxicity of chlorides, sulfates and total dissolved solids to some fishes in Illinois. Contract Report 283. State Water Survey Division, Peoria, IL.

US EPA. 1988. Ambient water quality criteria for Chloride - 1988. Office of Water. EPA 440/5-88-001, Washington, DC.

Table 1 **Fishes collected from the Middle Branch of the North Branch of the Chicago River on 14 July 1998.**

Species		Location d/s 001	Location d/s 002
Gizzard shad	Dorosoma cepedianum	-	6
Central mudminnow	Umbra limi	8	-
Goldfish	Carassius auratus	9	10
Fathead minnow	Pimephales promelas	2	1
Black bullhead	Ameiurus melas	6	9
Green sunfish	Lepomis cyanellus	2	15
Bluegill	Lepomis macrochirus	-	12
Black crappie	Pomoxis nigromaculatus	1	1
Largemouth bass	Micropterus salmoides	15	10

Table 2. Abundance of macroinvertebrates collected from the Middle Branch of the North Branch of the Chicago River on 14 July 1998.

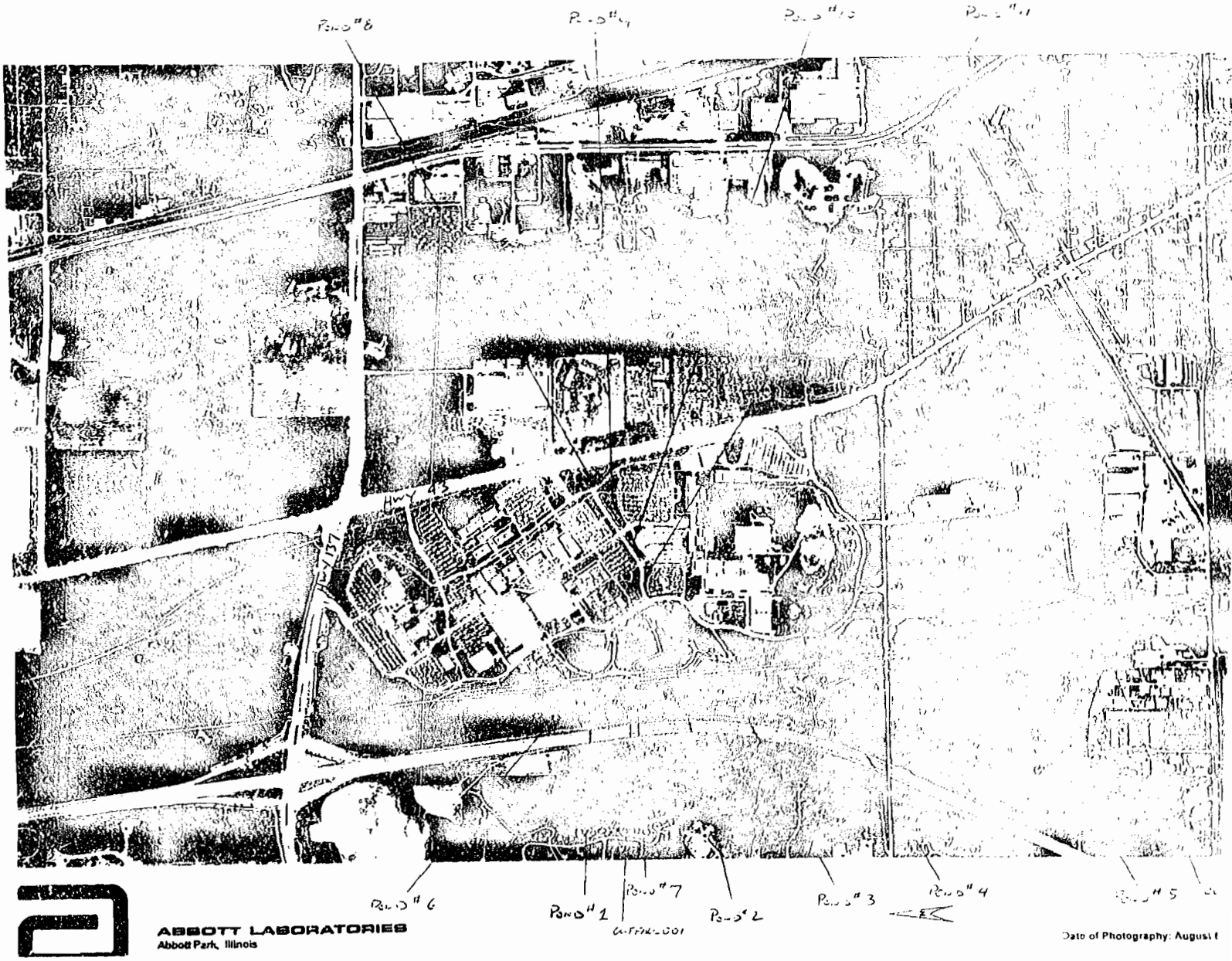
Species	Location 2	Location 3
TURBELLARIA		A*
ECTOPROCTA		U
ANNELIDA		
Oligochaeta		
Naididae	C	U
Tubificidae	A	A
Hirudinea		
Helobdella stagnalis	C	
Erpobdella punctata	C	U
Placobdella ornata		U
Helobdella sp.		U
CRUSTACEA		
Isopoda		
Caecidotea sp.	A	A
Amphipoda		
Cragonyx sp.	C	C
Decapoda		
Orconectes virilis	C	C
Procambarus acutus	U	U
INSECTA		
Ephemeroptera		
Caenis sp.		U
Odonata		
Coenagrionidae	C	
Anax junius	C	
Hemiptera		
Palmacorixa sp.	C	U
Belostoma sp.	U	
Coleoptera		
Peltodytes sexmaculatus	U	
Hydroporus sp.	C	U
Dubiraphia sp.		C
Enochrus sp.		U
Diptera		
Ceratopogonidae	U	
Chironomus sp.	U	U
Tanypus sp.	U	U
Polypedilum convictum	U	U
Cryptochironomus sp.	U	U

Table 2 (cont.)

	Location 2	Location 3
Clinotanypus sp.	C	
Polypedilum illinoense	U	U
Thienemannimyia grp.		U
Phaenopsectra sp.		U
Trichoptera		
Cheumatopsyche sp.	U	A
Hydropsyche depravata grp.		A
MOLLUSCA		
Gastropoda		
Physella sp.	A	
Menetus sp.	U	U
Helisoma sp.	A	U
Stagnicola sp.	A	
Ferrissia sp.		U
Pelecypoda		
Pisidium sp.	A	
Sphaerium spp.	U	A
Number of Taxa	28	29
	39	

* U = ≤2 individuals present
C = 3-9 individuals present
A = ≥10 individuals present

ATTACHMENT 1

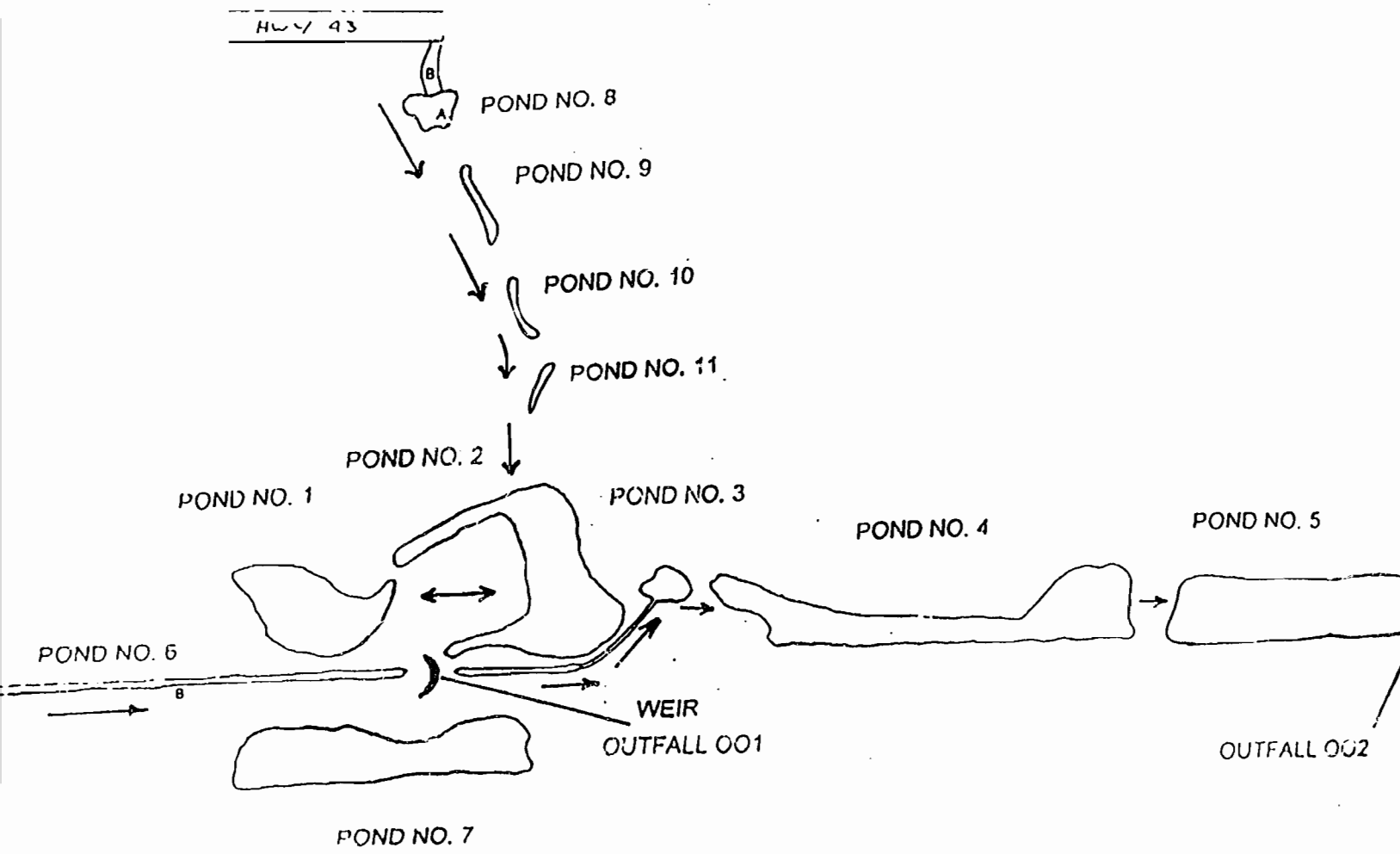


ABBOTT LABORATORIES
Abbott Park, Illinois

Date of Photography: August

ATTACHMENT 2

Abbott Park Pond Flow Diagram



Note: When Weir is Full Water Flows to Outfall 002

ATTACHMENT 3

Abbott Park Outfall 002 TDS and Chlorides Discharge Loadings

Month/Yr.	002 Discharge Flow (MGD)	TDS Concentrations (mg/l)	TDS Loading #/day	Chlorides Concentrations (mg/l)	Chlorides Loading #/day
	0.38	730	2313.516	274	868.3608
Jan-97	1.65	930	12797.73	420	5779.62
Feb-97	0.54	1000	4503.6	429	1932.0444
Mar-97	0.63	1200	6305.04	619	3252.3498
Apr-97	1.24	1200	12409.92	557	5760.2712
May-97	0.58	1100	5320.92	521	2520.1812
Jun-97	0.85	1000	7089	452	3204.228
Jul-97	0.77	1000	6421.8	415	2665.047
Aug-97	0.46	830	3184.212	273	1047.3372
Sep-97	0.31	670	1732.218	256	661.8624
Oct-97	0.57	650	3089.97	148	703.5624
Nov-97	0.66	630	3467.772	177	974.2788
Dec-97	1.42	670	7934.676	183	2167.2324
Jan-98	1.03	940	8074.788	605	5197.071
Feb-98	2.29	1000	19098.6	328	6264.3468
Mar-98	1.31	970	10597.638	345	3769.263
Apr-98	0.43	940	3371.028	283	1014.8946
May-98	1.06	800	7072.32	274	2422.2696
Jun-98	0.68	620	3516.144	149	845.0088
Jul-98	0.53	830	3668.766	196	866.3592
Aug-98	0.88	710	5210.832	205	1504.536
Sep-98	1.23	670	6872.994	137	1405.3734
Oct-98	1.46	480	5844.672	95	1156.758
Nov-98	0.72	500	3002.4	94	564.4512
Dec-98					
	Average		836.25	6370.86	
	Maximum		1200	19098.6	
				309.79	2356.11
				619	6264.34

ATTACHMENT 4

Abbott Park Pond Utility Discharge Source Inventory and Sampling Results

Item 1 was taken from city water analysis sampled in 1996 and February 3, 1998
Item 2 was taken from well water analysis sampled on December 4, 1997
Items 3 and 4 were sampled on January 21 and 30, 1998
Items 5 and 6 were sampled on January 21, 1998

Abbott Park Pond Process Discharges Inventory						Analytical Results	
Item Number	Discharge	Supply Source	Discharges to	Rate of Discharge	Type of Discharge	Total Dissolved Solids	Chlorides
						mg/1	mg/1
1	Non-Contact Cooling Water	City Water with no Additives	Pond 1	9800 gal/day	Continuous	180	12.7
2	Well Water	Continuous Bleed-off from Well Pumps	Pond 1	9000 gal/day	Continuous	502	12.53
3	Cooling Tower Blow Down at AP33	Well Water with Sodium Hypochlorite and Polymer with Molybdenum Marker	Pond 2	43,836 gal/day	Non Continuous	1,239	67
4	Cooling Water Blow Down at AP7	Well Water with Sodium Hypochlorite and Polymer with Molybdenum Marker	Pond 1	32,877 gal/day	Non Continuous	1,540	67**
5	RO/CDI Carbon Filter	Well Water	*	8,250 gal/day	Non Continuous	184	14.1
6	RO Reject Water	Well Water	Pond 1	20,294 gal/day	Continuous	640	40.9

*This source is discharged to the well water tanks for reuse in cooling tower blow down and lawn watering
**This reported value is from the analysis of a sample taken from the AP33 cooling tower blow down

ATTACHMENT 5

Abbott Park Pond Samples Data

Sample Location	Analytical Data (mg/l)					
	12/21/98 (Pre-Snow)		1/25/99 (Post Snow)		2/1/99 (Post Snow)	
	Chlorides	TDS	Chlorides	TDS	Chlorides	TDS
Pond 1	98.2	564	375	910	473	980
Pond 2	100	568	386	884	554	950
Pond 3	109	580	322	796	579	932
Pond 4	100	584	102	318	104	94
Pond 5	101	548	186	538	69.3	236
Pond 6	101	564				
Pond 8	166	490	1100	1980	787	1440
Pond 8 Inlet			1300	2340	987	1600
Pond 9	186	588				
Pond 10	214	626	882	1520	1160	1930
Pond 11	207	640				
Atkinson Road Upstream Location*	146	542	286	632	177	558
Upstream Location**			307	666	372	674
Route 176 Downstream Location***	137	562	267	704	254	686

* Upstream of Outfall 002
** Upstream of Outfall 001
*** About 2,000 feet downstream of Outfall 002

ATTACHMENT 6

Relative Runoff Contributions To Abbott Park Ponds

nth/Yr.	Rainfall Amt.	Abbott Park Imper Flow	Abbott Park Perv Flow	Total Abbott Park Flow	Hwy. 43 Flow	Total Runoff to Ponds	Average Utilities Flow	Runoff % of Tot. Pond Inflow	Average Pond Retention Period	Avg. Outfall 002 Monthly Flow
	(inches)	(MGD)	(MGD)	(MGD)	(MGD)	(MGD)	(MGD)	(%)	(Days)	(MG)
Jan-97	1.38	0.13	0.12	0.25	0.01	0.26	0.12	68.36	164	0.38
Feb-97	5.56	0.59	0.53	1.12	0.04	1.16	0.12	90.6	48.73	1.65
Mar-97	1.57	0.15	0.14	0.29	0.01	0.29	0.12	71.08	149.89	0.54
Apr-97	1.76	0.17	0.16	0.33	0.01	0.34	0.12	75.01	134.73	0.63
May-97	2.69	0.26	0.23	0.49	0.02	0.51	0.12	80.81	99.46	1.24
Jun-97	3.81	0.38	0.34	0.72	0.02	0.74	0.12	86.04	72.35	0.58
Jul-97	3.04	0.29	0.26	0.55	0.02	0.57	0.12	82.61	90	0.85
Aug-97	4.5	0.43	0.39	0.82	0.03	0.85	0.12	87.57	64.43	0.77
Sep-97	1.69	0.17	0.15	0.32	0.01	0.33	0.12	73.22	138.81	0.46
Oct-97	2.75	0.26	0.24	0.5	0.02	0.52	0.12	81.15	97.7	0.31
Nov-97	1.46	0.14	0.13	0.27	0.01	0.28	0.12	70.26	154.17	0.57
Dec-97	1.5	0.14	0.13	0.27	0.01	0.28	0.12	70.14	154.8	0.66
Jan-98	2.67	0.26	0.23	0.49	0.02	0.5	0.12	80.7	100.06	1.42
Feb-98	1.7	0.18	0.16	0.34	0.01	0.35	0.12	74.66	131.33	1.03
Mar-98	4.29	0.41	0.37	0.78	0.02	0.81	0.12	87.04	67.17	2.29
Apr-98	3.56	0.35	0.32	0.67	0.02	0.69	0.12	85.21	76.68	1.31
May-98	3.02	0.29	0.26	0.55	0.02	0.57	0.12	82.54	90.49	0.43
Jun-98	2.64	0.26	0.24	0.5	0.02	0.51	0.12	81.03	98.34	1.06
Jul-98	1.38	0.13	0.12	0.25	0.01	0.26	0.12	68.36	164	0.68
Aug-98	6.88	0.66	0.59	1.25	0.04	1.29	0.12	91.5	44.03	0.53
Sep-98	2.34	0.23	0.21	0.44	0.01	0.45	0.12	79.1	108.31	0.38
Oct-98	5.27	0.5	0.45	0.95	0.03	0.98	0.12	89.1	56.51	1.23
Nov-98	2	0.2	0.18	0.38	0.01	0.39	0.12	76.39	122.38	1.46
Dec-98	1.15	0.11	0.1	0.21	0.01	0.22	0.12	64.29	185.09	0.72
imum	1.15	0.11	0.1	0.21	0.01	0.22	0.12	64.29	44.03	0.31
imum	6.88	0.66	0.59	1.25	0.04	1.29	0.12	91.5	185.09	2.29
rage	2.86	0.28	0.25	0.53	0.02	0.55	0.12	78.99	108.89	0.9

ATTACHMENT 7

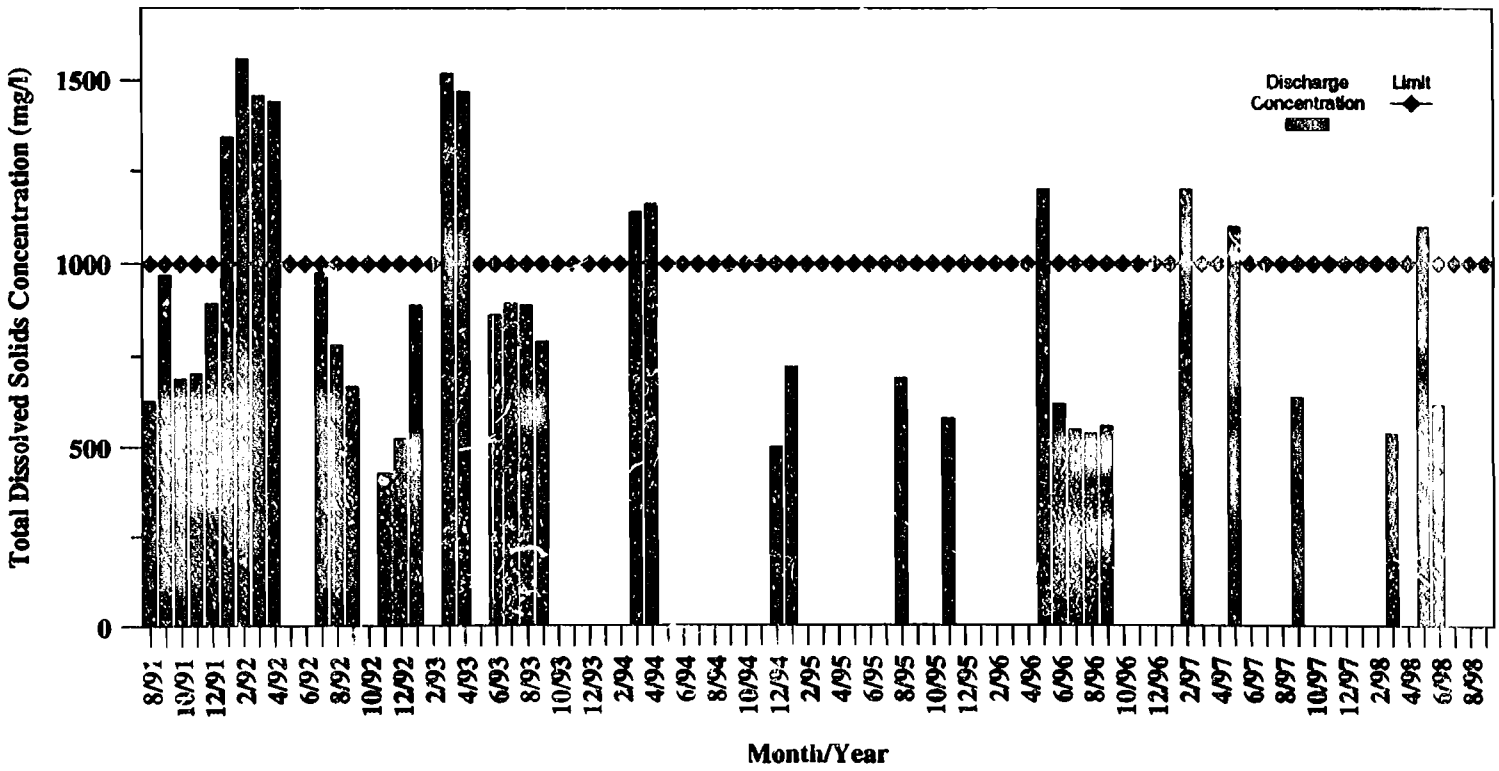
Utility TDS and Chlorides Average Loading Contributions

Waste stream	Discharge Rate (gal/day)	TDS Concentration (mg/l)	TDS Loading (#/day)	Chlorides Concentration (mg/l)	Chlorides Loading (#/day)
NC Cooling Wtr.	9800	180	14.71	12.7	1.04
Well Water	9000	502	37.68	12.5	0.94
AP 33 Cool Twr BD.	43836	1239	452.97	67	24.49
AP7 Cool Twr. BD.	32877	1540	422.26	67	18.37
RO/CDI Carbon Filt.	8250	184	12.66	14.1	0.97
RO Reject Water	20294	640	108.32	40.9	6.92
		Total Utilities	940.28		52.73
		Average Total AP Outfall 002 Loading*	6370.86		2356.11
		Runoff Loading Contribution**	5430.58		2303.38
		Utility Loading %	14.76		2.24

ee Attachment 3
Total loadings minus utilities loadings

ATTACHMENT 8

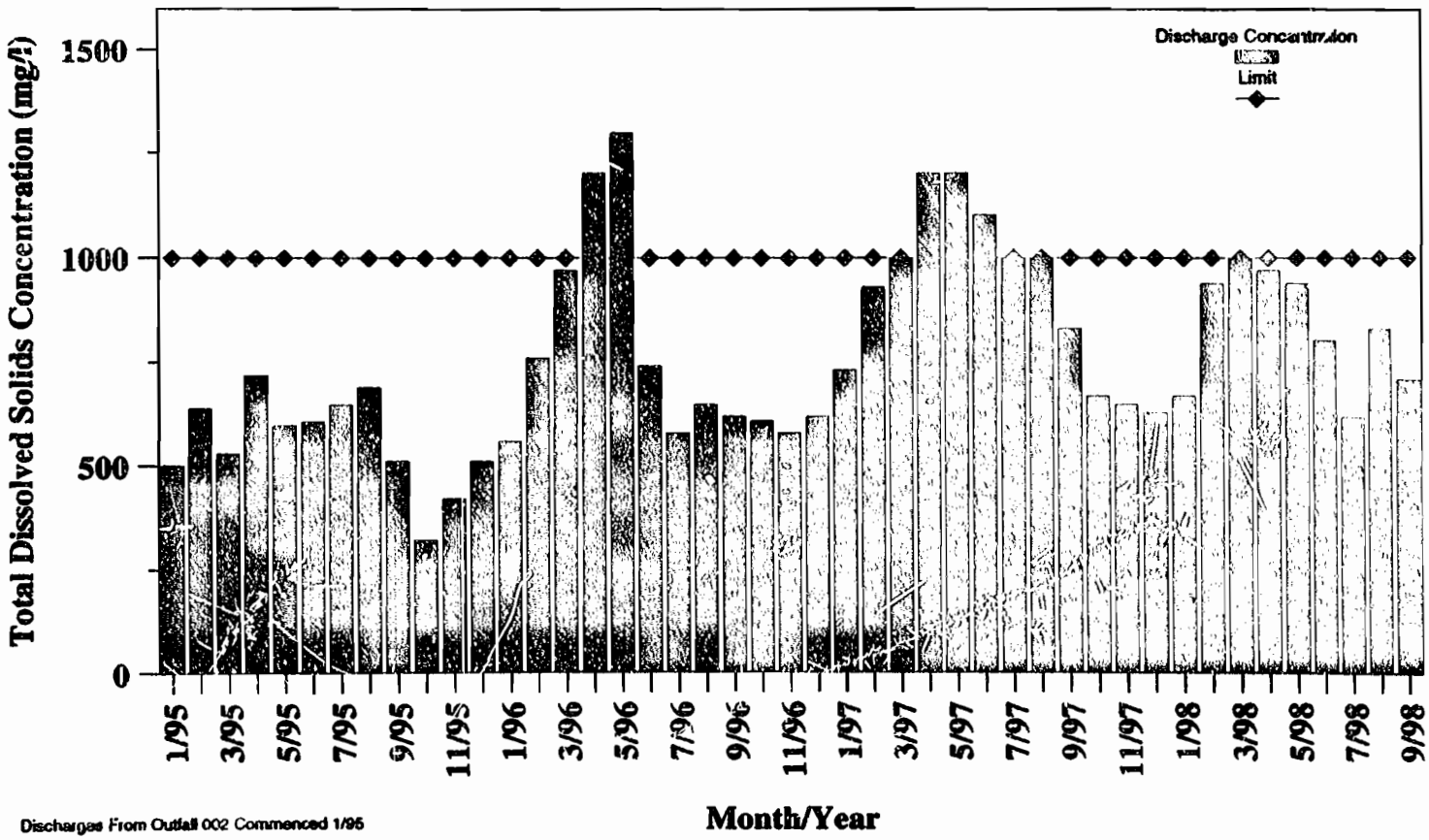
Abbott Park Outfall 001
Total Dissolved Solids Discharge monitoring Data



TDS Reporting Commenced 8/95
An Absence Of Data For A Given Month Indicates No Flow From The Outfall During That Month

ATTACHMENT 9

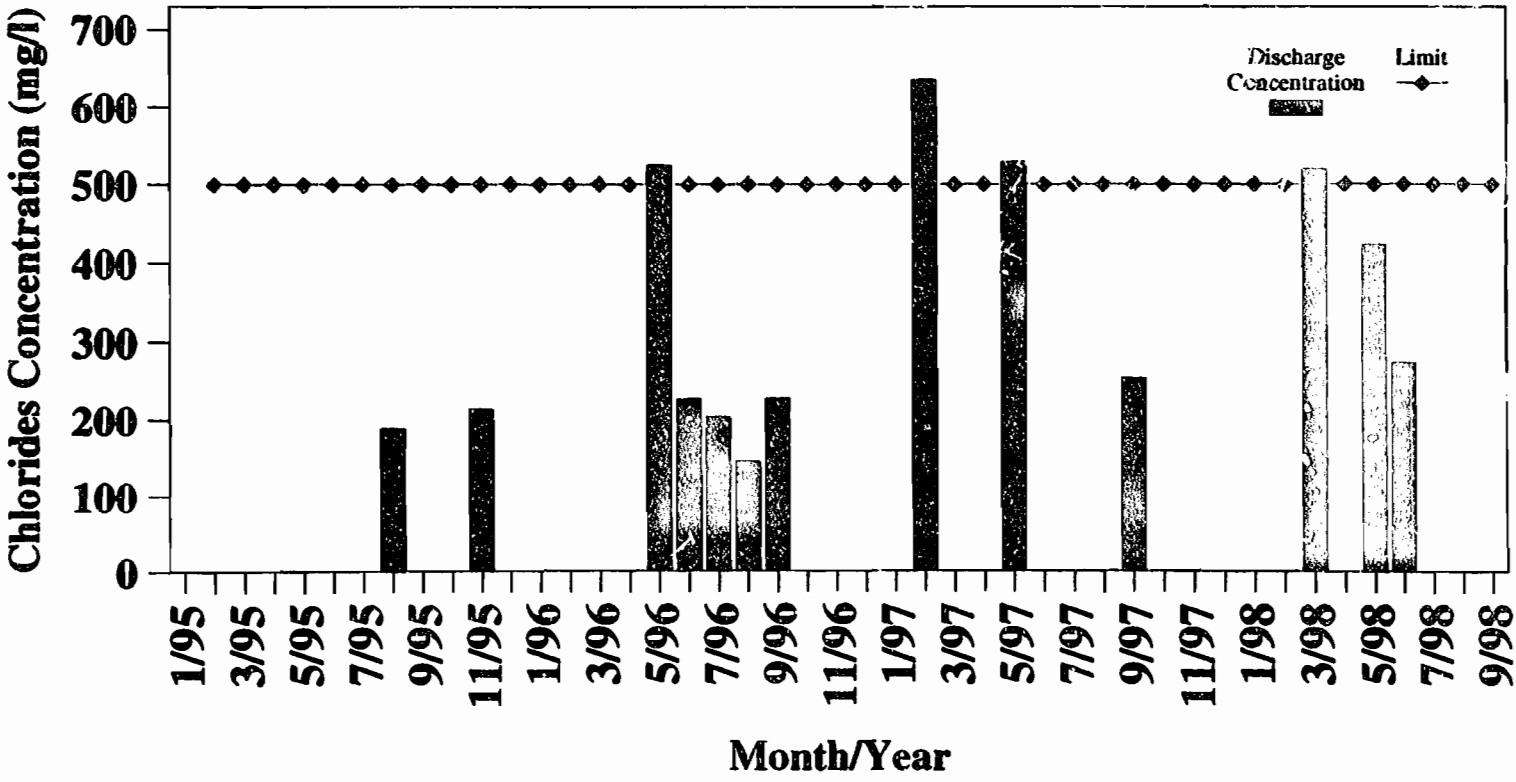
Abbott Park Outfall 002
Total Dissolved Solids Discharge Monitoring Data



Discharges From Outfall 002 Commenced 1/95

ATTACHMENT 10

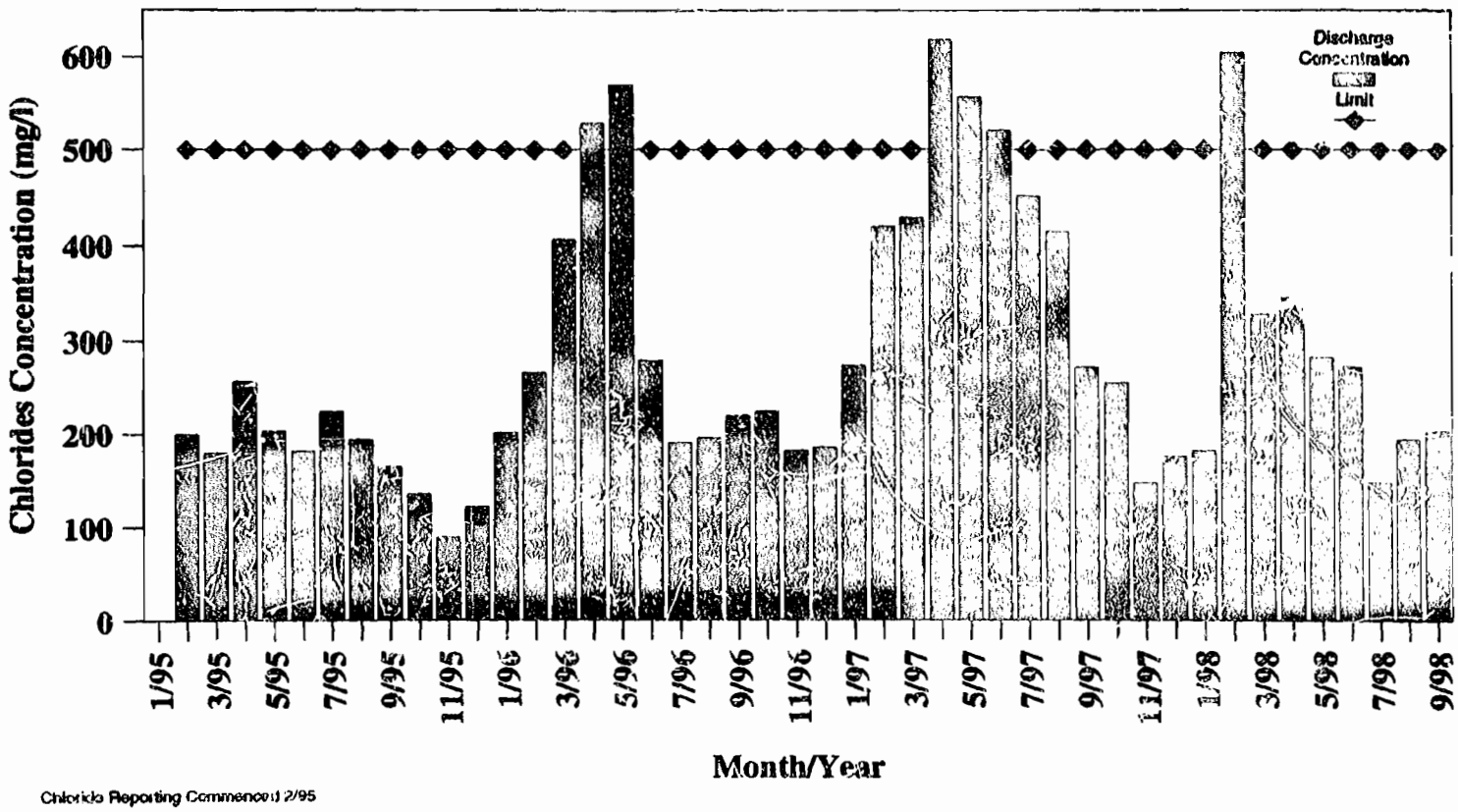
Abbott Park Outfall 001
Chlorides Discharge Monitoring Data



Chloride Reporting Commenced 2/95
An Absence Of Data For A Given Month Indicates No Flow From The Outfall During That Month

ATTACHMENT 11

Abbott Park Outfall 002
Chlorides Discharge Monitoring Data



Chloride Reporting Commenced 2/95