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The Fate of Organic Pollutants in a Wastewater Land Treatment System Using Lagoon Impoundment and Spray Irrigation

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Muskegon County Wastewater Management System
Muskegon, MI

September 1983

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THE FATE OF ORGANIC POLLUTANTS IN A WASTEWATER LAND TREATMENT SYSTEM USING LAGOON IMPOUNDMENT AND SPRAY IRRIGATION

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CR806873

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U.S. ENVIRONMENTAL PROTECTION AGENCY
ADA, OKLAHOMA 74820

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16. ABSTRACT Muskegon County Wastewater Management System (MCWMS) is one of the largest facilities of its kind treating on the average of 125 thousand cubic meters of wastewater by extended aeration, lagoon impoundment and spray irrigation. Over 70% of the influent originates from industrial sources including several organic chemical manufacturers. This study was undertaken to determine the fate of the organic compounds within the treatment system. The influent, which is comprised of about 150 organic chemicals at low μg/l to low mg/l concentrations, enter the system and is treated, initially, in the biological cells. Over 90% of the total organic compounds are removed from the water at this stage by volatilization, sedimentation into sludge and biological breakdown. Certain compounds preferentially settle in the sludge and are resistant to biodegradation. A few biodegradable compounds are also found in the sludge at less than 1 mg/kg. The water treated in this manner enters two storage lagoons (344 hectare each). Impoundment for approximately five months helps to further remove organics by further volatilization, sedimentation, biological breakdown and photodecomposition. The organic compounds surviving after this treatment are in most cases less than 1% of their influent concentrations. Spray irrigation of the lagoon impounded water, however, virtually removes all remaining organic matter. The draintiles which collect the soil percolated water show only sporadic low concentrations. In addition, after eight years of irrigation, the soils are almost free of organic compounds. The analysis of corn samples did not detect any uptake of man-made organics.

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FOREWORD

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The purpose of this project was to determine the fate of toxic organics in a slow rate land treatment system. The slow rate system was preceeded by both extended aeration and lagoon impoundment. Due to the pretreatment steps prior to land application a majority of the compounds were reduced to nondetectable levels in the liquid. The irrigated water after percolation through the soil profile was found to contain sporatic low concentration of organics. There was no significant accumulation of organic compounds in the soils after seven years of application nor contamination of the corn crop grown. The results of this project have further encouraged the use of natural systems for wastewater treatment.

Clinton W. Hall

Clinton W. Hall, Director
Robert S. Kerr Environmental Research
Laboratory

ABSTRACT

Muskegon County Wastewater Management System (MCWMS) is one of the largest facilities of its kind treating on the average of 125 thousand cubic meters of wastewater by extended aeration, lagoon impoundment and spray irrigation. Over 70% of the influent originates from industrial sources including several organic chemical manufacturers. This study was undertaken to determine the fate of the organic compounds within the treatment system. The influent, which comprises of about 150 organic chemicals at low ug/l to low mg/l concentrations, enter the system and is treated, initially, in the biological cells. Over 90% of the total organic compounds are removed from the water at this stage by volatilization, sedimentation into sludge and biological breakdown. Compounds preferentially settling in the sludge are 3,3'-dichlorobenzidine, 2-chloroaniline, alkyl benzenes and 2,4'-diamino-3,3'-dichlorobiphenyl at average concentrations ranging from 26 to 44 mg/kg. These compounds are resistant to biodegradation. A few biodegradable compounds like phenanthrene and naphthalene are also found in the sludge at less than 1 mg/kg, possibly due to their affinity to the oils and greases commonly found in the sludge. The water treated in this manner enters two storage lagoons (344 hectare each). Impoundment for approximately five months helps to further remove organics by volatilization, sedimentation, biological breakdown and photodecomposition. The organic compounds surviving after this treatment are in most cases less than 1% of their influent concentra-

tions. The compounds 2,2'-dichloroazobenzene and diethoxychlorobenzene, however, do not readily volatilize, are not biodegradable and do not accumulate in the sludge and thus appear to elude treatment during the initial two steps. Spray irrigation of the lagoon impounded water, however, virtually removes all remaining organic matter. The draintiles which collect the soil percolated water show only sporadic low concentrations (1 μg/l) of chloroform, 1,2-dichloroethane and phthalate esters.

In addition, after eight years of irrigation, the soils are almost free of organic compounds except for 2,2'-dichloroazobenzene and phthalates detected in some fields. The analysis of corn samples did not detect any uptake of man-made organics.

The discharges, except for occasional (μg/l) levels of some organics, have been clean. Isolated incidences are apparently due to lagoon seepage, which also contributes to the discharge. Minimization at the industrial source has kept the levels of contamination in the lagoon seepage under control.

This report was submitted in fulfillment of Cooperative Agreement CR806873 by Muskegon County Wastewater Management System and Department of Public Works under the sponsorship of the U.S. Environmental Protection Agency. This report cover the period May 1, 1979 to November 30, 1981, and work was completed as of September 1982.

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To the Muskegon County Board of Public Works for their continued dedication to the goals of a cleaner environment as demonstrated by their committment to the land treatment concept and their financial support for further research.

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SECTION 1

INTRODUCTION

The Muskegon County Wastewater Management System began operation in 1973 as a regional land treatment system for Muskegon County, Michigan. The system is currently the largest land treatment works in the United States and consists of a regional collection network, treatment facility, and farm operation designed for reclamation of the nutrient value of the wastewater for agricultural irrigation and ultimate renovation of polluted waters to produce a high quality effluent. Decades of industrial and municipal pollution of the lakes in Muskegon County by the discharge of wastewater have created an adverse situation in terms of resource management, economic development, and overall quality of life in the County. Faced with these problems, the County evaluated numerous alternatives for wastewater treatment and finally chose an innovative, regional, land treatment system as the solution for its water quality problems. The treatment system first operates by collection of regional municipal, industrial wastewater and its transportation to an inland, treatment works. All wastewater was previously discharged directly or indirectly to river and lake systems within the County. After collection, the wastewater is treated by aeration and impoundment before being used as water for agricultural irrigation. The soil acts as a "living filter" for purifiing the treated water, while the nutrient value is reclaimed by crops in the largest farming operation in the County. With this system, a very high quality effluent is produced. In addition, the sale of crops from farming operations provides a significant revenue source for the system to offset operational costs, thereby reducing the ultimate cost for treatment to the users.

Numerous research efforts by the United States Environmental Protection Agency, the University of Michigan, Michigan State University, the Michigan Department of Natural Resources, and the County of Muskegon have examined the effects of the land treatment system on the site and also the impact on the entire region. These studies have been limited in scope to classical parameters such as nutrients and trace metals in the study of lake and stream water quality, water-soil-crop interactions, and treatment efficiency. All studies to date have shown the treatment system is providing high quality, cost effective wastewater treatment to the area*, while at the same time, creating an acceptable environment for recreational usage and industrial development of the natural resources in the County.

Within the last decade, considerable emphasis on a national level concerning toxic wastes and their effect on the environment has created renewed interest in the Muskegon System. Over 60% of the influent to the treatment work originates from sources typically industrial from pulp and paper, chemical, and general manufacturing operations in the County. The Robert S. Kerr Environmental Research Laboratory in 1977 conducted a preliminary survey of toxic pollutants in the System and identified 56 chemicals, including priority pollutants in the influent to the treatment works (1). This information promoted this present investigation to study the fate of

* The 1982 User's fee for operation and maintenance is 25.4 cents/1,000 gallons and the debt retirement was an additional 4.5 cents/1,000 gallons.

these and other organic chemicals in the Muskegon System. The objectives of this study are as follows:

1) The qualitative and quantitative identification of the organic chemicals that enter the system.

2) Defining the variability of organic chemicals in the treatment works over a two year period with emphasis on seasonal cycles and treatment unit processes.

3) Determine the ultimate fate of organic chemicals in the System and defining any potential environmental impact.

4) Suggest improvements in wastewater pretreatment, design criteria and operational modes in land application sites which are effective in treating various organic chemicals.

The information from the study will be used to not only document the efficiency of land treatment for hazardous waste management, but also for local industrial regulatory programs and the ultimate management of the treatment system. The results of this study can also have a dramatic impact on local industries by saving major capital investments and continued O&M costs for maintaining elaborate pretreatment systems if the land application system is effective in removing organic pollutants.

SECTION 2

SUMMARY AND CONCLUSIONS

The results of the study show that the Muskegon County Wastewater Management System is very effective in treating a variety of chemicals and industrial wastes by utilizing extended aeration, lagoon impoundment, and spray irrigation. Almost 150 chemicals have been identified in the plant influent and traced through the various treatment processes. Volatile solvent concentrations in the influent range from low mg/l levels to trace (1-50 µg/l) amounts of phenols, amines, and aromatic hydrocarbons.

Extended aeration removes over 90% of most of these chemicals by volatilization, sedimentation into the sludge and biological breakdown. The concentrations increase from low µg/l influent levels to mid range mg/l levels in the sludge for 3,3'-dichlorobenzidine, 2-chloroaniline, alkyl benzenes, and 2,4'-diamino-3,3'-dichlorobiphenyl. Lagoon impoundment of aeration cell effluent further removes the organic chemicals by additional volatilization, metabolism, sedimentation, and photo oxidation. Due to the pretreatment steps prior to irrigation, a majority of the influent chemicals have been reduced to non-detectable levels in the liquid, with 99%+ removal of the remaining residuals.

The irrigated water, when percolated through the soil profile and collected as drain tile effluent is found to contain sporatic low concentration (1 µg/l) levels of chloroform, 1,2-dichloroethane, and phthalate esters. These chemicals are not detected in the actual discharge waters (NPDES #001 and #002). In addition, the soils do not exhibit any significant accumulation of organic chemicals after seven years of irrigation activities nor has any contamination been detected in the corn crop.

Two chemicals, 2-chloroaniline and 1,2-dichloroethane have been detected in the lagoon seepage waters. The levels have significantly declined during the study period and average 2 µg/l in recent samples. Because these chemicals are related to past and present storage lagoon concentrations, it becomes imperative to manage the levels in the lagoons and influent concentrations to minimize survival of chemicals in the seepage waters. Since both chemicals are removed by more than 98% by extended aeration and impoundment, then by minimizing at the industrial source, the discharge in the seepage waters can be eliminated. Since this research has commenced, and with the help of its findings, the County has passed an amendment to its sewer use ordinance minimizing certain toxic compound discharges into the system. The impact of this minimization requirement or "pretreatment" on local industry has been very slight with only two industries affected. Of these two industries one had to reduce the loading of a single compound while the second required more extensive pretreatment due to a State DNR litigation agreement.

The feasibility of sludge application is also investigated as part of this study. This phase is currently under investigation with results expected in a later report. In order to minimize any long-term effects from continued application of sludges containing organic chemicals, compound accumulating in the sludge also need to be controlled at the industrial sources.

SECTION 3

RECOMMENDATIONS

The County has identified two areas from the study that require management changes to maintain the integrity of the treatment works and decrease the possibility of environmental discharge of chemicals. These areas are lagoon seepage and sludge concentration. The lagoon seepage question is two-fold, first, as it relates to the interception ditches, and second, the northwest corner of the storage lagoons.

In February 1981, the County issued management guidelines, limiting the discharge of organic chemicals by industrial users to the system. Utilizing the extensive data base of industrial loadings and treatment performance data collected by the County laboratory during the study period, limits were established for chemicals that persist by concentrating in the sludge or that survive treatment and thus have a potential for discharge to the environment. The limits will be effective January 31, 1982 and should insure future operation without lagoon seepage or sludge disposal questions being raised. In addition, if monitoring indicates any significant trends which suggest that present limits need to be revised or new compounds need to be controlled, the necessary action will be taken by the County through the powers outlined in the Amendments to Exhibit D (County Wastewater Ordinance).

Lagoon seepage in the northwest corner of the storage lagoon system will be examined in the 201 Facilities Expansion Plan hydrogeological study. When the groundwater dynamics of this area are defined, management strategies will be developed to control or contain any migration from the storage lagoons. In examination of the sludge accumulation question, results of lysimeter sludge application studies indicate that the organic chemicals in the sludge will not leach through the soil column and that they will undergo some biodegradation. A small field pilot study is being proposed for spring of 1982. If results are favorable, the sludge may be land applied on a larger scale. In order to prevent any future questions from arising concerning sludge management, chemicals accumulating in the sludge will be limited as part of the industrial effluent guidelines. These limits are again subject to the results of future monitoring programs by the County.

The studies that were undertaken at Muskegon will help understand the behavior of many of the man-made organics at treatment facilities employing extended aeration, lagoon impoundment and spray irrigation. Other than volatilization, the two major removal mechanisms include detoxification by bacteria and photo-oxidation by solar radiation. The mechanism of bacterial action should be investigated further with a goal of isolating the working bacteria.

SECTION 4

DESIGN FEATURES OF THE WASTEWATER SYSTEM

The Muskegon County Wastewater Management System employs extended aeration, lagoon impoundment, and spray irrigation to treat an average of 33 million gallons per day (MGD), 125 thousand cubic meters per day (TCMD) of municipal and industrial wastewater. The System operates as a regional treatment facility, serving 13 municipalities and over 23 major industries (including six chemical-related industries). Over 70% of the incoming wastewater can be attributed to industrial discharge.

The System is located on 11,000 acres (4,455 hectares) of sandy, unproductive land in the northeast corner of Muskegon County. Wastewater is collected by six pumping stations and delivered to a central pumping station with a maximum capacity of 56,000 gallons per minute (212 cubic meters/minute). The combined wastewater is pumped through approximately 11 miles (17.2 kilometers) of reinforced concrete pipe (a 66-inch diameter force main) to the Wastewater System.

Initial treatment of the wastewater is first provided by three extended aeration cells. Each cell has a surface area of eight acres (3.24 hectares) and a holding capacity of 42 MG (159 thousand cubic meters). The cells are lined with soil-cement and contain 12 mechanical floating aerators and six stationary platform mixers, with a total combined horsepower of 1020. Operation of the extended aeration cells typically involves utilizing two cells in series with a holding time of 2.5 days. The remaining cell is left empty to accomodate future flows or, as an emergency treatment basin, to isolate wastewater if an industrial spill of hazardous waste materials occurs. In the cells, biological oxidation takes place, along with some sedimentation of suspended solids and anaerobic digestion of the bottom material. BOD_5 removals for 1980 averaged 68% while suspended solids removed averaged 48%. After aeration, the treated wastewater passes down a concrete spillway to the storage lagoon system. The Wastewater System utilizes two, 850-acre (344 hectares) lagoons with a total combined storage capacity of 5.1 billion gallons (19.3 million cubic meters). The lagoons are encircled by 15 feet (4.6 meters) high dikes with 200 feet (61 meters) as their base width. A 400 ft (122 meters) wide border strip of the lagoon is lined with 8 inches (20 centimeters) of compacted clay, with the remaining bottom area left as native soil. The dike, together with clay border strips, provides 600 ft of filtration for the seepage water. This water is then collected by an interception ditch system surrounding the lagoons. Interception ditch water may then be pumped back into the storage lagoons, or if NPDES water quality criteria are met, it may be discharged to receiving streams. The lagoon system provides further treatment of the wastewater by sedimentation of solids, and biological treatment by aerobic oxidation in the warmer months, and anaerobic metabolism under ice cover. In addition, photochemical reactions can take place to degrade organic chemicals and to cause die-off of bacterial agents. Examination of overall treatment efficiency at this point reveals about 95% of the BOD_5 and 93% of the suspended solids are removed by lagoon impoundment and extended aeration.

The storage lagoons are operated by alternately filling each lagoon in the winter months. During irrigation season, the lagoon with the highest water quality (the one currently not being filled) is discharged into an outlet lagoon with about 14 acres surface area (5.67 hectares). The outlet structure is constructed similar to the aeration cells, with a depth of 12 feet (3.66 meters). This water is then discharged into two ditches which feed the irrigation pumping stations. The lagoons may be operated in series, in parallel, or alternately filled during irrigation season. The lagoons have a winter storage capacity to impound five months influent flow at 42 MGD (159 TCMD). The spray irrigation part of the treatment system is carried out on 5,500 acres (2,327 hectares) of specially-drained farm land. Irrigation volume is related to the capacity of the soil to act as a filter for the water. About 85% of the soil types on the project fall into the categories of Rubicon, Roscommon, and Au Gres sand, all of which are well drained. The remaining soils are clays (Granby and Nester-Tonkey) which are poorly drained. Water is applied to the land by 54 center-pivot irrigation rigs at a rate of 2.5-4 inches (6.4-10.2 cm) per week. The rigs move in a circular path with a radii of 730 to 1,350 feet (223-411 meters) and make one revolution in one to seven days. End spray guns are used in many of the rigs to expand the irrigation area. Water is supplied to the irrigation system by two large pumping stations. The north station has ten 250 horsepower (188 KW) pumps while the south station has four 100 horsepower (75 KW) and seven 250 horsepower (188 KW) pumps. The irrigation fields are drained by an elaborate network of perforated nylon-socked tiles and a series of collection ditches. The drainage network consists of 70 miles (114 kilometers) of drain tile, 19 miles (31 kilometers) of drain pipe, and 10 miles (16 kilometers) of ditches. This system acts to control the groundwater table, direct water flow, and to recollect the renovated water and thus preventing water logging of the land.

Because all irrigated water is intercepted by the drain tiles, the Wastewater System does not operate as a discharge to groundwater, thus protecting usable aquifiers from potential contamination. Over 300 monitoring wells have been installed to ensure the protection of groundwater quality and to study the efficiency of irrigation operations.

Corn is grown in the irrigation fields as both a cash crop and a source for removal of nutrients. The crop, along with the adsorption capacity of the soil, acts to remove nutrients as fertilizer. In addition, the soil acts as a media for bacterial degradation of organic chemicals, which results in a reduction in BOD_5. This phase of the treatment cycle acts as a final polish to renovate the quality of the wastewater and to reclaim the nutrients as a usable fertilizer. Considering the sandy soils discussed earlier, the land, in its original state, would be highly unproductive for farming operations. With irrigation, however, the System continues to yield 50+ bushels per acre, 43.5 hectoliters per hectare (near the County average for productive farm land) of corn. This amounts to about one million dollars of revenue from the sale of the crop, which can be applied to reduce operational costs.

The collected water from the drain tiles and lagoon seepage is then discharged to the north via an outfall to Mosquito Creek. Water from the fields on the southern part of the project is discharged to Black Creek. These streams flow eventually to Lake Michigan through inland lakes. The project has operated since May, 1973, and has continuously produced a high quality effluent. Average water quality parameters for 1980 are given in Table 1.

TABLE 1. TREATMENT PERFORMANCE 1980

	Influent (mg/l)	North Outfall 001 Effluent (mg/l)
BOD_5	242	2.6
Suspended Solids	245	6.5
Total Phosphorus (P)	2.14	0.11
Ammonia (N)	7.68	0.96

The high level of BOD_5 and total phosphorus removal was provided at a cost to the users of $254 per million gallons. A more detailed discussion of the treatment facility and its operation was presented in several earlier progress reports (2 & 3).

SECTION 5

SAMPLING

Locations and Frequency

Two separate sampling regimes were employed during the study. The first year of the study, December 1, 1979-November 30, 1980, was designed to provide intensive data concerning treatment performance and to identify any potential problem areas. The second year program, December 1, 1980-November 30, 1981, was designed to continue treatment performance monitoring, and also to study soil accumulation and lagoon seepage in a detailed manner.

Sampling stations, sample type, and frequency for the first year are given in Table 2. Similar information for the second year is given in Table 3. Figure 1 shows the location of the various sampling stations monitored during the study. Figure 2 gives the location of the additional lagoon seepage monitoring wells on the dike walls. These wells were added for the special lagoon seepage study.

Collection and Preservation

All water samples collected as two-week composites were taken as daily, 300 ml grab samples in a solvent-rinsed BOD bottle, dried at 100°C for six hours prior to use. The sample was then split into two portions: 1) 40 ml aliquot stored in a teflon-faced, screw-capped glass vial for volatile analysis, and 2) 260 ml aliquot stored in a one-gallon amber glass bottle for semi-volatile analysis. All volatile analysis samples were stored in separate glass vials

TABLE 2
DECEMBER 1979 - NOVEMBER 1980
SAMPLING PROGRAM

Station	Sample Type	Frequency
Influent	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Spillway (biological treatment effluent)	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
South Interception Ditch (NPDES #000)	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Drain Tile Discharge #11	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Drain Tile Discharge #19	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Drain Tile Discharge #48	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
North Outfall, SW-05 (NPDES #001)	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
South Outfall, SW-34 (NPDES #002)	2-Week Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Outlet Lagoon	2-Week Composite	Bimonthly during irrigation
East Storage Lagoon	4-Point Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
West Storage Lagoon	4-Point Composite	Monthly, 12-79 through 4-80; then biweekly 5-80 - 11-80
Aeration Cell #2 Sludge	Grab	Bimonthly 6-80 through 11-80
East Storage Lagoon Sludge	Grab	Bimonthly 6-80 through 11-80

TABLE 2
DECEMBER 1979 - NOVEMBER 1980
SAMPLING PROGRAM
(CONTINUED)

Station		Sample Type	Frequency
West Storage Lagoon Sludge		Grab	Biweekly 6-80 to 11-80
Wells:	USGS2-6, LS-34C2, LS-34C3, LS-33B2, LS-31B2, 17A, LS-1B2, LS-2B2, LS-3B2, LS-4B2, LS-5B2, LS-6B2	Grab	2 Wells per month on a rotating schedule
Soils:	Circle 11, 19, and 48	Composite as 0' - 1', 1'-2', & 2'-3' intervals	Annual
Corn:	6 Circles on project plus 3 controls off project	Composite	Annual

TABLE 3
DECEMBER 1980 - NOVEMBER 1981
SAMPLING PROGRAM

Station	Sample Type	Frequency
Influent	2-Week Composite	Monthly
Spillway	2-Week Composite	Monthly
South Interception Ditch	2-Week Composite	Monthly
North Interception Ditch	2-Week Composite	Monthly
Drain Tile #11	2-Week Composite	Monthly
Drain Tile #19	2-Week Composite	Monthly
Drain Tile #48	2-Week Composite	Monthly
North Outfall	2-Week Composite	Monthly
South Outfall	2-Week Composite	Monthly
East Storage Lagoon	4-Point Composite	Monthly
West Storage Lagoon	4-Point Composite	Monthly
Outlet Lagoon	2-Week Composite	Monthly during irrigation
Aeration Cell #2 Sludge	Grab	Quarterly
East Storage Lagoon Sludge	Grab	Quarterly

Table 3
DECEMBER 1980 - NOVEMBER 1981
SAMPLING PROGRAM
(CONTINUED)

Station	Sample Type	Frequency
West Storage Lagoon Sludge	Grab	Quarterly
Wells: (See Table 1)	Grab	1 well/month on a rotating schedule
Soils: Circle 11, 19, 48	Composite at 0'-1', 1'-2', & 2'-3' intervals	Irrigation
Corn: 3 Circles on project plus 3 controls off project	Composite	Annual
Special Lagoon Seepage Wells:		
A1-3, B1-3, C1-3, D1-3, 1-6B2, 34C2	Grab	Monthly 6-81 to 11-81
Air Samples: Cell II	Composite	Daily for 2 Weeks

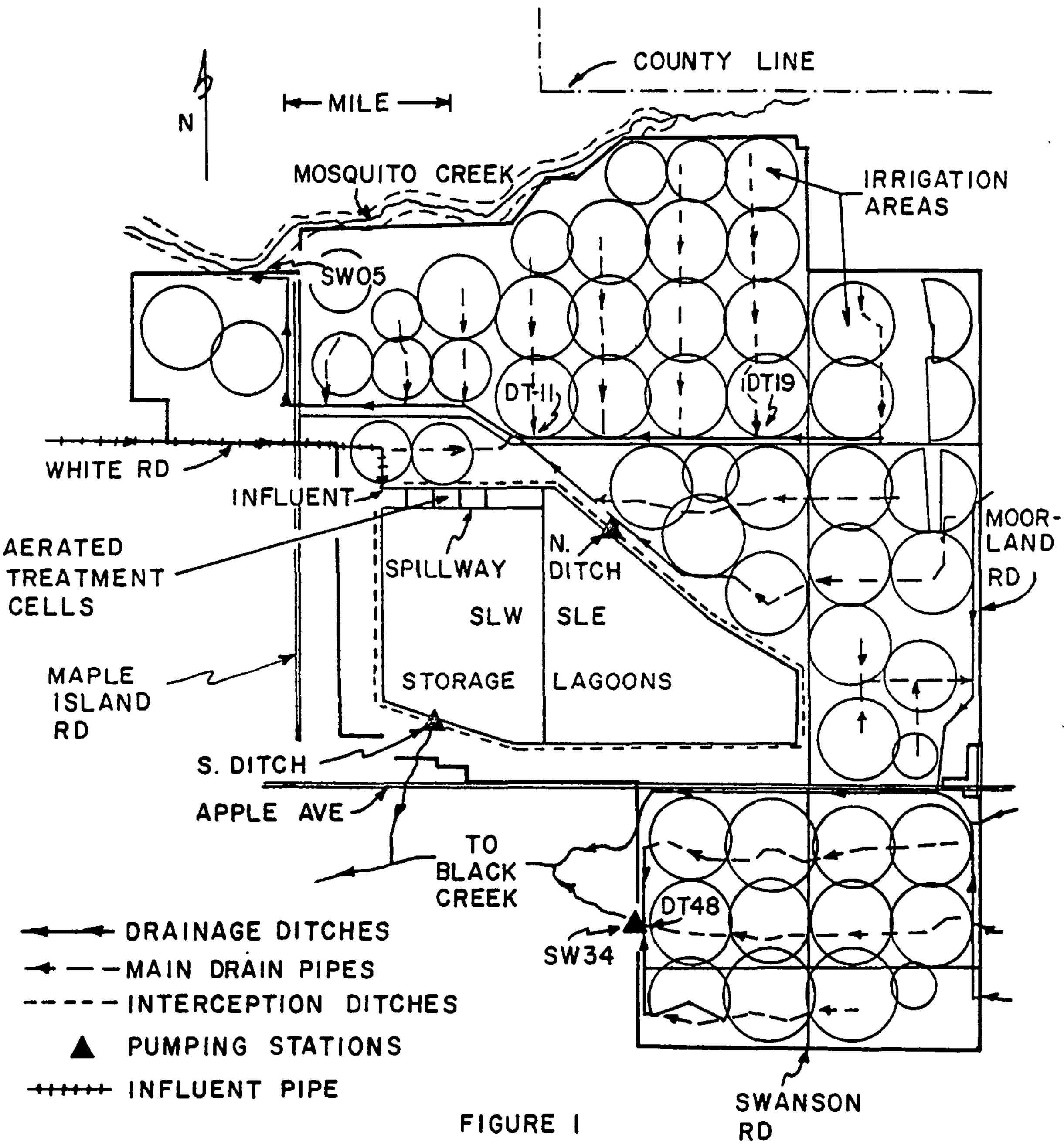

FIGURE I

SAMPLING LOCATIONS

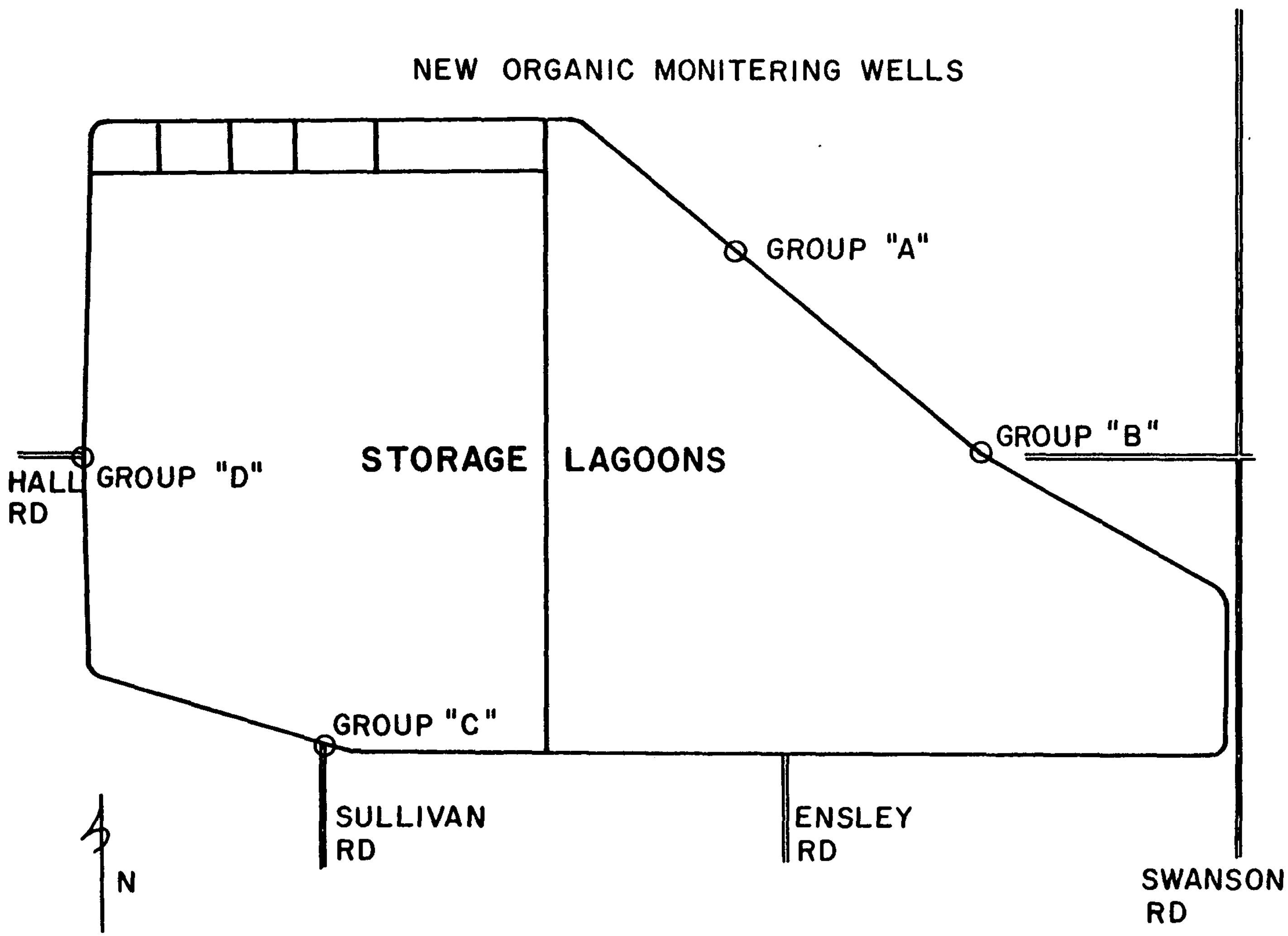
NEW ORGANIC MONITERING WELLS
GROUP "A"
GROUP "B"
STORAGE
LAGOONS
HALL
RD
GROUP "D"
GROUP "C"
N
SULLIVAN
RD
ENSLEY
RD
SWANSON
RD

FIGURE 2

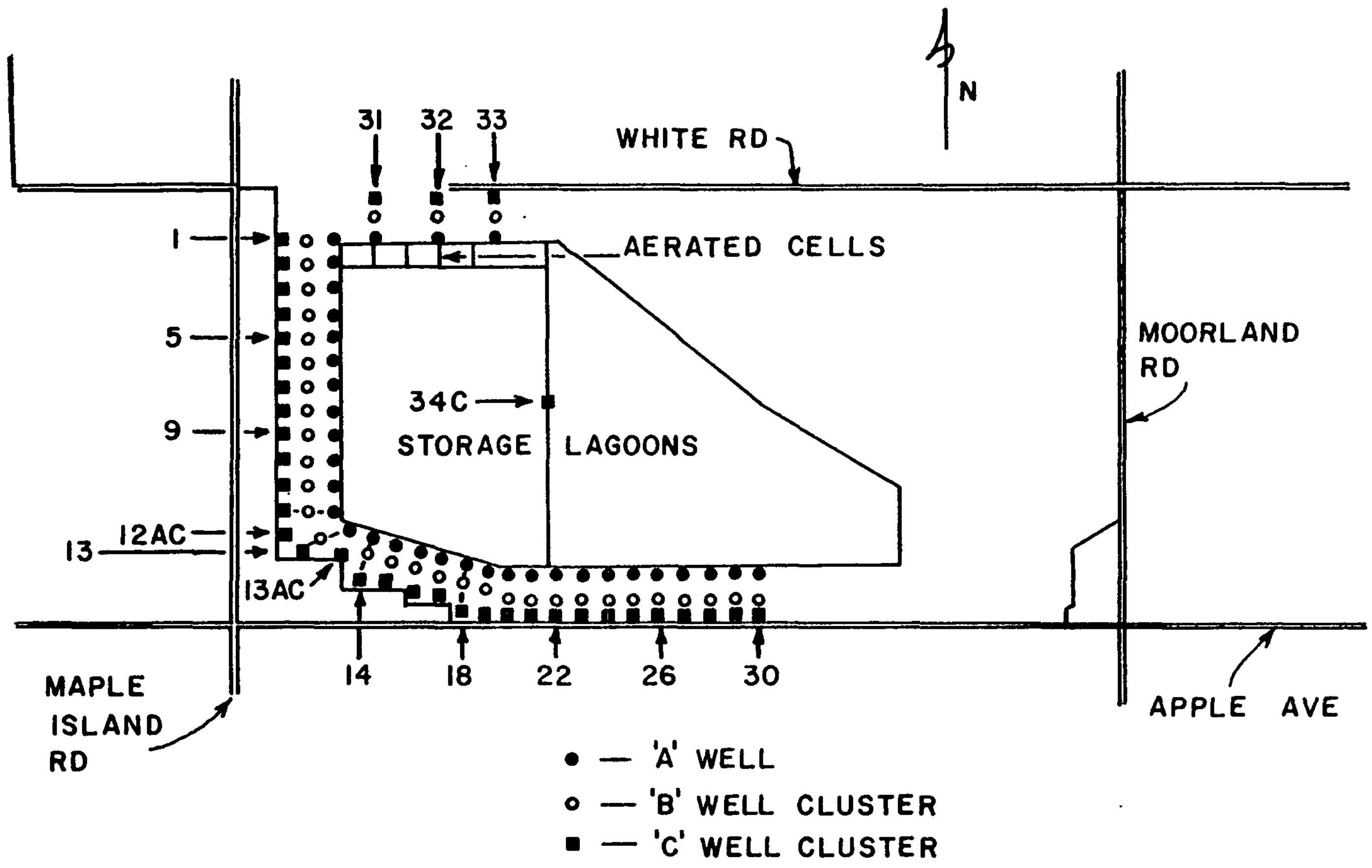

FIGURE 3 – LAGOON SEEPAGE WELLS

for each day. Semi-volatile analysis samples were composited daily into the same bottle by station. Storage lagoon samples were collected by compositing four 500 ml samples, taken at the middle of each dike wall in a gallon amber glass bottle. A volatile sample was taken at each station also. Well samples were collected by either bailing the well with a galvanized bailer, or by pumping with Aquamaster 3 HP model 5306 centrifugal pumps. Upon collection, the samples were transferred to a one-gallon amber glass bottle and a 40-ml teflon-faced, screw-capped vial for each station. All water samples were stored at 4°C prior to analysis.

Sludge samples were collected using a ponar dredge and stored in glass jars with teflon liners. Study samples were stored at 4°C prior to analysis.

Soil samples were collected using a metal coring device. Ten locations in each circle were cored and composited into one sample. The soil was transferred to a glass jar with a teflon liner and stored at 4°C prior to analysis.

Corn samples were collected as dried grain ($\approx$15% moisture) and stored in glass jars with teflon caps. The corn was stored at 4°C prior to analysis.

SECTION 6

RESULTS AND DISCUSSION

Results for the sampling period December 1, 1979 to November 30, 1981 are presented in Appendix A. Results are grouped according to month. Compounds not reported are non-detectable at the detection limits listed in the Methods section. Quality control data is given in Appendix B. All the analytical procedures were adapted from EPA protocol. A complete description of these is in Appendix D.

The results presented detail the systems performance during an 18-month period. The following cycles are studied:

Storage	12-79 to 4-80
Irrigation	5-80 to 11-80
Storage	12-80 to 4-81
Irrigation	4-81 to 11-81

Each phase of the system (influent composition, extended aeration treatment, long term impoundment, sludge application irrigation, discharges and wells) will be discussed in terms of chemical composition, treatment efficiency, and general environmental impact. Lagoon seepage is also discussed in detail as this area is subject to intensive study during the second year. The data not only shows the effects of present loadings, but also historical contributions. This is especially true for soil, sludge, and lagoon seepage data. Because the historical component cannot be quantified, interpretations and conclusions drawn from present data may be changed if future observation results in new information.

A section concerning quality control data is also included. The first five months of the study contain a large portion of quality control analyses to establish the validity of the data and to aid in the interpretation of the results. Utilizing a series of spiked and duplicate samples, the recovery and precision of the results are defined according to the various sample matrices.

Influent Composition

The influent data collected over the study period shows a complex mixture of chemicals entering the wastewater system. Chemical types include chlorinated and aromatic solvents, aromatic amines, chlorinated benzenes, polynuclear aromatic hydrocarbons, sulfides and phenols. The wide variation in loadings and compound types can be attributed to the diversity of industry utilizing the metro system (6 chemical, 1 pulp and paper, 20+ manufacturing) and their production campaigns. A review of industrial monitoring data collected to date indicates the grouping of chemicals and industrial sources shown in Table 4.

TABLE 4. INDUSTRIAL SOURCES OF CHEMICALS

Industrial Category	Chemical
Pulp and Paper	Sulfides, Halomethanes, Chlorinated Phenols (di & tri-chloro), Substituted Phenols (Vanillin, etc.), Substituted Naphthalenes and Benzenes
Chemical	Aromatic Amines, Solvents, Substituted Phenols, Chlorinated Benzenes, Naphthalenes, Substituted Benzenes
Manufacturing	Solvents, Polynuclear Aromatic Hydrocarbons

Loading of compounds from the pulp and paper industry are relatively consistent, as their process discharge does not vary greatly on a daily basis. In contrast, loadings of compounds from the chemical industries may vary over several orders of magnitude.

A total of 50 priority pollutants have been identified as entering the wastewater system, along with about 97 other organic chemicals. Tables 5 and 6 list the chemicals in these two groups and also give the average influent concentrations during the two-year study period.

TABLE 5. PRIORITY POLLUTANTS FOUND IN INFLUENT SAMPLES DURING 1980 AND 1981

Priority Pollutants	Average Concentration (μg/l)
Acenaphthene	< 1
Acenaphthylene	< 1
Anthracene	< 1
Benzene	153
Benzo (a) anthracene	< 1
Benzo (a) pyrene	< 1
Bis(2-ethylhexyl)phthalate	23
Bromodichloromethane	2
Butyl benzyl phthalate	1
Chlorobenzene	23
2-Chlorophenol	2
Chlorophenylether	< 1
Chloroethane	< 1
Chloroform	747
4-Chloro-3-methylphenol	3
2-Chloronaphthalene	< 1
Chrysene	< 1
1,2-Dichlorobenzene	4
1,4-Dichlorobenzene	1
3,3'-Dichlorobenzidine	23
1,1-Dichloroethane	3
1,1-Dichloroethene	< 1
1,2-Dichloroethane	730
2,4-Dichlorophenol	2
Diethyl phthalate	< 1
2,4-Dimethylphenol	1
Dimethyl phthalate	4
Di-n-butyl phthalate	< 1
Ethylbenzene	14
Fluoranthene	18
Fluorene	< 1
Methyl chloride	< 1
Methylene chloride	43
Naphthalene	4
Pentachlorophenol	< 1
Phenanthrene	1

(continued)

TABLE 5. (Continued)

Priority Pollutants	Average Concentration (μg/l)
Phenol	5
Pyrene	< 1
Tetrachloroethylene	361
Toluene	1,964
Trans-1,2-dichloroethene	6
Trichlorobenzene	< 1
1,1,1-Trichloroethane	93
Trichloroethylene	36
2,4,6-Trichlorophenol	2
Vinyl chloride	1

TABLE 6. ADDITIONAL ORGANIC CHEMICALS FOUND IN INFLUENT SAMPLES DURING 1980 AND 1981

Compound	Average Concentration (μg/l)
Acetanilide	5
Acetone	2664
Alkyl substituted benzenes	53
Aniline	24
Benzaldehyde	<1
Benzyl alcohol	<1
Butyl benzene	<1
Carbon disulfide	<1
2-Chloroaniline	567
2-Chlorohydroquinone	<1
Chloromethylbenzene	<1
Cresol	10
2,4'-Diamino-3,3'-dichlorobiphenyl	118
2,2'-Dichloroazobenzene	38
1,4-Diethoxybenzene	<1
Diethoxychlorobenzene	21
Dihydroxyphenylethanone	<1
Dimethoxybenzene	1
3,4-Dimethoxyphenol	6
Dimethyl benzaldehyde	2
Dimethyl phenol	<1
Dimethyl disulfide	180
Dimethyl naphthalenes	14
Dimethyl oxetane	<1
1,4-Dioxane	<1
2-Ethoxypropane	3
Ethyl aniline	2
Ethyl phenol	<1
Acetovanillone	16
Isopropylidene dioxyphenol	8
Methanethiol	<1
2-Methoxyaniline	<1
2-Methoxyphenol	40
Methyl aniline	37
Methyl naphthalenes	8
Naphthol	1
N,N-Dimethylaniline	5
N-Phenylaniline	<1
Phenylethanone	<1
Phthalic acid	<1
2-Propanol	842
Substituted benzoic acids	1

(Continued)

TABLE 6. (Continued)

Compound	Average Concentration (μg/l)
Substituted benzaldehyde	2
Substituted vanillin	<1
Thiobismethane	171
Tributyl phosphate	30
Diisopropoxychlorobenzene	4
Trimethyl naphthalenes	11
Trimethyl phenanthrenes	<1
Vanillin	6
Xylene	<1

Of the priority pollutants the volatile compounds benzene (153 μg/l), chloroform (747 μg/l), 1,2-dichloroethane (730 μg/l), tetrachloroethylene (361 μg/l), toluene (1,964 μg/l), 1,1,1-trichloroethane (93 μg/l) comprise the largest loadings to the treatment works. These materials all originate from industrial usage (parts washing, paint, etc.) or chemical manufacturing. The only semi-volatile priority pollutants comprising significant average loadings are bis(2-ethylhexyl)phthalate (23 μg/l), 3,3'-dichlorobenzidine (23 μg/l) and fluoranthene (18 μg/l). The remaing semi-volatile compounds average less than 10 μg/l.

Of the additional organic chemicals received, acetone (2,264 μg/l), 2-chloroaniline (567 μg/l), 2,4'-diamino-3,3'-dichlorobiphenyl (118 μg/l), dimethyl disulfide (180 μg/l), 2-propanol (842 μg/l), and thiobismethane (171 μg/l) are received in high quantitites. The sulfides originate from the pulp and paper industry while the remaing compounds are discharged from chemical manufacturers. The compound, 2,4'-diamino-3,3'-dichlorobiphenyl could not be identified by mass spectral interpretation alone, as its spectrum is similar to 3,3'-dichlorobenzidine. NMR analysis, however, defined the structure as a diphenylene derivative formed by the benzidine rearrangement in the industrial synthesis of dichlorobenzidine.

Overall, about 80% of the chemicals detected are at levels of less than 50 μg/l. The highest concentrations detected for any of the chemicals are 18 mg/l of acetone in the June, 1981 composite and 11 mg/l in the August, 1981 composite. No other levels in excess of 10 mg/l are encountered during the two-year study period. Numerous other compounds including aliphatic hydrocarbons, esters, alcohols, and terpene-related derivatives are frequently detected; however, for the purposes of the study and because the low environmental significance of the previous materials, only the compounds listed in Tables 5 and 6 were followed in the treatment system.

Considerable differences in concentration ranges are evident in the data. Compounds detected over 50 μg/l are given in Table 7. These materials amount to about 10% of the chemicals studied.

TABLE 7. INFLUENT CHEMICALS DETECTED AT LEVELS OVER 50 μg/l ON THE AVERAGE

Chloroform*	Thiobismethane
1,2-Dichloroethane*	Dimethyl disulfide
Benzene	2-Chloroaniline
Tetrachloroethylene*	Acetone
Toluene	2-Propanol
1,1,1-Trichloroethane*	Alkyl substituted benzenes
Methylene chloride*	2,4-Diamino-3,3'-dichlorobiphenyl

* EPA Priority Pollutant

Table 8 gives the chemicals detected at levels between 500 μg/l and 10,000 μg/l. This group corresponds to about 5% of the total number of influent chemicals examined.

TABLE 8. INFLUENT CHEMICALS DETECTED AT LEVELS BETWEEN 500 μg/l AND 10,000 μg/l ON THE AVERAGE

1,2-Dichloroethane*	Toluene*
Chloroform*	Acetone
2-Chloroaniline	2-Propanol

* EPA Priority Pollutant

While Tables 7 and 8 classify the compounds on the basis of their averages, any individual sample may contain fewer or larger number of compounds in each category. Using the March, 1981 composite as an example, the following groupings can be developed:

59 total chemicals
14 chemicals between 50 μg/l and 1,000 μg/l
45 chemicals less than 50 μg/l

Table 9 presents the March data in total form.

TABLE 9 . MARCH, 1981, INFLUENT DATA

Priority Pollutants	Concentration (μg/l)
Methylene Chloride	70
1,1-Dichloroethane	3
Trans-1,2-dichloroethene	9
Chloroform	541
1,2-Dichloroethane	391
1,1,1-Trichloroethane	62
Bromodichloromethane	4
Trichloroethene	13
Benzene	181
Tetrachloroethene	500
Chlorobenzene	5
Toluene	562
2-Chlorophenol	1
Phenol	4
2,4-Dichlorophenol	1
2,4,6-Trichlorophenol	2
4-Chloro-m-cresol	1
1,4-Dichlorobenzene	2
1,2-Dichlorobenzene	7
Trichlorobenzene	2
Naphthalene	6
2-Chloronaphthalene	1
Dimethyl phthalate	2
Acenaphthylene	1
Acenaphthene	1
Diethyl phthalate	1
Fluorene	1
Chlorophenylether	2
Anthracene	2
Phenanthrene	3
Di-n-butyl phthalate	3
Pyrene	2
Fluoranthene	3
Butyl benzyl phthalate	13
Benzo(a)anthracene	2
Benzo(a)crysene	2

(Continued)

TABLE 9 (Continued)

Priority Pollutants	Concentration (μg/l)
Di(ethylhexyl)phthalate	351
Acetone	181
Thiobismethane	141
2-Propanol	721
Dimethyl disulfide	78
2-Methoxyphenol	55
Cresol	7
3,4-Dimethoxyphenol	41
Dihydroxyphenylethanone	3
Ethyl phenol	1
Isopropylidene dioxyphenol	2
Vanillin	2
Acetovanillone	90
Aniline	120
2-Chloroaniline	770
Methylnaphthalene	12
Di-methylnaphthalene	17
Trimethylnaphthalene	18
Tributyl phosphate	15
Substituted benzene	38
Dichloroazobenzene	24
Dichlorobenzidene isomer	291
Diethoxychlorobenzene	3

The overall variability illustrated here again relates back to the industrial usage breakdown discussed earlier. It is a combination of batch-to-batch process variation and the change in production campaigns that contribute to the influent concentration levels. In addition, the overall dilution of chemical industry effluent in the system acts to prevent adverse impacts from spot concentration variations over several orders of magnitude. Individual flows for the six industries range from 0.3 MGD to 1.2 MGD. Given the total flow of 33 MGD to the wastewater system, a 30-fold dilution will take place before an effluent reaches the treatment works.

In summary, the influent of the Muskegon County Wastewater Management System contains a large number of potentially toxic chemicals. Concentrations are low, however, as over 80% of the chemicals are less than 50 μg/l. It should also be noted that highly resistant chemicals such as PCB's and certain pesticides are absent from the influent.

Extended Aeration Treatment

The incoming wastewater is first subjected to an extended-aeration (approximately three days) treatment, as discussed earlier. This consists of two 8-acre (42 MG) aeration cells operated in series. Comparison of the spillway values as the water leaves the aeration cell illustrates the effects of this treatment.

Average concentrations for priority pollutants and the additional organic chemicals are given in Tables 10 and 11. Overall present removal data are also included.

TABLE 10. PRIORITY POLLUTANTS FOUND IN THE SPILLWAY EFFLUENT AND THEIR REMOVAL EFFICIENCIES DURING 1980 AND 1981

Priority Pollutants	Concentration (μg/l)	Average % Removal
Acenaphthene	-	100
Acenaphthylene	-	100
Anthracene	-	100
Benzene	11	93
Benzo(a)anthracene	-	100
Benzo(a)pyrene	-	100
Bis(2-ethylhexyl)phthalate	9	61
Bromodichloromethane	-	100
Butyl benzyl phthalate	-	100
Chlorobenzene	<1	99+
2-Chlorophenol	<1	99+
Chlorophenylether	-	100
Chloroethane	-	100
Chloroform	86	89
4-Chloro-3-methylphenol	-	100

(Continued)

TABLE 10 (Continued)

Priority Pollutants	Average Concentration (μg/l)	Average % Removal
2-Chloronaphthalene	-	100
Chrysene	< 1	99+
1,2-Dichlorobenzene	< 1	99+
1,4-Dichlorobenzene	-	100
3,3'-Dichlorobenzidine	6	74
1,1-Dichloroethane	< 1	99+
1,1-Dichloroethene	-	100
1,2-Dichloroethane	164	78
2,4-Dichlorophenol	< 1	99+
Diethyl phthalate	-	100
2,4-Dimethylphenol	-	100
Dimethyl phthalate	-	100
Di-n-butyl phthalate	< 1	99+
Ethyl benzene	< 1	99+
Fluoranthene	< 1	99+
Fluorene	-	100
Methyl chloride	-	100
Methylene chloride	31	28
Naphthalene	< 1	99+
Pentachlorophenol	-	100
Phenanthrene	< 1	99+
Phenol	5	0
Pyrene	-	100
Tetrachloroethylene	31	91
Toluene	34	98
Trans-1,2-dichloroethylene	< 1	99+
Trichlorobenzene	-	100
1,1,1-Trichloroethane	9	90
Trichloroethylene	2	94
2,4,6-Trichlorophenol	1	50
Vinyl chloride	-	100

TABLE 11. ADDITIONAL ORGANIC CHEMICALS FOUND IN SPILLWAY EFFLUENT AND THEIR REMOVAL EFFICIENCIES DURING 1980 AND 1981

Compound	Concentration (μg/l)	Average % Removal
Acetanilide	< 1	99+
Acetone	1258	53

(Continued)

TABLE 11. (Continued)

Compound	Concentration (μg/l)	Average % Removal
Alkyl substituted benzenes	19	64
Aniline	1	96
Benzaldehyde	< 1	99+
Benzyl alcohol	< 1	99+
Butyl benzene	-	100
Carbon disulfide	-	100
2-Chloroaniline	92	84
Chloromethylbenzene	-	100
Cresol	1	90
2,4'-Diamino-3,3'-dichlorobiphenyl	52	56
2,2-Dichloroazobenzene	18	53
1,4-Diethoxybenzene	< 1	99+
Diethoxychlorobenzene	10	52
Dihydroxyphenylethanone	< 1	99+
Dimethoxybenzene	< 1	99+
3,4-Dimethoxyphenol	2	67
3,4-Dimethylphenol	< 1	99+
Dimethyl benzaldehyde	< 1	99+
Dimethoxy phenol	-	100
Dimethyl disulfide	50	72
Dimethyl naphthalenes	4	71
Dimethyl oxetane	-	100
1,4-Dioxane	-	100
N-Ethylaniline	-	100
2-Ethoxypropane	< 1	99+
Ethyl aniline	< 1	99+
Ethyl phenol	-	100
Acetovanillone	1	94
Isopropylidene dioxyphenol	4	50
2-Methoxyaniline	< 1	99+
2-Methoxyphenol	3	93
Methyl aniline	13	65
Methyl naphthalenes	2	75
N,N-Dimethylaniline	1	80
N-Phenylaniline	-	100
Phenylethanone	< 1	99+
Phthalic acid	-	100
2-Propanol	589	30
Substituted benzaldehyde	< 1	99+
Substituted vanillin	< 1	99+
Thiobismethane	30	82
Tributyl phosphate	12	60
Diisopropoxychlorobenzene	1	75

(Continued)

TABLE 11 (Continued)

Compound	Concentration (µg/l)	Average % Removal
Trimethyl naphthalenes	5	55
Trimethyl phenanthrenes	-	100
Vanillin	< 1	99+
Xylene	-	100

The data show a majority of the chemicals in the influent are removed by extended aeration treatment. Four processes may take place in this treatment: loss to atmosphere by aeration of volatile materials, loss by bacterial metabolism of labile materials, sedimentation, and concentration of recalcitrant materials through the system. Atmospheric loss via aeration can be attributed to be the mechanism for removal of almost half of the priority pollutants present as they are classed as volatile materials. On a weekly basis, as the February, 1980 sample shows, chloroform drops from 1100 to 91 µg/l, 1,2-dichloroethane from 1900 to 500 µg/l, and benzene from 160 to 3 µg/l from influent to spillway. Chloroform removal reported here is consistent with levels found by the University of Cincinnati (11) as they noted a reduction of 80 µg/l. The same study found chloroform levels over the aeration cells to range from 100 to 200 $\mu g/M^3$, which is far below the OSHA threshold limit value (TLV) of 50,000 $\mu g/M^3$ for an 8-hour, 5-day week. Air samples, collected as part of the study gave similar results. The data are given in Table 12.

TABLE 12. RESULTS OF AIR SAMPLING FOR VOLATILE SOLVENTS OVER AERATION CELL II, OCTOBER, 1981

Date	Solvent ($\mu g/M^3$)		
	Chloroform	1,2-Dichloroethane	Toluene
10/14	98	72	100
10/15	85	51	92
10/20	110	63	130
10/21	65	42	85
10/22	130	81	70

Using the average influent concentrations for these three solvents, the pounds per day lost to the atmosphere amount to 156 for chloroform, 133 for 1,2-dichloroethane, and 467 for toluene. The loss, spread over two 8-acre aeration cells, however, is diluted sufficiently to prevent any potential public health problem from occurring.

Atmospheric loss via aeration probably is also the major mechanism for removal of other compounds including methylene chloride, 1,1-dichloroethane, trans-1,2-dichloroethylene, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, bromodichloromethane, chlorobenzene, and ethyl benzene as metabolic breakdown would be very slow.(12) Thiobismethane, dimethyl disulfide, acetone, and isopropanol could be removed by combinations of volatilization, chemical oxidation (sulfides only), and metabolism. These compounds may be produced *in situ* by metabolic routes as sulfides are products of anaerobic digestion while alcohols and ketones are oxidative metabolites.(13) These compounds also have considerable water solubility which probably acts to reduce volatilization. This is noted by the lower removal efficiency of each chemical (thiobismethane 82%, dimethyl disulfide 72%, acetone 53%, 2-propanol 30%). The efficient treatment of volatile organics is very important as 10 of the 12 compounds listed in Table 7, as present in the influent at levels greater than 500 μg/l, are volatile. The data shows between 89 and 100% removal of most priority pollutant influent volatile organics by the aeration process. Such efficiency is not to be achieved by most conventional, short-term aeration, activated-sludge type systems.(14) The only volatile compound not consistently averaging high removal levels is 1,2-dichloroethane. The removal of this compound averages 78%. This material also has a water solubility of approximately 1%, which would act to keep the chemical in solution and inhibit volatilization. Loss via microbial metabolism can be postulated for many of the phenolic and aniline compounds entering the system. Table 13 summarizes some of the weekly removals observed after an extended aeration treatment.

TABLE 13. REMOVAL EFFICIENCIES BY METABOLIC ROUTES IN EXTENDED AERATION

Compound	Levels (μg/l)	% Removal	Sample Date	2-Year Avg. Removal
2-Methoxy phenol	78 to <1	100	3/80	93
Methyl aniline	320 to 48	85	6/80	65
Aniline	5 to <1	100	2/81	96
Acetovanillone	61 to <1	100	1/81	94
Isopropylidene dioxy phenol	30 to 8	74	1/81	50

These chemicals show no accumulation in the sludge from aeration Cell II, and are not volatile. Any loss should, therefore, be by metabolic breakdown.

Sludge accumulation does occur for many types of influent chemicals as shown by the average concentration data for Cell II in Table 14. These chemicals include the alkyl substituted benzenes (present as a homologous series centering around dodecylbenzene), naphthalenes, chlorinated aromatic amines, and polynuclear aromatic hydrocarbons. Concentration factors for selected compounds are given in Table 15. These values are based on averages of influent data and sludge data.

TABLE 14. AVERAGE CONCENTRATION OF ORGANIC CHEMICALS IN CELL II SLUDGE (μg/Kg) FOR 1980 and 1981

Priority Pollutants	Average
Butyl benzyl phthalate	280
Benzo(a)anthracene	60
Bis(ethylhexyl)phthalate	4,200
1,4-Dichlorobenzene	200
1,2-Dichlorobenzene	320
Di-n-butyl phthalate	340
3,3'-Dichlorobenzidine	44,000
Fluoranthene	230
Fluorene	140
Naphthalene	580
Phenanthrene	810
Phenol	240
Pyrene	200
Toluene	730
Additional Organic Compounds	
2-Chloroaniline	26,600
Cresol	1,100
2,2'-Dichloroazobenzene	1,400
Diethoxychlorobenzene	4,000
Dimethyl naphthalenes	9,400
2,4'-Diamino-3,3'-dichlorobiphenyl	35,000
Methyl naphthalenes	2,600
Substituted alkyl benzenes	40,000
Trimethyl naphthalenes	7,300
Tributyl phosphate	800

TABLE 15. SELECTED SLUDGE CONCENTRATION FACTORS FOR CHEMICALS IN CELL II SLUDGE

Compound	Avg. Sludge Conc. (μg/l)	Avg. Influent Conc. (μg/l)	Conc. Factor
Phenanthrene	810	1	810
Bis(ethylhexyl)phthalate	4,200	23	183
3,3'-Dichlorobenzidine	44,000	23	1,910
2-Chloroaniline	26,600	567	47
Cresol	1,100	10	110
2,2'-Dichloroazobenzene	1,400	38	37
Diethoxychlorobenzene	4,000	21	190
2,4'-Diamino-3,3'-dichlorobiphenyl	35,000	118	300
Alkyl substituted benzenes	40,000	53	755
Methyl naphthalene	2,600	8	325
Dimethyl naphthalene	9,400	14	670
Trimethyl naphthalene	7,300	11	663
Naphthalene	580	4	145

Compounds with high concentration factors such as phenanthrene and naphthalenes have been shown to biodegrade in an aerobic aqueous environment.[19] The accumulation of these compounds in the sludge can be partially attributed to their affinity to the oils and greases common to sludge.

The concentration of alkyl substituted homologues of naphthalene far exceeds that of the parent compound, and this is consistent with a study recently completed at the University of California.[20]

Other compounds such as 2-chloroaniline, 3,3'-dichlorobenzidine, and 2,4'-diamino-3,3'-dichlorobiphenyl due to their resistance to biodegradation, and tend to either appear in the sludge or remain in the aqueous phase.

Alkyl substituted benzenes (C_{10} - C_{14}) originate from linear alkyl benzene sulfonate (LAS) detergents which are used domestically as well as once manufactured locally. The accumulation of these compounds in the sludge is probably due to their low biodegradability and low water solubility. Aeration cell sludge appears to be at equilibrium as over two years of data collection has shown no trend of increasing or decreasing chemical accumulation. Variations in concentration are partially resultant from sampling and experimental differences, but primarily due to non-homogeneity within the sludge itself.

Examining the overall performance of extended aeration, only 15 of the 135 influent chemicals have been detected at levels greater than 50 μg/l after treatment. These include toluene, chloroform, 1,2-dichloroethane, dimethyl disulfide, phenol, 2-chloroaniline, 2-propanol, 2-methoxyphenol, methylene chloride, acetone, benzene, tetrachloroethylene, methyl aniline, alkyl substituted benzenes, and 2,4'-diamino-3,3'-dichlorobiphenyl. Of these compounds, only 4 are consistently above or near 50 μg/l. They are chloroform (86 μg/l), 1,2-dichloroethane (164 μg/l), dimethyl disulfide (50 μg/l), and 2-chloroaniline (92 μg/l). Differences such as these can be attributed again to variations in industrial loadings. Generally, removals for most compounds are better during summer months than winter, probably due to higher temperatures increasing volatilization and metabolism. This is evident when comparing February, 1980, and September 8-19, 1980, in terms of the removal of 1,2-dichloroethane (1900 - 580 μg/l vs 780 - 42 μg/l), and 2-chloroaniline (410 - 80 μg/l vs 330 - 10 μg/l). Even sporadic high levels such as 1250 μg/l benzene entering the system during the second July, 1980, composite and the 120 μg/l 3,3'-dichlorobenzidine entering during the May, 1980, composite did not result in higher levels leaving the spillway.

In summary, the large volume, extended aeration treatment employed appears to be highly effective in handling daily loadings and even sporadic shock levels as efficient removal is achieved by volatilization, metabolism, sludge concentration, or combinations of these mechanisms for most compounds. A majority of the overall removal of organic chemicals occurs in this unit of the treatment process. Even though the concentration of certain chemicals in the sludge does represent a removal from the liquid phase, continued accumulation may prohibit future land application of aeration cell sludges.

Long-Term Impoundment

The storage lagoon system acts to further treat the wastewater by facilitating additional volatilization, metabolic utilization, photo-oxidations, and settling processes. The tremendous volume of the lagoon system also provides a large "buffer" capacity to adsorb any short-term shock load that may pass through the extended aeration treatment. Both composition and concentration exhibit seasonal patterns with the highest levels and number of compounds being found when the lagoons are under ice cover. Lack of volatilization and the slow nature of anaerobic metabolism prevent efficient chemical removal during this period. This is illustrated in Tables 16 and 17 for 1980 and 1981 data respectively.

TABLE 16. SEASONAL VARIATION IN THE STORAGE LAGOONS DURING 1980

Compound	Concentration (μg/l) March, 1980 E. Lagoon	W. Lagoon	August, 1980 E. Lagoon	W. Lagoon
Chloroform	13	1	6	1
Bis(ethylhexyl)phthalate	-	-	2	2
2-Chloroaniline	4	1	8	2
Dichloroazobenzene	2	3	4	2
Alkyl substituted benzenes	-	-	2	-
Tributyl phosphate	10	19	-	-
Benzene	3	2	-	-
1,1,1-Trichloroethane	2	2	-	-
Phenol	1	-	-	-
Methylene chloride	4	3	-	-
1,2-Dichlorethane	68	51	9	-
Toluene	-	1	-	-
Dimethyl disulfide	1	2	-	-
2-Ethoxy propane	35	2	-	-
Methyl aniline	1	-	-	-
3,4-Dimethoxyphenol	4	-	-	-
2,4'-Diamino-3,3'-dichloro-biphenyl	2	-	-	-
Total	16		6	

TABLE 17. SEASONAL VARIATION IN THE STORAGE LAGOONS DURING 1981

Compound	Concentration (μg/l) March, 1981 E. Lagoon	W. Lagoon	August, 1981 E. Lagoon	W. Lagoon
Chloroform	25	18	1	15
1,2-Dichloroethane	10	12	-	13
Tetrachloroethene	12	14	1	9
Toluene	2	1	-	-
Acetone	53	-	-	-
2-Chloroaniline	48	7	6	37
Cresol	1	-	-	-
1,1,1-Trichloroethane	-	-	-	3
2,4'-Diamino-3,3'-Dichloro-biphenyl	22	-	-	-
2,2'-Dichloroazobenzene	16	1	2	28
Diethoxychlorobenzene	7	1	-	-
3,4-Dimethyl phenol	-	1	-	-

(continued)

TABLE 17. (Continued)

Compound	Concentration (µg/l) March, 1981 E. Lagoon	W. Lagoon	August, 1981 E. Lagoon	W. Lagoon
Dimethyl disulfide	1	-	-	-
Dimethyl naphthalenes	7	-	-	-
1H-Indole	6	-	-	-
Isopropylidine dioxyphenol	1	5	1	3
Methyl aniline	12	-	-	5
Phenyl ethanone	2	-	-	-
Trichloroethylene	-	-	-	1
Alkyl substituted benzenes	11	-	-	-
Thiobismethane	8	-	-	-
Tributyl phosphate	1	-	-	-
Trimethyl naphthalenes	8	-	-	-
Methyl naphthalenes	2	-	-	-
Total	22		4	

Differences in concentration between the two storage lagoons is from different flow patterns employed in the filling of each lagoon. Higher concentrations and numbers of compounds are found in the lagoon that is being filled. Both Tables 16 and 17 show about 20 compounds present during winter months, with only chloroform and 1,2-dichloroethane near 50 µg/l in 1980 and acetone and 2-chloroaniline at that level in 1981. The other chemicals average 10 µg/l, which is a very low level and at the recommended detection limit for EPA priority pollutants (4&5). Water that is used for irrigation is drawn from the lagoon with the longest residence time (east lagoon in 1981). Using the August, 1981, data as an example, the 100+ compounds entering the system are reduced to only 5 (chloroform, trichloroethylene, 2-chloroaniline, isopropylidene dioxyphenol, and 2,2'-dichloroazobenzene) at levels less than 10 µg/l by the extended-aeration, lagoon-impoundment treatment prior to irrigation.

Dichloroazobenzene does not show a seasonal variation with higher lagoon concentrations during the winter. This compound could also be dichlorodiphenyl hydrazine. A distinction has never been made, as they both chromatograph as the azo compound. This chemical exhibits a trend of increasing concentrations during summer months. A recent study[15] has demonstrated the conversion of certain chlorinated anilines to chlorinated azobenzenes by photochemical oxidation. Such a condensation reaction may be occurring in the storage lagoon to convert the 2-chloroaniline to 2,2'-dichloroazobenzene, thus increasing the concentration of the latter chemical during periods without ice cover.

Table 18 gives the average storage lagoon concentrations and pollutant removal efficiencies during the two-year study. Out of the original list of 125 chemicals, 35 have survived the impoundment phase of treatment. Of this group, only 18 are detected sufficient times or in great enough quantities to average 1 μg/l or more. One of the key functions of long term storage is to further degrade the low quantities of chemicals left after extended aeration. The large surface area, coupled with wind action, provides an excellent mechanism for volatilization of solvent chemicals. Only one solvent, 1,2-dichloroethane persists at greater than 10 μg/l (average 14 μg/l). This concentration represents, however, 98% removal of the influent loading.

Metabolic and sedimentation routes remove heavier chemicals with 2-chloroaniline being the only non-volatile to persist at $>$ 10 μg/l (actual average 11 μg/l). Most of the chemicals in Table 20 are loaded into the system at 50 μg/l or greater. With a few exceptions, such as isopropylidene dioxyphenol, alkyl benzenes, tributyl phosphate, and diethoxychlorobenzene, treatability could probably be enhanced by limiting the influent concentrations.

The latter group of chemicals, however, show definite resistance to treatment by either extended aeration or impoundment.

TABLE 18. AVERAGE STORAGE LAGOON CONCENTRATIONS OF ORGANIC CHEMICALS AND REMOVAL EFFICIENCIES FOR 1980 AND 1981

Priority Pollutants	Average Concentration (μg/l)	Average Removal (%) From Extended Aeration	Average Removal (%) Total
Benzene	< 1	93	99+
Bis(2-ethylhexyl)phthalate	3	61	87
2-Chlorophenol	< 1	99+	99+
Chloroform	9	89	99
3,3'-Dichlorobenzidine	< 1	74	99+
1,2-Dichloroethane	14	78	98
Methylene chloride	< 1	28	99+
Phenol	2	0	60
Pyrene	< 1	99+	99+
Tetrachloroethylene	3	91	99
Toluene	1	98	99+
1,1,1-Trichloroethane	< 1	90	99+
Trichloroethylene	< 1	94	99+
2,4,6-Trichlorophenol	< 1	50	99+
Additional Organic Compounds			
Acetone	1	53	99+
Acetovanillone	< 1	94	99+
Alkyl substituted benzenes	3	64	94
Carbon disulfide	< 1	99+	99+
2-Chloroaniline	11	84	98
2-Chlorohydroquinone	< 1	99+	99+
2,4'-Diamino-3,3'-dichlorobiphenyl	3	56	97
Cresol	< 1	90	99+
2,2'-Dichloroazobenzene	7	53	82
Diethoxychlorobenzene	2	52	90
Diethoxybenzene	< 1	99+	99+
3,4-Dimethoxyphenol	< 1	67	99+
Dimethyl disulfide	1	72	99+
Dimethyl naphthalenes	< 1	71	99+
Isopropylidine dioxyphenol	2	50	75
Methyl aniline	2	65	95
Methyl naphthalenes	< 1	75	99+
N,N-Dimethylaniline	< 1	80	99+
2-Propanol	1	30	99+
Thiobismethane	1	82	99+
Tributyl phosphate	3	60	90

Sedimentation of compounds associated with solids does contribute a significant part to the overall treatment in the storage lagoons as sludge blankets are located at the inlets of each lagoon. A sounding study conducted in 1980 revealed a thin sludge blanket averaging a 250-yard radius, .75 inches deep in the west lagoon and a 550-yard radius, 4 inches deep in the east lagoon (Appendix C).

Representative sludge quality data for the east and west lagoon sludges are given in Table 21. The chemical makeup is essentially the same as Cell II sludge with, however, a general reduction in concentration of an order of magnitude. The alkyl benzenes, 2-chloroaniline, 3,3'-dichlorobenzidine and 2,4'-diamino-3,3'-dichlorobiphenyl are in greatest concentrations in the sludge. From this information, it is evident that the chemicals associated with the suspended solids in the spillway effluent settle out quickly in the storage lagoons. A small, dissolved fraction of these chemicals also exists which results in the water levels observed.

In summary, the lagoon impoundment of the wastewater provides an efficient means to treat residual chemicals after extended aeration. Through sedimentation, volatilization, and metabolic mechanisms, a large portion of the spillway chemicals are removed. Because of seasonal cycles in the storage lagoon system, concentrations are higher in the winter than in the summer.

TABLE 19. CONCENTRATION OF ORGANIC CHEMICALS IN EAST AND WEST LAGOON SLUDGE (μg/Kg) 1980

Priority Pollutants	10/31, East	11/18, West
Bis(ethylhexyl)phthalate	4,400	11,700
Chrysene	310	-
3,3'-Dichlorobenzidine	4,000	11,200
Di-n-butyl phthalate	600	-
Ethyl benzene	4	-
Fluoranthene	220	1,260
Naphthalene	60	50
Phenanthrene	-	200
Toluene	3	-
Additional Organic Compounds		
2-Chloroaniline	5,700	2,500
2,2'-Dichloroazobenzene	940	440
2,4'-Diamino-3,3'-dichlorobiphenyl	13,100	52,000
Diethoxychlorobenzene	460	90
Dimethyl naphthalenes	820	1,400
Methyl naphthalenes	560	420
Substituted benzenes	17,600	17,000
Trimethyl naphthalenes	1,200	2,200

Irrigation

After impoundment, water is pumped into the outlet lagoon and then to crop irrigation. Examining the composition of the outlet lagoon reveals only 6 compounds are present. With the exception of sporadic occurrences of bis(ethylhexyl)phthalate being present (possible laboratory contamination), concentrations of organics are well below 10 μg/l prior to irrigation. Selected examples of organic chemical levels in irrigation water for 1980 and 1981 are given in Table 20.

TABLE 20. ORGANIC CHEMICAL LEVELS IN IRRIGATION WATER FOR 1980 AND 1981

Compound	Concentration (μg/l) 1980 June	1980 August	1981 June	1981 August
1,2-Dichloroethane	1	1	<1	1
Chloroform	1	1	1	<1
Bis(ethylhexyl)phthlate	7	-	-	-
2-Chloroaniline	4	2	1	1
2,2'-Dichloroazobenzene	4	2	7	2
1,1,1-Trichloroethane	<1	<1	<1	1

These reductions, with the exception of 2,2'-dichloroazobenzene, correspond to 99+% removal prior to irrigation. Again, the 2,2'-dichloroazobenzene level may partially be from photochemical condensation of 2-chloroaniline as discussed earlier.[15]

Results of the drain tile analyses illustrate the treatment of the irrigated outlet lagoon water after passing through the soil. Trace levels of phthalate esters and herbicides (1 μg/l) appear in the drain from May to November in 1980 and 1981. This corresponds to crop treatment with simazine and atrazine, and irrigated water leaching herbicides and possibly phthalates from drain tiles.

Levels of 1 μg/l chloroform and 1,2-dichloroethane did occur in the August and November sample series for 1980 and 1981. Chloroform and 1,2-dichloroethane breakthrough is limited to the north fields as DT 48 contained no measurable levels of these materials. Fields south of Apple Avenue (drained by DT 48) receive lower hydraulic loadings which could account for the absence of these chemicals at this station. The levels are, however, extremely low. In examining 1981 results for drain tiles, breakthrough of chloroform and 1,2-dichloroethane at 1 ug/l levels is noted in the April through August samples on a sporadic basis for DT 11 and DT 19. The sporadic nature of these results probably reflects the difficulty of obtaining precise analytical data at the detection limit of the test. Overall, the drain tile effluent shows high quality treatment is taking place in the soil matrix.

The fate of chemicals applied to the soil is examined in the second year of research by an initial sampling in November, 1980, and subsequent monthly samples taken from April to August of 1981. The results show phthalate esters and xylene distributed in the soil column at 1,2, and 3 foot intervals. One chemical 2,2'-dichloroazobenzene, is located only in the surface sample. Levels range from 0.05 to 9.0 mg/Kg for phthalates, <0.05 mg/Kg to 1.0 mg/Kg for xylene, and <0.05 to 0.20 mg/Kg for 2,2'-dichloroazobenzene. The variability of phthalate data indicates possible laboratory contamination problems. For example, 8.3 mg/Kg of bis(ethylhexyl)phthalate is reported for Circle 48, 0-1 foot on May, 1981. Samples from April to June, 1981 are <0.05 mg/Kg for both dates. No rationale for such data can be given, except for laboratory contamination. Consequently, phthalate data for soil samples is of limited value. Xylene is an ingredient in the dispersing agent (crop oil) used to apply herbicides to the farm land. It is not detected in any significant quantities in wastewater samples, so its distribution is resultant from herbicide application.

The residuals of 2,2'-dichloroazobenzene are from irrigation water loadings. Because of the possible photochemical condensation of 2-chloroaniline and loadings applied in past years of operation, the dynamics of this material cannot be determined. The levels are low and confined to the first foot of soil, suggesting minimal environmental impact from potential leaching or future accumulations. Given the analytical variability of the numbers (0.15 mg/Kg to <0.05 mg/Kg), it is difficult to speculate if the levels are increasing, decreasing, or at equilibrium. Only additional monitoring can answer these questions. The most important information gained from the soil samples is the fact that no significant accumulation for any of the influent chemicals is noted. The possibility exists for levels of chemicals, below the water detection limit, to concentrate in the soil matrix to high levels. After 7 years of operation, this has not occurred in the wastewater system.

Samples of corn collected at harvest in 1980 and 1981 revealed no translocation of wastewater organic chemicals. Numerous aldehydes, esters, substituted phenols, fatty acids, and hydrocarbons are noticed, but similar compounds are found in control samples taken from corn fields in other counties. None of the 125 organic chemicals identified in the influent are detected in the corn samples.

Lagoon Seepage

The system is designed to prevent lagoon seepage from migrating off the project by two interception ditches surrounding the north, east, and south boundaries, and purge wells along the west. Monitoring of the lagoon seepage wells (Figure 3) on the western side (2B2 and 3B2) are found to contain 5 µg/l of 1,2-dichloroethane while 1B2, 4B2, and 5B2 contain no detectable organics. Chloride data for 2B2 and 3B3 are 132 and 155 mg/l respectively while 4B2 and 5B2 are 5 and 1 mg/l. This suggests a localized groundwater migration in the northwest direction towards 2B and 3B wells. Chloride levels of 2 and 1 mg/l in 2C2 and 3C2, however, show no migration approximately 500 ft beyond the B well cluster. It seems that this migration is localized to 2B and 3B areas. Monitoring of the wells in 1981, however, reveal 1,2-dichloroethane (1 µg/l) and several aniline homologs present at 1B2. Chemical changes in wells 1B2 and 2B2 during the study period are given in Tables 21 and 22. The results do show a definite localized deterioration in water quality. Table 23 illustrates changes in well 31B2 from 1980 to 1981. Again, there appears to be a migration of storage lagoon water in the northwest direction. Continued operation of the purge wells should restrict the localized migration to the B clusters. The hydrogeology of this area is currently under investigation as part of the 201 facilities plan for the site. Depending on the results of this study, additional groundwater control measures may be instituted. One possible alternative is the construction of an interception ditch in this area.

Analysis of the middle dike seepage well LS34C2 in 1980 revealed elevated levels of 2-chloroaniline (210 µg/l) and 1,2-dichloroethane (53 µg/l), indicating groundwater contamination localized below the storage lagoons at 38 ft. The contamination does not persist to 68 ft as LS34C3 contains no detectable organics. These levels may be resultant from previous high water concentration levels, adsorption phenomena concentrating present low organic levels,

TABLE 21. CHEMICAL CHANGES IN WELL 1B2

Compound	Concentration (µg/l)				
	7-28-80	8-28-80	2-19-81	3-11-81	8-13-81
Chloroethane	<1	<1	1	<1	8
1,2-Dichloroethane	<1	<1	1	<1	<1
Di-n-butyl phthalate	<1	<1	2	3	<1
Cresol	<1	<1	1	<1	<1
Methyl aniline	<1	<1	1	1	<1
Ethyl aniline	<1	<1	3	1	<1
Trichloroethylene	<1	<1	<1	<1	1
Trans-1,2-dichloroethylene	<1	<1	<1	<1	1

TABLE 22. CHEMICAL CHANGES IN WELL 2B2

Compound	Concentration (µg/l)	
	6-13-80	7-81
1,2-Dichloroethane	5	3
Chloroethane	<1	8
Tetrachloroethene	<1	26
Toluene	<1	9

TABLE 23. CHEMICAL CHANGES IN WELL LS31B2

Compound	Concentration (µg/l)	
	10-20-80	3-24-81
Chloroform	6	2
1,2-Dichloroethane	10	<1
Di-n-butyl phthalate	1	2
Bis(ethylhexyl)phthalate	2	<1
Dichloroazobenzene	1	<1
2-Chloroaniline	<1	2
Aniline	<1	1
Naphthalene	<1	1

or leaching organics from the sludge blankets on the lagoon bottom. With the sandy soils present under the lagoons, adsorption reactions may be minimal as this type of matrix does not tend to concentrate organics (17). Similarly, the small extent of the sludge blankets in the storage lagoons, as discussed earlier, would tend to limit the effects of leaching. Levels of these chemicals are found in the interception ditches as both contain mixtures of lagoon seepage and groundwater. The north interception ditch (ND) is mixed with groundwater and drain tile effluent to form the north discharge (05 or NPDES #001) to Mosquito Creek. Its influence on water quality will be discussed in the section on "discharges." South interception ditch (SD, or the discharge to HH&G Drain) represents a direct discharge of groundwater and lagoon seepage to Black Creek.

A consistent 4 to 6 μg/l of 1,2-dichloroethane was found at SD, along with concentrations of 2-chloroaniline that varied from 86 μg/l to 1 μg/l in 1980. The 86 μg/l level was found in December and then the level dropped to 20 μg/l for 3 months. Beginning with warmer temperatures, the level dropped to 5 μg/l and then to non-detectable levels.

Beginning in 1981, north ditch was sampled and a peak level of 180 μg/l of 2-chloroaniline was present in March. Levels fell to 28 μg/l in April and then to $<$ 1 μg/l in May. This is the same pattern as noted for south ditch in 1980. During the same period, however, the south ditch water contained only 1 μg/l of 2-chloroaniline. Factors that contributed to increased levels of 2-chloroaniline in 1980 are apparently not present in 1981 data. The new lagoon seepage wells define the distribution of chemicals in the dike well water. The concentration of 2-chloroaniline is at high levels in A, B, and

D group wells. The greatest concentrations are localized at 30 ft in A (.113 mg/l), 50 foot in B (.25 mg/l) and 30 foot in D (.160 mg/l). Deeper wells of the A and D cluster (50 ft and 70 ft) contain very low levels of 2-chloroaniline. The C group cluster contained 29 μg/l at 30 feet and less than detectable levels for other remaining depths.

The lower levels of 2-chloroaniline present in the C group cluster supports the data observed for south ditch during this period. Higher levels present in north ditch are also supported by the elevated levels in A and B groups. Reasons for the concentration distribution are, however, not as clear. The presence of 2-chloroaniline and isopropylidene dioxyphenol in the seepage water reflect lagoon water concentrations. The A group of wells is the only group in the close proximity to the sludge blankets in the lagoons. The B group of wells are located in the path of regional groundwater flow and this could account for higher levels of 2-chloroaniline in this group. Therefore, elevated 2-chloroaniline levels are probably only slightly influenced by the leaching action of seepage water through the sludge.

The distribution of 1,2-dichloroethane is of interest as it is only present in well group D. As documented in this report and previous ones, 1,2-dichloroethane also occurs in lagoon seepage wells 1B2, 2B2, and 3B2. This distribution pattern suggests a problem with 1,2-dichloroethane localized in west lagoon. A previously high load of 1,2-dichloroethane may have entered west lagoon in the past and, because of mixing problems which would occur under ice cover, a localized area of the lagoon may have become contaminated. The lagoon area around D group is especially prone to mixing problems.

The A, B, and D well clusters are all in proximity of the lagoon inlets and the higher levels of chemicals observed could be resultant from such a mixing problem. This problem could be eliminated by extending the outfall pipe further into the lagoon to facilitate better dispersion. Continued monitoring of these wells by gas chromatography and HPLC has revealed no significant trend of increasing or decreasing levels. Given the complexity of the data patterns, accurate conclusions regarding lagoon seepage cannot be drawn with present data. Hydraulic loadings may also influence lagoon seepage concentrations. Levels of 2-chloroaniline are greatest during winter months, which corresponds to the highest water levels in the storage lagoon system. Only future monitoring and correlation of storage lagoon, dike wells, and interception ditch data can answer the questions surrounding lagoon seepage.

Analysis of well 17A in 1980 revealed no detectable organics present, illustrating the absence of lagoon seepage movement beyond the interception ditch. This plus the lack of chloride contamination in C group well clusters, shows the effectiveness of the design features in preventing lagoon seepage migration off the project. The presence of organic chemicals in the seepage water, however, indicates inadequate treatment with respect to possible previous high loadings, soil adsorption and concentration mechanisms, or sludge leaching causing the survival of certain chemicals in the wastewater system. There is no adverse environmental impact from lagoon seepage of the two chemicals, considering that the currently proposed EPA water quality criteria for 1,2-dichloroethane is 7 μg/l at the 10^{-5} risk level. This is based on the consumption of 2 liters of water plus 18.7 grams of contaminated fish per day (16). Using this as a criteria, the 4-6 μg/l are probably not harmful to the environment. No present standard is available for 2-chloroaniline; however, bioassay information will be developed as part of the system's new NPDES permit. Futher investigation is needed, however, to define the dynamics of lagoon seepage in order to insure that levels are controlled and do not increase beyond any standards.

With the potential for discharge of chemicals to the environment in lagoon seepage waters, it is important to manage the concentration of these chemicals in the storage lagoon water. While the historical influences to the lagoon seepage waters cannot be changed, the future influences can, by limiting the initial concentration of chemicals entering the system to levels which will reduce survival in the lagoon system. The County has instituted management guidelines for effluent chemicals from industrial chemicals. The levels are set to introduce influent levels that can be effectively treated and thus, eliminate potential adverse environmental effects from the pass through of chemicals in the lagoon seepage water.

Discharges

The two discharges are unique in terms of composition and, therefore, warrant separate discussions. South discharge(34) on NPDES #002 is made up of groundwater and drain tile effluent. The effluent chemical composition is very similar to the drain tiles discussed earlier as only trace levels of phthalate and herbicides are present in 1980-1981 samples. The herbicide levels (1 μg/l) are probably no greater than those experienced at any farming operation in terms of agricultural runoff. The absence of organics from this station illustrates the efficiency of the treatment system in producing high quality effluent by spray irrigation.

The north discharge (05 of NPDES #001) is made up of drain tile effluent, groundwater, and lagoon seepage collected in the north interception ditch. Low levels of 1,2-dichloroethane (1 μg/l) and 2-chloroaniline (15 to $<$ 1 μg/l) are encountered at this station from January, 1980, to April, 1980. With the drain tiles showing no contamination present, the introduction of these compounds must be from lagoon seepage entering north ditch and being mixed in the discharge. Concentrations of 2-chloroaniline follow seasonal patterns with highest values in the winter and a reduction to nondetectable levels in the summer.

The chemicals were not present in 1981 samples which is consistent with the change in lagoon seepage concentrations discussed earlier. Several sporadic concentrations (1-18 μg/l) of chlorinated solvents such as methylene chloride and tetrachloroethene are found in the discharge water, however, concentrations in drain tiles or irrigation water are not observed. These numbers are probably laboratory contamination as no consistent trend is documented.

The effective nature of the Muskegon System is evident by the absence of the influent industrial chemicals in the discharges. Of the 125 chemicals identified in the study, only low levels of 2-chloroaniline and 1,2-dichloroethane pass through the system. These chemicals could be easily eliminated from the discharge by management of influent levels as both compounds have a treatment efficiency of 98%. Lower influent levels would reduce these chemicals to below analytical detection limits.

Wells

In addition to the lagoon seepage wells discussed earlier, six metal cased USGS wells and other selected lagoon seepage were monitored during the study period. The USGS wells are metal cased, and not subject to phthalate interferences. No detectable compounds are found in USGS 1-6 during the sampling program. These results show that ground water aquifiers are being protected in the land application of the treated water. The draintiles collect the irrigated water adequately, preventing possible contamination of the groundwater table. Small quantities of the organic compounds in the lagoon impounded water are further eliminated by land application.

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APPENDIX A

Results

WATER SAMPLES

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	60	2										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate												1
Bromodichloromethane	13											
Butyl benzyl phthalate												
Chlorobenzene												
2-Chlorophenol	4											
Chlorophenylether												
Chloroethane												
Chloroform	1,300	140		14								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene	2	1										
1,2-Dichlorobenzene	2	1										
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine	14	11										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	560	91		15	5							
2,4-Dichlorophenol												
Diethyl phthalate											1	
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate	8	32	2			3		1	1	3	2	1
Ethylbenzene												
Fluoranthene	3	2										
Methyl chloride												

TABLE A-1. DECEMBER, 1979 - JANUARY, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	24	3										
Pentachlorophenol												
Phenanthrene	4	4										
Phenol	13	90	5	7								
Pyrene												
Tetrachloroethylene	10	2										
Toluene	89	5										
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	28	2										
Trichloroethylene												
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone												
Acetovanillone												
Alkyl substituted benzenes	38	3		2		2		3	2			4
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	1,200	88	3	4		86		15				
Chloromethylbenzene												

DECEMBER, 1979 - JANUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	17	18										
2,4'-Diamino-3,3'-dichloro-biphenyl												
2,2-Dichloroazobenzene												
1,4-Diethoxybenzene												
Diethoxychlorobenzene												
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	90											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	41	3										
Dimethyl naphthalenes	83	45		5								
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	320											
Methyl aniline												
3-Methyldibenzothiophene												

DECEMBER, 1979 - JANUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	40	14		4								
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol												
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	320	120										
Tributyl phosphate	15	48	6	12								
Trimethyl naphthalenes	32	39										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

DECEMBER, 1979 - JANUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	160	3										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	1											
Bromodichloromethane	12	2										
Butyl benzyl phthalate												
Chlorobenzene	4											
2-Chlorophenol	15	4	1									
Chlorophenylether												
Chloroethane												
Chloroform	1,100	92	13	1								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	2											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine		1										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	1,900	580	43	20		5		2				
2,4-Dichlorophenol												
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride												

FEBRUARY, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	3											
Pentachlorophenol												
Phenanthrene												
Phenol	32	32	5	3		2						
Pyrene												
Tetrachloroethylene	100	3										
Toluene	160	3	3									
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	62	5										
Trichloroethylene	16	1										
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone												
Acetovanillone												
Alkyl substituted benzenes												
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	410	80	4	3		22		3				
Chloromethylbenzene												

FEBRUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	14	10	2									
2,4'-Diamino-3,3'-dichloro-biphenyl												
2,2-Dichloroazobenzene	5	5	2	3								
1,4-Diethoxybenzene												
Diethoxychlorobenzene												
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	260	9										
Dimethyl naphthalenes	3	3										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane	37	16										
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	30	10										
Methyl aniline												
3-Methyldibenzothiophene												

FEBRUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	2										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol	16	10										
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol												
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	160	72										
Tributyl phosphate	8	11	6	1		2						
Trimethyl naphthalenes	3	2										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

FEBRUARY, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	81	17	3	2								
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate												
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene												
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane												
Chloroform												
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	1											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	2											
1,1-Dichloroethane	6											
1,1-Dichloroethene												
1,2-Dichloroethane	740	250	68	51		6		2				
2,4-Dichlorophenol												
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride	9			32								

MARCH, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	37	24	4	3								
Naphthalene	2											
Pentachlorophenol												
Phenanthrene												
Phenol	8	1	1									
Pyrene												
Tetrachloroethylene	130	4	7									
Toluene	370	64	17	1								
Trans-1,2-dichloroethylene	12											
Trichlorobenzene												
1,1,1-Trichloroethane	130	7	2	2								
Trichloroethylene	110											
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone												
Acetovanillone												
Alkyl substituted benzenes	20	25										
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	200	18	4	1		25		2				
Chloromethylbenzene												

MARCH, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	19											
2,4'-Diamino-3,3'-dichloro-biphenyl	110	7	2									
2,2-Dichloroazobenzene	5	4	2	3								
1,4-Diethoxybenzene												
Diethoxychlorobenzene												
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	11		4									
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	790	290										
Dimethyl naphthalenes	2											
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane			35	2								
Ethyl aniline	11											
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	78											
Methyl aniline	11	7	1									
3-Methyldibenzothiophene												

MARCH, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	1											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol	3											
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol		1,200										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanolacetate												
Tetramethylbutylphenol												
Thiobismethane	250	49	1	2								
Tributyl phosphate	40	39	10	19								
Trimethyl naphthalenes	2											
Trimethyl phenanthrenes												
Vanillin												
Xylene												

MARCH, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	62	35										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate												
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene	97											
2-Chlorophenol	4	7										
Chlorophenylether												
Chloroethane												
Chloroform	670	170	16	29								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	14	2										
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine												
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	53	130	96	110		5		1				
2,4-Dichlorophenol												
Diethyl phthalate	1											
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride												

APRIL, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	6	2										
Pentachlorophenol												
Phenanthrene												
Phenol	4	19	3	3								
Pyrene												
Tetrachloroethylene	150	26	2									
Toluene	580	36	1	1								
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	30											
Trichloroethylene	30											
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	5,800											
Acetovanillone												
Alkyl substituted benzenes	8	5										
Aniline												
Atrazine												
Azobenzene		1										
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide				6								
2-Chloroaniline	180	44	17	3		32		12				
Chloromethylbenzene												

APRIL, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol		8										
2,4'-Diamino-3,3'-dichloro-biphenyl	16	5										
2,2-Dichloroazobenzene	20	6	3	3								
1,4-Diethoxybenzene												
Diethoxychlorobenzene												
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol		33										
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	770	360										
Dimethyl naphthalenes	12	8										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane				3								
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	6	88										
Methyl aniline	4											
3-Methyldibenzothiophene												

APRIL, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	6	4										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	2,400											
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	1,700	170										
Tributyl phosphate	16	20	13	15								
Trimethyl naphthalenes	10	8										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

APRIL, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	26											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	16	10	6	6		8		8	4	3	3	
Bromodichloromethane	5											
Butyl benzyl phthalate	7	1										
Chlorobenzene	2											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	610	70	10		2					2		
4-Chloro-3-methylphenol	20											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	19	1										
1,4-Dichlorobenzene		7										
3,3'-Dichlorobenzidine	120											
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	510	270	19	3	4	5		2				
2,4-Dichlorophenol	7	4	1									
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	11											
Di-n-butyl phthalate	5											
Ethylbenzene												
Fluoranthene												
Methyl chloride												

May 1-15, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
-Methylene chloride	120	770										
-Naphthalene	16	1										
-Pentachlorophenol												
-Phenanthrene	5											
-Phenol	12	8	4	2	3							
-Pyrene												
-Tetrachloroethylene	160	10	2									
-Toluene	550	11										
-Trans-1,2-dichloroethylene												
-Trichlorobenzene												
-1,1,1-Trichloroethane	60											
-Trichloroethylene	9											
-2,4,6-Trichlorophenol	11	8	3									
-Vinyl chloride												
Additional Organic Chemicals												
-Acetaniline	110	6										
-Acetone	1,800	300										
-Acetovanillone												
-Alkyl substituted benzenes	91	19	11	8	3							
-Aniline	51	5										
-Atrazine												
-Azobenzene												
-Benzaldehyde												
-Benzyl alcohol												
-Butyl benzene												
-Carbon disulfide												
-2-Chloroaniline	1,100	43	8	4	5	5		2				
-Chloromethylbenzene												

MAY 1-15, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	14											
2,4'-Diamino-3,3'-dichloro-biphenyl	400	79	10	2								
2,2-Dichloroazobenzene	89	18	8	7	4							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	82	44	8	3	2							
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	10	5	3	2	1							
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	270	48										
Dimethyl naphthalenes	40	7										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	130											
Methyl aniline												
3-Methyldibenzothiophene												

MAY 1-15, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	28	2										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol	11	22										
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,100	90										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	250	26										
Tributyl phosphate	86	39	2	7								
Trimethyl naphthalenes	32	6										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

MAY 1-15, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	34											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	7	2	4	4				10	3	5	4	
Bromodichloromethane	6											
Butyl benzyl phthalate	3											
Chlorobenzene	4											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	810	95	12	4	3							
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	6											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	81	2										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	680	300	21	4	5	5		1				
2,4-Dichlorophenol	10	5	2									
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	6											
Di-n-butyl phthalate	1											
Ethylbenzene												
Fluoranthene												
Methyl chloride												

MAY 19-30, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	12	4										
Pentachlorophenol												
Phenanthrene	2											
Phenol	6	2	4	3								
Pyrene												
Tetrachloroethylene	200	25	4									
Toluene	920	57										
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	71	3										
Trichloroethylene	18											
2,4,6-Trichlorophenol	11	10	4									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	900	100										
Acetovanillone												
Alkyl substituted benzenes	99	31	17	6	3							
Aniline												
Atrazine										1		
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	910	57	10	5	5		1					
Chloromethylbenzene												

MAY 19-30, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	16											
2,4'-Diamino-3,3'-dichloro-biphenyl	600	81	12	4								
2,2-Dichloroazobenzene	91	21	9	9	3							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	97	39	6	3	2							
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	12	4	4	3	1							
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	290	57										
Dimethyl naphthalenes	46	6										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline	34	6										
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	180											
Methyl aniline	29	7										
3-Methyldibenzothiophene												

MAY 19-30, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	31	5										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline						3						
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	300	41										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	310	41										
Tributyl phosphate	41	47	4	10		3						
Trimethyl naphthalenes	30	7										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

MAY 19-30, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	43	1										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	4		20	31	7	2		2	2	2		5
Bromodichloromethane	4											
Butyl benzyl phthalate	2											
Chlorobenzene	2											
2-Chlorophenol	1	1										
Chlorophenylether												
Chloroethane												
Chloroform	540	39	7	1	1							
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	4											
1,4-Dichlorobenzene	3											
3,3'-Dichlorobenzidine	2	2										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	1,800	220	24		1	6						
2,4-Dichlorophenol	1	1										
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	5											
Di-n-butyl phthalate												
Ethylbenzene	6											
Fluoranthene												
Methyl chloride												

JUNE 2-13, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	21	3										
Naphthalene	4											
Pentachlorophenol												
Phenanthrene	1	1										
Phenol	2					1						
Pyrene												
Tetrachloroethylene	190	12										
Toluene	520	5										
Trans-1,2-dichloroethylene	6											
Trichlorobenzene												
1,1,1-Trichloroethane	44	3										
Trichloroethylene	9	1										
2,4,6-Trichlorophenol	1	1	1									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	2,100	400										
Acetovanillone												
Alkyl substituted benzenes	10	13										
Aniline												
Atrazine								1	1	1	1	
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	540	210	51	4	4			1				
Chloromethylbenzene												

JUNE 2-13, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	4											
2,4'-Diamino-3,3'-dichloro-biphenyl	12	15	4									
2,2-Dichloroazobenzene	13	13	4	4	4							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	25	26	3									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	2	2	1	2								
Dimethoxybenzene												
3,4-Dimethoxyphenol	13											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	22	3	1									
Dimethyl naphthalenes	12	4										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane	15	2										
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	34											
Methyl aniline	320	48	30									
3-Methyldibenzothiophene												

JUNE 2-13, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	5	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,100	130										
Simazine										1		
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	190	21	1									
Tributyl phosphate	14	11	1									
Trimethyl naphthalenes	9	5										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

JUNE 2-13, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	240	2										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	7		3	11	26	2		1	4			3
Bromodichloromethane	3											
Butyl benzyl phthalate												
Chlorobenzene	6											
2-Chlorophenol	1											
Chlorophenylether												
Chloroethane												
Chloroform	750	37	5	1	1	1						
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	2											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	6	3										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	1,500	64	25	2	1	5						
2,4-Dichlorophenol	2	2										
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	2											
Di-n-butyl phthalate												
Ethylbenzene	11											
Fluoranthene												
Methyl chloride												

JUNE 16-27, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	26	3										
Naphthalene	1											
Pentachlorophenol												
Phenanthrene												
Phenol	3											
Pyrene												
Tetrachloroethylene	390	8	1									
Toluene	1,200	2										
Trans-1,2-dichloroethylene	12											
Trichlorobenzene												
1,1,1-Trichloroethane	58	1										
Trichloroethylene	9											
2,4,6-Trichlorophenol	2	2										
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	1,500	55										
Acetovanillone												
Alkyl substituted benzenes	23	10										
Aniline												
Atrazine								2	1	1	1	
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	460	46	2	2	4	1						
Chloromethylbenzene												

JUNE 16-27, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	4											
2,4'-Diamino-3,3'-dichloro-biphenyl	28	27	2									
2,2-Dichloroazobenzene	42	10	2	1	1							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	8	7										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	5	2										
Dimethoxybenzene												
3,4-Dimethoxyphenol	8											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	300	35										
Dimethyl naphthalenes	2											
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	32											
Methyl aniline	11	3	14									
3-Methyldibenzothiophene												

JUNE 16-27, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	1											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	850											
Simazine								1	1	1	1	
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	110	17										
Tributyl phosphate	140	4										
Trimethyl naphthalenes	2											
Trimethyl phenanthrenes												
Vanillin												
Xylene												

JUNE 16-27, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	380	10	1									
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	10	7	8	3	2			4	12	2	2	4
Bromodichloromethane	2											
Butyl benzyl phthalate									1			
Chlorobenzene	19											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	520	25	3	1	1					1		
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	6											
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine	4	1										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	72	8	4	1	1	6		1		1		
2,4-Dichlorophenol												
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	4		4	4	1							
Di-n-butyl phthalate	1											
Ethylbenzene	15											
Fluoranthene												
Methyl chloride												

JULY 7-18, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	35	9										
Naphthalene	2											
Pentachlorophenol												
Phenanthrene	1											
Phenol	4											
Pyrene												
Tetrachloroethylene	170	5	1									
Toluene	310	2										
Trans-1,2-dichloroethylene	2											
Trichlorobenzene												
1,1,1-Trichloroethane	16											
Trichloroethylene	7											
2,4,6-Trichlorophenol	3	3	2									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	940	94										
Acetovanillone												
Alkyl substituted benzenes	22	12										
Aniline												
Atrazine								1	1	1	1	1
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	930	97	4	2	3							
Chloromethylbenzene												

JULY 7-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	4											
2,4'-Diamino-3,3'-dichloro-biphenyl	22	8	2									
2,2-Dichloroazobenzene	31	15	7	4	4							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	2	1	1									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	2	1										
Dimethoxybenzene												
3,4-Dimethoxyphenol	4	4										
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	79	70										
Dimethyl naphthalenes	6											
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	10											
Methyl aniline	1		6									
3-Methyldibenzothiophene												

JULY 7-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	1											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	340	110										
Simazine								1	1	1	1	1
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	71	10										
Tributyl phosphate	44	2	1		1							
Trimethyl naphthalenes	8											
Trimethyl phenanthrenes												
Vanillin												
Xylene												

JULY 7-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	1,250	50										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	12	8	11	17	3			7	13	12		8
Bromodichloromethane	2											
Butyl benzyl phthalate												
Chlorobenzene	1											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	620	35	5	1	1					2		
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	5											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine	2	1										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	1,200	31	7		1	5		1		1		
2,4-Dichlorophenol	2											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene	9											
Fluoranthene												
Methyl chloride												

JULY 21-31, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	80	6										
Naphthalene	3											
Pentachlorophenol												
Phenanthrene	1											
Phenol	2		2			1						
Pyrene												
Tetrachloroethylene	87	3										
Toluene	490	10										
Trans-1,2-dichloroethylene	6											
Trichlorobenzene												
1,1,1-Trichloroethane	69	4										
Trichloroethylene	13											
2,4,6-Trichlorophenol	3	3										
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	3,400	530										
Acetovanillone												
Alkyl substituted benzenes	16	11										
Aniline												
Atrazine									1			
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	890	150	5	1	1							
Chloromethylbenzene												

JULY 21-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	10											
2,4'-Diamino-3,3'-dichloro-biphenyl	17	10	3									
2,2-Dichloroazobenzene	41	7	6	4	3							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	15	3										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	8	4										
Dimethoxybenzene												
3,4-Dimethoxyphenol	4	1										
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	400											
Dimethyl naphthalenes	8											
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	6											
Methyl aniline												
3-Methyldibenzothiophene												

JULY 21-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	1											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	38	140										
Simazine									1			
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	38	8										
Tributyl phosphate	27											
Trimethyl naphthalenes	7											
Trimethyl phenanthrenes												
Vanillin												
Xylene												

JULY 21-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	190	10										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	10	9	7	9	6	7		6	9	8	2	2
Bromodichloromethane	4											
Butyl benzyl phthalate	2											
Chlorobenzene	21	2										
2-Chlorophenol	3											
Chlorophenylether												
Chloroethane												
Chloroform	790	12	6	1	1							
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	10											
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine	15	3										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	1,100	29	10	1	1	5		1				
2,4-Dichlorophenol	3											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	2	1										
Di-n-butyl phthalate	1											
Ethylbenzene	12											
Fluoranthene												
Methyl chloride												

AUGUST 11-18, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	41	5										
Naphthalene	3	1										
Pentachlorophenol												
Phenanthrene	1											
Phenol	5											
Pyrene												
Tetrachloroethylene	200	8										
Toluene	1,600	41										
Trans-1,2-dichloroethylene	2											
Trichlorobenzene												
1,1,1-Trichloroethane												
Trichloroethylene	18	1										
2,4,6-Trichlorophenol	2											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	270	95										
Acetovanillone												
Alkyl substituted benzenes	21	9										
Aniline												
Atrazine								1	1	1	1	1
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	740	110	8	2	1							
Chloromethylbenzene												

AUGUST 11-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	6											
2,4'-Diamino-3,3'-dichloro-biphenyl	19	3	2									
2,2-Dichloroazobenzene	64	11	9	6	5							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	8	2	1									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	8	2										
Dimethoxybenzene												
3,4-Dimethoxyphenol	2											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	97	6										
Dimethyl naphthalenes	10	3										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol												
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	35											
Methyl aniline	6											
3-Methyldibenzothiophene												

AUGUST 11-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	7	2										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	91	40										
Simazine								1	1	1	1	1
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	120	5										
Tributyl phosphate	19	3	3	1	1							
Trimethyl naphthalenes	10	3										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

AUGUST 11-18, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	70	1										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	3	5	2	2		3		2	2	26	12	310*
Bromodichloromethane	3											
Butyl benzyl phthalate	2											
Chlorobenzene	33	4										
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	990	36	6	1	1			5		1		
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	3											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine	9	2										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	690	51	9		1			1		2		
2,4-Dichlorophenol	4											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	3											
Di-n-butyl phthalate	2											
Ethylbenzene	11											
Fluoranthene												
Methyl chloride												

AUGUST 25 - September 5, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	36	12										
Naphthalene	3	1										
Pentachlorophenol												
Phenanthrene	1											
Phenol												
Pyrene												
Tetrachloroethylene	401	4										
Toluene	1,100											
Trans-1,2-dichloroethylene	1											
Trichlorobenzene												
1,1,1-Trichloroethane	49	1										
Trichloroethylene	8	1										
2,4,6-Trichlorophenol	4											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone												
Acetovanillone												
Alkyl substituted benzenes	21	10	2									
Aniline	15											
Atrazine								1	2	1	1	1
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	970	210	8	2	2							
Chloromethylbenzene												

AUGUST 25 - SEPTEMBER 5, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	4											
2,4'-Diamino-3,3'-dichloro-biphenyl	21	4	2									
2,2-Dichloroazobenzene	51	12	4	2	2							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	21	14	3									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	5	4	1									
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	71											
Dimethyl naphthalenes	6	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane	2											
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	21	11	7	2	2							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	4											
Methyl aniline	3											
3-Methyldibenzothiophene												

AUGUST 25 - SEPTEMBER 5, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	280											
Simazine								1		1	1	1
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	22	3										
Tributyl phosphate	9											
Trimethyl naphthalenes	8	1										
Trimethyl phenanthrenes												
Vanillin												
Xylene												

* High concentration due to possible laboratory contamination.

AUGUST 25 - SEPTEMBER 5, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	95											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	9	2	4	2	2	2		2	1	5	3	1
Bromodichloromethane	2											
Butyl benzyl phthalate												
Chlorobenzene												
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane												
Chloroform	920	70	8	2	1							
4-Chloro-3-methylphenol	4											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	3											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine												
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	780	42	3	1	1							
2,4-Dichlorophenol	1											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	5											
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride												

SEPTEMBER 8-19, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
-Methylene chloride	9											
-Naphthalene	4	1										
-Pentachlorophenol												
-Phenanthrene												
-Phenol	6	8										
-Pyrene												
-Tetrachloroethylene	310	38										
-Toluene	670	71										
-Trans-1,2-dichloroethylene												
-Trichlorobenzene												
-1,1,1-Trichloroethane	49											
-Trichloroethylene												
-2,4,6-Trichlorophenol	3											
-Vinyl chloride												
Additional Organic Chemicals												
-Acetaniline												
-Acetone	290											
-Acetovanillone	26											
-Alkyl substituted benzenes	5	1										
-Aniline	26											
-Atrazine										1	1	
-Azobenzene												
-Benzaldehyde												
-Benzyl alcohol												
-Butyl benzene												
-Carbon disulfide												
-2-Chloroaniline	330	10	7	1								
-Chloromethylbenzene												

SEPTEMBER 8-19, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	6											
2,4'-Diamino-3,3'-dichloro-biphenyl	9		1									
2,2-Dichloroazobenzene	5	2	3	2	1							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	8		5	1								
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	3											
Dimethoxybenzene												
3,4-Dimethoxyphenol	2											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	270	18										
Dimethyl naphthalenes	6	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	51	36	3	2	2							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	5											
Methyl aniline	83											
3-Methyldibenzothiophene												

SEPTEMBER 8-19, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	2											
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	730											
Simazine										1	1	
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	71	10										
Tributyl phosphate	9											
Trimethyl naphthalenes	5	1										
Trimethyl phenanthrenes												
Vanillin	18											
Xylene												

SEPTEMBER 8-19, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	70											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	11	9	3	2	1	1		1	5	2	4	2
Bromodichloromethane												
Butyl benzyl phthalate	4											
Chlorobenzene	33	2										
2-Chlorophenol	4	1										
Chlorophenylether												
Chloroethane												
Chloroform	670	42	2	1	1							
4-Chloro-3-methylphenol	2											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	4											
3,3'-Dichlorobenzidine	22	8										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	690	85	4	1	1	4						
2,4-Dichlorophenol												
Diethyl phthalate	2											
2,4-Dimethylphenol												
Dimethyl phthalate	3											
Di-n-butyl phthalate												
Ethylbenzene	11											
Fluoranthene												
Methyl chloride												

SEPTEMBER 27 - OCTOBER 3, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	190	26										
Naphthalene	3	1										
Pentachlorophenol												
Phenanthrene												
Phenol	4	1										
Pyrene												
Tetrachloroethylene	400	21										
Toluene	1,200	26										
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	31	5	1									
Trichloroethylene	8											
2,4,6-Trichlorophenol	3											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	1,200	30										
Acetovanillone	51	3	1									
Alkyl substituted benzenes	18	6	2	1								
Aniline	15											
Atrazine										1	1	
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	870	180	3	1								
Chloromethylbenzene												

SEPTEMBER 27 - OCTOBER 3, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	3											
2,4'-Diamino-3,3'-dichloro-biphenyl	19	3	1									
2,2-Dichloroazobenzene	13	3	2	2	1							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	12	2										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	5	1										
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	100	12										
Dimethyl naphthalenes	5	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline	3											
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	32	2	1									
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	18											
Methyl aniline	110	8										
3-Methyldibenzothiophene												

SEPTEMBER 27 - OCTOBER 3, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	1											
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	270											
Simazine										1	1	
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	32	6										
Tributyl phosphate	14											
Trimethyl naphthalenes	7	1										
Trimethyl phenanthrenes												
Vanillin	47											
Xylene												

SEPTEMBER 27 - OCTOBER 3, 1980 COMPOSITE SAMPLES (µG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	42											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	6	67	8	3	5	2		1	3	3	2	
Bromodichloromethane												
Butyl benzyl phthalate	6											
Chlorobenzene												
2-Chlorophenol	1											
Chlorophenylether												
Chloroethane												
Chloroform	510	37	3	2	1							
4-Chloro-3-methylphenol	2											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	4											
3,3'-Dichlorobenzidine	11											
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	760	140	5	2	1	3						
2,4-Dichlorophenol	1											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	4											
Di-n-butyl phthalate	20											
Ethylbenzene												
Fluoranthene												
Methyl chloride												

OCTOBER 6-17, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	84	7	2									
Naphthalene	1											
Pentachlorophenol												
Phenanthrene	2											
Phenol	7											
Pyrene												
Tetrachloroethylene	500	8	1									
Toluene	490											
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	81											
Trichloroethylene	4											
2,4,6-Trichlorophenol	2											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	580	7										
Acetovanillone	46	4	1									
Alkyl substituted benzenes	66	13	2	1								
Aniline	20											
Atrazine										1		
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	1,300	70										
Chloromethylbenzene												

OCTOBER 6-17, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	2											
2,4'-Diamino-3,3'-dichloro-biphenyl	97	21	1									
2,2-Dichloroazobenzene	64	17	3	1	1							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	32	3										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	18											
Dimethoxybenzene												
3,4-Dimethoxyphenol	1											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	130	240										
Dimethyl naphthalenes	6	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	9	6	1	1								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	18											
Methyl aniline	96	18										
3-Methyldibenzothiophene												

OCTOBER 6-17, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	1	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	480											
Simazine										1		
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	48											
Tributyl phosphate	18											
Trimethyl naphthalenes	7	1										
Trimethyl phenanthrenes												
Vanillin	33	4	1									
Xylene												

OCTOBER 6-17, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	34											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	6	8	3	2	2	7		8	2	2	2	1
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene	270											
2-Chlorophenol	3											
Chlorophenylether												
Chloroethane												
Chloroform	690	90	5	2	1							
4-Chloro-3-methylphenol	1											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	3											
3,3'-Dichlorobenzidine	34	10	1									
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	990	45	8	3	2	3						
2,4-Dichlorophenol	2											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	4											
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride												

OCTOBER 20-31, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
-Methylene chloride	100	10										
-Naphthalene	2	1										
-Pentachlorophenol												
-Phenanthrene												
-Phenol	2											
-Pyrene												
-Tetrachloroethylene	140	3										
-Toluene	390	8										
-Trans-1,2-dichloroethylene	3											
-Trichlorobenzene												
-1,1,1-Trichloroethane	27											
-Trichloroethylene	30											
-2,4,6-Trichlorophenol	6											
-Vinyl chloride												
Additional Organic Chemicals												
-Acetaniline												
-Acetone	4,600	15	1									
-Acetovanillone	15	1										
-Alkyl substituted benzenes	210											
-Aniline	93	8										
-Atrazine										1		
-Azobenzene												
-Benzaldehyde												
-Benzyl alcohol												
-Butyl benzene												
-Carbon disulfide												
-2-Chloroaniline	190	15	3	1								
-Chloromethylbenzene												

OCTOBER 21-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	4											
2,4'-Diamino-3,3'-dichloro-biphenyl	53	8	2									
2,2-Dichloroazobenzene	24	7	5	2	1							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	16	8	2	1	1							
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	7	1										
Dimethoxybenzene												
3,4-Dimethoxyphenol	1											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	160											
Dimethyl naphthalenes	7	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	16	6	3	1	1							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	6											
Methyl aniline	13											
3-Methyldibenzothiophene												

OCTOBER 20-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol												
Simazine										1		
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	19											
Tributyl phosphate	3											
Trimethyl naphthalenes	6	1										
Trimethyl phenanthrenes												
Vanillin	11	2										
Xylene												

OCTOBER 20-31, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene												
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	2	2	4	2	1	1		1	1	4	2	1
Bromodichloromethane	2											
Butyl benzyl phthalate	2											
Chlorobenzene	11											
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane												
Chloroform	730	32	3	3	2					1	1	
4-Chloro-3-methylphenol	5											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	3											
3,3'-Dichlorobenzidine	27	4	2									
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	870	68	5	2	1	4				1	1	
2,4-Dichlorophenol	1											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	2											
Di-n-butyl phthalate												
Ethylbenzene	10											
Fluoranthene												
Methyl chloride												

NOVEMBER 3-14, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	31	2										
Naphthalene	2	1										
Pentachlorophenol												
Phenanthrene												
Phenol	3											
Pyrene												
Tetrachloroethylene	460	2	1									
Toluene	710	8	1									
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	10	1										
Trichloroethylene	11											
2,4,6-Trichlorophenol	2											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	380	15										
Acetovanillone	46											
Alkyl substituted benzenes	41	6										
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	510	42	8	2	1							
Chloromethylbenzene												

NOVEMBER 3-14, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	2											
2,4'-Diamino-3,3'-dichloro-biphenyl	26	3	1									
2,2-Dichloroazobenzene	42	9	6	3	2							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	27	8	2	1								
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	9	3	1									
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	91	8										
Dimethyl naphthalenes	2	2										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	31	8	3	2	1							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	9											
Methyl aniline	10											
3-Methyldibenzothiophene												

NOVEMBER 3-14, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	3	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	4											
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	610											
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanolacetate												
Tetramethylbutylphenol												
Thiobismethane	37	1										
Tributyl phosphate	31	2	1									
Trimethyl naphthalenes	7	2										
Trimethyl phenanthrenes												
Vanillin	39											
Xylene												

NOVEMBER 3-14, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	63											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	5	3	2	4	2	1		2	2	5	3	1
Bromodichloromethane												
Butyl benzyl phthalate	1											
Chlorobenzene	8											
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane												
Chloroform	810	96	3	3	2					1	1	
4-Chloro-3-methylphenol	5											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine	11	3										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	730	270	8	2	2	4				1	1	
2,4-Dichlorophenol												
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	4											
Di-n-butyl phthalate												
Ethylbenzene	13											
Fluoranthene												
Methyl chloride												

NOVEMBER 17-28, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	63	6										
Naphthalene	1											
Pentachlorophenol												
Phenanthrene	4	1										
Phenol	4	1										
Pyrene												
Tetrachloroethylene	590	2										
Toluene	820	4	1									
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	33	1										
Trichloroethylene	11											
2,4,6-Trichlorophenol	1											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	570	3										
Acetovanillone	38	1										
Alkyl substituted benzenes	22	3	2									
Aniline	61	4										
Atrazine										1		
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	340	21	3	2	1							
Chloromethylbenzene												

NOVEMBER 17-28, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	3											
2,4'-Diamino-3,3'-dichloro-biphenyl	11	2										
2,2-Dichloroazobenzene	9	6	3	3	2							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	19	3	2									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	7											
Dimethoxybenzene												
3,4-Dimethoxyphenol	2											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	87	5										
Dimethyl naphthalenes	4	1										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline	5											
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	27	7	3	2								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	11											
Methyl aniline	25	2										
3-Methyldibenzothiophene												

NOVEMBER 17-28, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,300	12										
Simazine										1		
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	41											
Tributyl phosphate	9	3										
Trimethyl naphthalenes	5	1										
Trimethyl phenanthrenes												
Vanillin	22	1										
Xylene												

NOVEMBER 17-28, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene												
Benzo (a) anthracene	1											
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	9	14	10				4			3		
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene	7											
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane												
Chloroform	510	35	18	1						1	1	
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene	1											
1,2-Dichlorobenzene	4											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	24	18										
1,1-Dichloroethane	6											
1,1-Dichloroethene												
1,2-Dichloroethane	1,300	48	27	1		3	3	1		1	1	
2,4-Dichlorophenol	1	1										
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	1	1										
Di-n-butyl phthalate												
Ethylbenzene	17											
Fluoranthene	1											
Methyl chloride												

DECEMBER, 1980 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	21	2										
Naphthalene	4											
Pentachlorophenol	4											
Phenanthrene												
Phenol		2	37	2								
Pyrene	1											
Tetrachloroethylene	200	21	1							1		
Toluene	920	1										
Trans-1,2-dichloroethylene	19	1										
Trichlorobenzene												
1,1,1-Trichloroethane	12	4	1									
Trichloroethylene	310	2	1									
2,4,6-Trichlorophenol	3	2	1									
Vinyl chloride	38											
Additional Organic Chemicals												
Acetaniline												
Acetone	2,000	72										
Acetovanillone	4	1	1									
Alkyl substituted benzenes	12	10	8									
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide	6	1	1									
2-Chloroaniline	370	13	20	3		1	42		2			
Chloromethylbenzene												

DECEMBER, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	9		15									
2,4'-Diamino-3,3'-dichloro-biphenyl	53	49	38									
2,2-Dichloroazobenzene	29	29	16									
1,4-Diethoxybenzene												
Diethoxychlorobenzene	3	2	3									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	1	2	1									
Dimethoxybenzene												
3,4-Dimethoxyphenol		7										
3,4-Dimethylphenol												
Dimethyl benzaldehyde	49	3	22									
Dimethyl disulfide	200	99	17	4								
Dimethyl naphthalenes	3	4	1									
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	1		8				1					
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	23											
Methyl aniline												
3-Methyldibenzothiophene												

DECEMBER, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	2	1									
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	2											
N-Phenylaniline	1		1									
Phenylethanone												
Phthalic acid												
2-Propanol	1,600	99										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	50	13	9									
Tributyl phosphate	2	13	5	1								
Trimethyl naphthalenes	2	4	2									
Trimethyl phenanthrenes												
Vanillin	1	4	1									
Xylene												

DECEMBER, 1980 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	96	9										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate						1	3	1	2	2	1	
Bromodichloromethane	6	1										
Butyl benzyl phthalate												
Chlorobenzene	93											
2-Chlorophenol	1											
Chlorophenylether												
Chloroethane												
Chloroform	2,000	150	60	1								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	55	15										
1,1-Dichloroethane												
1,1-Dichloroethene												
1,2-Dichloroethane	270	150	49	3		5	6	1		1	1	
2,4-Dichlorophenol	1	1										
Diethyl phthalate						1	7	4	2	1		
2,4-Dimethylphenol												
Dimethyl phthalate	11						2					
Di-n-butyl phthalate										1		
Ethylbenzene	76											
Fluoranthene												
Methyl chloride												

JANUARY, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	24	2										
Naphthalene	1											
Pentachlorophenol												
Phenanthrene												
Phenol	7											
Pyrene												
Tetrachloroethylene	770	49	13				2					
Toluene	8,000	22	5			1	1	1	1	1	1	
Trans-1,2-dichloroethylene	26	2										
Trichlorobenzene												
1,1,1-Trichloroethane	100	10	2									
Trichloroethylene	23	2	1									
2,4,6-Trichlorophenol	3	1	1									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	1,300	43										
Acetovanillone	61											
Alkyl substituted benzenes		16	9									
Aniline												
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	300	10	8	10		1	72					
Chloromethylbenzene												

JANUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	12											
2,4'-Diamino-3,3'-dichloro-biphenyl	140	38	21									
2,2-Dichloroazobenzene	84	37	10	3								
1,4-Diethoxybenzene												
Diethoxychlorobenzene	3	1	2				1					
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	32	17	3									
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	350	79	8									
Dimethyl naphthalenes	5	2										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol	2											
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	30	8	4	4								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	51											
Methyl aniline	7											
3-Methyldibenzothiophene												

JANUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	2	1										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	5											
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	640	56										
Simazine												
Substituted arizidine												
Substituted benzaldehyde	70	7	8									
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	74	29	14									
Tributyl phosphate	20	5	6	1								
Trimethyl naphthalenes	4	1										
Trimethyl phenanthrenes												
Vanillin	8	3										
Xylene												

JANUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	54											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate		4		2								
Bromodichloromethane	1											
Butyl benzyl phthalate												
Chlorobenzene	4											
2-Chlorophenol			1									
Chlorophenylether												
Chloroethane												
Chloroform	370	65	33	24								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	7											
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine		5										
1,1-Dichloroethane	2	1										
1,1-Dichloroethene												
1,2-Dichloroethane	14	4	16	12		2	2					
2,4-Dichlorophenol			1									
Diethyl phthalate				1			3					
2,4-Dimethylphenol												
Dimethyl phthalate	26	1										
Di-n-butyl phthalate	2	1		2								
Ethylbenzene												
Fluoranthene												
Methyl chloride												

FEBRUARY, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	20	7										
Naphthalene	3			1								
Pentachlorophenol												
Phenanthrene	2	1		1								
Phenol			4									
Pyrene												
Tetrachloroethylene	250	48	10			8	1	3			1	
Toluene	3,900	7	2									
Trans-1,2-dichloroethylene	5	1										
Trichlorobenzene												
1,1,1-Trichloroethane	36	6	2	1								
Trichloroethylene	4	14										
2,4,6-Trichlorophenol			2									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	2,000	24										
Acetovanillone												
Alkyl substituted benzenes	46	13	15									
Aniline	5											
Atrazine												
Azobenzene												
Benzaldehyde	3											
Benzyl alcohol	6											
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	730	54	51	19								
Chloromethylbenzene												

FEBRUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	6		1	3								
2,4'-Diamino-3,3'-dichloro-biphenyl	8	26	11	3								
2,2-Dichloroazobenzene	42	36	8	11		2						
1,4-Diethoxybenzene												
Diethoxychlorobenzene			3	9								
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene				5								
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	12	99	22									
Dimethyl naphthalenes	11	5	4									
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol			7	15								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	9			1								
Methyl aniline	38	9	10	10								
3-Methyldibenzothiophene												

FEBRUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	9	2	2									
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone												
Phthalic acid			1									
2-Propanol	1,700											
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene			4									
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	30	25	9									
Tributyl phosphate	35	17	18	13			3					
Trimethyl naphthalenes	18	7	6									
Trimethyl phenanthrenes												
Vanillin			1	1								
Xylene	4											

FEBRUARY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene	1											
Acenaphthylene	1											
Anthracene	2											
Benzene	181	12					2					
Benzo (a) anthracene	2											
Benzo (a) pyrene	2											
Bis(2-ethylhexyl)phthalate	351	7										
Bromodichloromethane	4											
Butyl benzyl phthalate	13											
Chlorobenzene	5	1										
2-Chlorophenol	1	1										
Chlorophenylether	2											
Chloroethane												
Chloroform	541	88	25	18						1		
4-Chloro-3-methylphenol	1											
2-Chloronaphthalene	1											
Chrysene												
1,2-Dichlorobenzene	7											
1,4-Dichlorobenzene	2											
3,3'-Dichlorobenzidine												
1,1-Dichloroethane	3											
1,1-Dichloroethene												
1,2-Dichloroethane	391	251	10	12		3	2			1		
2,4-Dichlorophenol	1	1										
Diethyl phthalate	1					1						
2,4-Dimethylphenol												
Dimethyl phthalate	2											
Di-n-butyl phthalate	3											
Ethylbenzene												
Fluoranthene	3											
Methyl chloride												

MARCH, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	70											
Naphthalene	6	1										
Pentachlorophenol												
Phenanthrene	3											
Phenol	4											
Pyrene	2	1										
Tetrachloroethylene	500	65	12	14								
Toluene	562	13	2	1			1			2		
Trans-1,2-dichloroethylene	9	1										
Trichlorobenzene	2											
1,1,1-Trichloroethane	62	4	1									
Trichloroethylene	13											
2,4,6-Trichlorophenol	2	3	1									
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	181		53								10	
Acetovanillone	90	1										
Alkyl substituted benzenes	38	151	11									
Aniline	120											
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	770	381	48	7		1	180					
Chloromethylbenzene												

MARCH, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol		7	1	1								
2,4'-Diamino-3,3'-dichloro-biphenyl	291	22	22									
2,2-Dichloroazobenzene	24	35	16	1								
1,4-Diethoxybenzene												
Diethoxychlorobenzene	3		7	1								
Dihydroxyphenylethanone	3											
Diisopropoxychlorobenzene												
Dimethoxybenzene	41	1		1								
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide												
Dimethyl naphthalenes												
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline						1						
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol	1											
Hexahydroazepin-2-one												
1H-Indole			6									
Isopropylidene dioxyphenol	2	5	1	5								
Methanethiol												
2-Methoxyaniline		2										
Methoxyethoxyethene												
2-Methoxyphenol	55											
Methyl aniline			12			1	1					
3-Methyldibenzothiophene												

MARCH, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	12		2									
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline						1	3					
N-Phenylaniline						1	2					
Phenylethanone		4	2									
Phthalic acid												
2-Propanol	721	9										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	141	43	8									
Tributyl phosphate	15	4	1									
Trimethyl naphthalenes	18	8	8									
Trimethyl phenanthrenes												
Vanillin	2	5										
Xylene												

MARCH, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	62	2										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	5	5										
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene	66											
2-Chlorophenol	2											
Chlorophenylether												
Chloroethane	3											
Chloroform	561	38		3				1		1		
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	3											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine												
1,1-Dichloroethane	3											
1,1-Dichloroethene												
1,2-Dichloroethane	2,610	160		7		3	3	3		1		
2,4-Dichlorophenol	1											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene	140											
Fluoranthene												
Methyl chloride												

APRIL, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	171	4	2	2				18				
Naphthalene	3											
Pentachlorophenol												
Phenanthrene		1										
Phenol				2								
Pyrene	1											
Tetrachloroethylene	851	20		2								
Toluene	9,300	9										
Trans-1,2-dichloroethylene												
Trichlorobenzene												
1,1,1-Trichloroethane	88	3										
Trichloroethylene	94	1										
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	5,600	130										
Acetovanillone	5											
Alkyl substituted benzenes	56	28	4	6								
Aniline	28											
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene	9											
Carbon disulfide												
2-Chloroaniline	180	10	11	4		1	28					
Chloromethylbenzene												

APRIL, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	61											
2,4'-Diamino-3,3'-dichloro-biphenyl	37	32										
2,2-Dichloroazobenzene	40	35	15	10	26							
1,4-Diethoxybenzene	2											
Diethoxychlorobenzene	47	5										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene	1	1										
Dimethoxybenzene		1										
3,4-Dimethoxyphenol	5											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	331	15										
Dimethyl naphthalenes	8	1										
Dimethyl oxetane												
1,4-Dioxane	26											
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline							1					
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol					5							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene							1					
2-Methoxyphenol	10											
Methyl aniline	43											
3-Methyldibenzothiophene												

APRIL, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	4											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline							1					
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,400	160										
Simazine												
Substituted arizidine						1						
Substituted benzoic acids	42											
Substituted indene												
Substituted naphthalenes	3											
Substituted naphthothiophenes		8										
Substituted phenanthrenes	11											
Substituted triazine						1						
Substituted vanillin	3											
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	240	9										
Tributyl phosphate	38	9										
Trimethyl naphthalenes	15	7										
Trimethyl phenanthrenes		9										
Vanillin												
Xylene												

APRIL, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	53	3										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate												
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene												
2-Chlorophenol	3											
Chlorophenylether												
Chloroethane												
Chloroform	840	61	2	5	2					1	1	
4-Chloro-3-methylphenol	1											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine												
1,1-Dichloroethane	8											
1,1-Dichloroethene												
1,2-Dichloroethane	420	260	2	3	2	3	3			1	1	1
2,4-Dichlorophenol	1											
Diethyl phthalate	1											
2,4-Dimethylphenol												
Dimethyl phthalate	1											
Di-n-butyl phthalate												
Ethylbenzene												
Fluoranthene												
Methyl chloride												

MAY, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride		8										
Naphthalene	2											
Pentachlorophenol												
Phenanthrene	1											
Phenol	4			1								
Pyrene												
Tetrachloroethylene	400	14	2	4		1	2				17	3
Toluene	2,600	2										
Trans-1,2-dichloroethylene	10	1										
Trichlorobenzene												
1,1,1-Trichloroethane	330	6	2	5	2		2			2		
Trichloroethylene	44	3										
2,4,6-Trichlorophenol	1											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	5,900	130										
Acetovanillone	6	1		3	1							
Alkyl substituted benzenes	51											
Aniline	7											
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide		3	1	1								
2-Chloroaniline	180	2	1	3	1							
Chloromethylbenzene												

MAY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	6											
2,4'-Diamino-3,3'-dichloro-biphenyl	2											
2,2-Dichloroazobenzene	57	7	9	12	8							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	42											
Dihydroxyphenylethanone	1											
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	1											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	240	29										
Dimethyl naphthalenes	10											
Dimethyl oxetane	13											
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one			2									
1H-Indole												
Isopropylidene dioxyphenol	1	1		3	1							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	11											
Methyl aniline	1											
3-Methyldibenzothiophene												

MAY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	8											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	7											
N-Phenylaniline												
Phenylethanone												
Phthalic acid	1											
2-Propanol	1,900	93										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane	1											
Tetrahydrofuranmethanol acetate			2									
Tetramethylbutylphenol												
Thiobismethane	290	25										
Tributyl phosphate												
Trimethyl naphthalenes	11											
Trimethyl phenanthrenes												
Vanillin												
Xylene	3											

MAY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	74	3										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	39	15										
Bromodichloromethane												
Butyl benzyl phthalate	2										7	
Chlorobenzene	9											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	940	52	1	23	1						1	
4-Chloro-3-methylphenol	2											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	6											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine	11											
1,1-Dichloroethane	17	1										
1,1-Dichloroethene	5											
1,2-Dichloroethane	470	60	1	50		2	2				2	
2,4-Dichlorophenol	1											
Diethyl phthalate	2											
2,4-Dimethylphenol	1											
Dimethyl phthalate	1											
Di-n-butyl phthalate	1											
Ethylbenzene	23						1					
Fluoranthene	530	23	1	12								
Methyl chloride												

JUNE, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	64	8										
Naphthalene	4											
Pentachlorophenol												
Phenanthrene	2											
Phenol												
Pyrene	1											
Tetrachloroethylene												
Toluene	2,500	41			1		1					
Trans-1,2-dichloroethylene	25	1										
Trichlorobenzene												
1,1,1-Trichloroethane	510	27		3	2		8					
Trichloroethylene	200	1										
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	18,000	78										
Acetovanillone	19											
Alkyl substituted benzenes	150	7	2									
Aniline	6										1	
Atrazine									1			3
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	300	86	2	39	1	2		1				
Chloromethylbenzene												

JUNE, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	11											
2,4'-Diamino-3,3'-dichloro-biphenyl	17	5	2									
2,2-Dichloroazobenzene	36	9	7	16	7							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	15	4	7									
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	1											
Dimethyl naphthalenes	32											
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole				1								
Isopropylidene dioxyphenol				1								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	21											
Methyl aniline												
3-Methyldibenzothiophene	2											

JUNE, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene	3											
Methyl naphthalenes	28											
Methyl phenanthrenes	10											
2-(methylthiol)benzothiazole				1								
Naphthol												
N,N-Dimethylaniline				1								
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,600	57										
Simazine									1	1		1
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanolacetate												
Tetramethylbutylphenol		2										
Thiobismethane	210	9		3								
Tributyl phosphate	20											
Trimethyl naphthalenes	25											
Trimethyl phenanthrenes												
Vanillin												
Xylene	5											

JUNE, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	76	4										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	29											
Bromodichloromethane	1											
Butyl benzyl phthalate												
Chlorobenzene	2											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	1,100	130	4	13	1					1		
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	3											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine	16											
1,1-Dichloroethane	8	2										
1,1-Dichloroethene												
1,2-Dichloroethane	56	190	4	20		2	2					
2,4-Dichlorophenol	2											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate												
Di-n-butyl phthalate												
Ethylbenzene	6	1										
Fluoranthene												
Methyl chloride												

JULY, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	26	7										
Naphthalene												
Pentachlorophenol												
Phenanthrene												
Phenol												
Pyrene												
Tetrachloroethylene	590	57	2	9								
Toluene	450	23		1						1		1
Trans-1,2-dichloroethylene	13	2										
Trichlorobenzene												
1,1,1-Trichloroethane	170	31	1	3								
Trichloroethylene	11	2										
2,4,6-Trichlorophenol	4											
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	580	830										
Acetovanillone												
Alkyl substituted benzenes	22	5										
Aniline												
Atrazine									1			
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	610	81	1	23	1							
Chloromethylbenzene	3											

JULY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol												
2,4'-Diamino-3,3'-dichloro-biphenyl	95	18										
2,2-Dichloroazobenzene	19	14	2	25	2							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	7			3								
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene	1											
3,4-Dimethoxyphenol	2											
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide												
Dimethyl naphthalenes												
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol		3		2								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol												
Methyl aniline												
3-Methyldibenzothiophene												

JULY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes												
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline												
N-Phenylaniline												
Phenylethanone	4											
Phthalic acid												
2-Propanol	160	230										
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane	1											
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	60	12		1								
Tributyl phosphate	2											
Trimethyl naphthalenes												
Trimethyl phenanthrenes												
Vanillin												
Xylene	1									1		

JULY, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	110											
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	9	16										
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene	3											
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	530	4	1	15								
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	5											
1,1-Dichloroethane	6											
1,1-Dichloroethene												
1,2-Dichloroethane	98	31		13	1	2	2					
2,4-Dichlorophenol	1											
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	1											
Di-n-butyl phthalate												
Ethylbenzene	14											
Fluoranthene												
Methyl chloride												

AUGUST, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	1	1										
Pentachlorophenol												
Phenanthrene												
Phenol												
Pyrene												
Tetrachloroethylene	1,600	8	1	9								
Toluene	11,000	33										
Trans-1,2-dichloroethylene	6											
Trichlorobenzene												
1,1,1-Trichloroethane	96	2		3	1		1					
Trichloroethylene	15			1							1	
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	4,800											
Acetovanillone												
Alkyl substituted benzenes	27	14										
Aniline	9	19										
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	700	300	6	37	1							
Chloromethylbenzene												

AUGUST, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	3	3										
2,4'-Diamino-3,3'-dichloro-biphenyl	43	9										
2,2-Dichloroazobenzene	28	16	2	28	2							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	24	22										
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide	25	10										
Dimethyl naphthalenes	10	2										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol		3	1	3								
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol												
Methyl aniline	280	190		5								
3-Methyldibenzothiophene												

AUGUST, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	3											
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	39	10										
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	3,100											
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	48	1										
Tributyl phosphate	20	18										
Trimethyl naphthalenes	11	4										
Trimethyl phenanthrenes												
Vanillin												
Xylene	3	2										

AUGUST, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	440	130										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	97	74										
Bromodichloromethane												
Butyl benzyl phthalate												
Chlorobenzene												
2-Chlorophenol												
Chlorophenylether												
Chloroethane												
Chloroform	930	560	1	8	7							
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	7											
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	190	77										
1,1-Dichloroethane	6	4										
1,1-Dichloroethene												
1,2-Dichloroethane	470	1,000		10	3	2	2					
2,4-Dichlorophenol												
Diethyl phthalate												
2,4-Dimethylphenol												
Dimethyl phthalate	3											
Di-n-butyl phthalate												
Ethylbenzene	9											
Fluoranthene	2											
Methyl chloride												

SEPTEMBER, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride												
Naphthalene	4											
Pentachlorophenol												
Phenanthrene	1	1										
Phenol	4											
Pyrene												
Tetrachloroethylene	500	340	4	5	7			3				
Toluene	5,200	450		1	1							
Trans-1,2-dichloroethylene	13	8										
Trichlorobenzene	4											
1,1,1-Trichloroethane	99	58	2		3							
Trichloroethylene	16	19					2					
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline	9											
Acetone	13,000	28,000										
Acetovanillone	1	8										
Alkyl substituted benzenes	180	62										
Aniline	29											
Atrazine											1	
Azobenzene												
Benzaldehyde												
Benzyl alcohol												
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	510	170	19	4	2		1					
Chloromethylbenzene												

SEPTEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	12	2										
2,4'-Diamino-3,3'-dichloro-biphenyl	1,300	1,000										
2,2-Dichloroazobenzene	75	53	2	13	5							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	51	35	1	5	1							
Dihydroxyphenylethanone												
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol												
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide												
Dimethyl naphthalenes	19	9										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane	39	7										
Ethyl aniline												
Ethyl phenol												
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol		11		4	3							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	4											
Methyl aniline		18										
3-Methyldibenzothiophene												

SEPTEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	12	5										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	54	6										
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,500	14,000										
Simazine								2			2	
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	87	100										
Tributyl phosphate	8	24										
Trimethyl naphthalenes	21	10										
Trimethyl phenanthrenes												
Vanillin												
Xylene	6											

SEPTEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	440	28										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate	28	13										
Bromodichloromethane												
Butyl benzyl phthalate	1											
Chlorobenzene	1											
2-Chlorophenol	1											
Chlorophenylether												
Chloroethane												
Chloroform	1,000	150	1	27	14					1		
4-Chloro-3-methylphenol	59											
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene												
1,4-Dichlorobenzene												
3,3'-Dichlorobenzidine	6	13										
1,1-Dichloroethane	11	1										
1,1-Dichloroethene												
1,2-Dichloroethane	120	51		5	5	2	1					
2,4-Dichlorophenol	2	1										
Diethyl phthalate												
2,4-Dimethylphenol	1	1										
Dimethyl phthalate	2											
Di-n-butyl phthalate	1											
Ethylbenzene	8	5		2								
Fluoranthene			3	2	1							
Methyl chloride												

OCTOBER, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride	15											
Naphthalene	3	1										
Pentachlorophenol												
Phenanthrene	1											
Phenol	3	2		4								
Pyrene												
Tetrachloroethylene	390	94	2	57	8		2	5				
Toluene	1,400	19		3	1							
Trans-1,2-dichloroethylene	13	3										
Trichlorobenzene												
1,1,1-Trichloroethane	250	16		2	3							
Trichloroethylene	29	8		3	2							
2,4,6-Trichlorophenol	4	2		1	1							
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline												
Acetone	32	5,700										
Acetovanillone	51	13		1								
Alkyl substituted benzenes	130	62										
Aniline	27											
Atrazine												
Azobenzene												
Benzaldehyde	1	1										
Benzyl alcohol	4											
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	55	93	7	59	1	1						
Chloromethylbenzene												

OCTOBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	24	3		1								
2,4'-Diamino-3,3'-dichloro-biphenyl	25	45										
2,2-Dichloroazobenzene	30	39	5	15	12							
1,4-Diethoxybenzene		15										
Diethoxychlorobenzene	35	44	4	14								
Dihydroxyphenylethanone	5											
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	10	5		4								
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide												
Dimethyl naphthalenes	25	4										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline		17										
Ethyl phenol	10											
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	14	11	2	15	5							
Methanethiol												
2-Methoxyaniline												
Methoxyethoxyethene												
2-Methoxyphenol	51											
Methyl aniline	15	86		22								
3-Methyldibenzothiophene												

OCTOBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	13	3										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline	39	13		2								
N-Phenylaniline												
Phenylethanone												
Phthalic acid												
2-Propanol	1,000	96		40								
Simazine											1	
Substituted arizidine												
Substituted benzaldehyde		1										
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin	17	9										
Sulfonylbismethane												
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	95	33		4	1							
Tributyl phosphate	28		1	18	7							
Trimethyl naphthalenes	24	10										
Trimethyl phenanthrenes												
Vanillin		4		1	1							
Xylene												

OCTOBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Priority Pollutants	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Acenaphthene												
Acenaphthylene												
Anthracene												
Benzene	96	9										
Benzo (a) anthracene												
Benzo (a) pyrene												
Bis(2-ethylhexyl)phthalate				6								
Bromodichloromethane	2											
Butyl benzyl phthalate												
Chlorobenzene	5	1										
2-Chlorophenol	1											
Chlorophenylether												
Chloroethane												
Chloroform	590	140	3	49	13			2		3	3	
4-Chloro-3-methylphenol												
2-Chloronaphthalene												
Chrysene												
1,2-Dichlorobenzene	2											
1,4-Dichlorobenzene	1											
3,3'-Dichlorobenzidine	18	4										
1,1-Dichloroethane	5	1										
1,1-Dichloroethene												
1,2-Dichloroethane	61	26		10	2	2	2					
2,4-Dichlorophenol	1											
Diethyl phthalate	4	1										
2,4-Dimethylphenol	1	1										
Dimethyl phthalate	18	3										
Di-n-butyl phthalate	2	1										
Ethylbenzene	7											
Fluoranthene												
Methyl chloride												

NOVEMBER, 1981 COMPOSITE SAMPLES (μG/L)

Priority Pollutants (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Methylene chloride		10										
Naphthalene	6	1										
Pentachlorophenol												
Phenanthrene	2											
Phenol	3											
Pyrene	1											
Tetrachloroethylene	190	44	1	16	2							
Toluene	910	46	1	5			1					
Trans-1,2-dichloroethylene	6	2										
Trichlorobenzene	1											
1,1,1-Trichloroethane	150	68										
Trichloroethylene	13	6										
2,4,6-Trichlorophenol												
Vinyl chloride												
Additional Organic Chemicals												
Acetaniline	45											
Acetone	2,200	1,100										
Acetovanillone	15											
Alkyl substituted benzenes	140	25	7	36	16							
Aniline	210											
Atrazine												
Azobenzene												
Benzaldehyde												
Benzyl alcohol	11											
Butyl benzene												
Carbon disulfide												
2-Chloroaniline	230	63	3	88	3	1	1					
Chloromethylbenzene												

NOVEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
Cresol	10	1		1								
2,4'-Diamino-3,3'-dichloro-biphenyl	71	30		25								
2,2-Dichloroazobenzene	88	53	8	49	8							
1,4-Diethoxybenzene												
Diethoxychlorobenzene	29	22	8	24	1							
Dihydroxyphenylethanone		11										
Diisopropoxychlorobenzene												
Dimethoxybenzene												
3,4-Dimethoxyphenol	1	4										
3,4-Dimethylphenol												
Dimethyl benzaldehyde												
Dimethyl disulfide		17										
Dimethyl naphthalenes	23	9										
Dimethyl oxetane												
1,4-Dioxane												
N-Ethylaniline												
2-Ethoxypropane												
Ethyl aniline												
Ethyl phenol	1											
Hexahydroazepin-2-one												
1H-Indole												
Isopropylidene dioxyphenol	4	3		2	1							
Methanethiol												
2-Methoxyaniline	17											
Methoxyethoxyethene												
2-Methoxyphenol	23											
Methyl aniline				37								
3-Methyldibenzothiophene												

NOVEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

Additional Org. Chem. (Cont'd)	Influent	Spillway	East Lagoon	West Lagoon	Outlet Lagoon	SD	ND	05	34	DT 11	DT 19	DT 48
4-Methyldibenzothiophene												
Methyl naphthalenes	17	4										
Methyl phenanthrenes												
2-(methylthiol)benzothiazole												
Naphthol												
N,N-Dimethylaniline		4		6	1							
N-Phenylaniline												
Phenylethanone	10	9										
Phthalic acid												
2-Propanol	35	1,100		39								
Simazine												
Substituted arizidine												
Substituted benzoic acids												
Substituted indene												
Substituted naphthalenes												
Substituted naphthothiophenes												
Substituted phenanthrenes												
Substituted triazine												
Substituted vanillin												
Sulfonylbismethane	1											
Tetrahydrofuranmethanol acetate												
Tetramethylbutylphenol												
Thiobismethane	11	38		12	2							
Tributyl phosphate	160	38	10	22	9		1	1				
Trimethyl naphthalenes	33	11										
Trimethyl phenanthrenes												
Vanillin	2											
Xylene	5	6										

NOVEMBER, 1981 COMPOSITE SAMPLES (μG/L) (CONTINUED)

<u>WELL SAMPLES</u>

Well Samples

USGS Wells

Date	Well Number	Concentration
2-02-80	USGS 6	No Detectable Compounds
5-31-80	USGS 3	No Detectable Compounds
9-05-80	USGS 2	No Detectable Compounds
9-20-80	USGS 4	No Detectable Compounds
11-06-80	USGS 3	No Detectable Compounds
11-25-80	USGS 5	No Detectable Compounds
4-17-81	USGS 1	No Detectable Compounds
1-21-81	USGS 5	No Detectable Compounds
2-04-81	USGS 6	No Detectable Compounds
7-09-81	USGS 2	No Detectable Compounds

Lagoon Seepage Wells

4-06-80	LS34-C3	No Detectable Compounds
5-01-80	17A	No Detectable Compounds
7-08-80	5B2	No Detectable Compounds
7-28-80	1B2	No Detectable Compounds
8-08-80	1B2	No Detectable Compounds
8-20-80	4B2	No Detectable Compounds
10-24-80	6B2	No Detectable Compounds
10-07-80	LS33-B2	No Detectable Compounds

2B2 6-13-80

Priority Pollutants	Concentration (μg/l)
1,2-Dichloroethane	5
No other compounds detected	

3B2 6-27-80

Priority Pollutants	
1,2-Dichloroethane	5
No other compounds detected	

LS34-C2 3-10-80

Priority Pollutants	
Benzene	11
1,2-Dichloroethane	53

LS34-C2 (Cont'd) 3-10-80

Additional Organic Compounds	Concentration (μg/1)
2-Chloroaniline	210
Tributyl phosphate	8
N,N-Dimethyl aniline	8
No other compounds detected	

WELLS

LS33-B2 12-09-80

Additional Organic Compounds	
Dichloroazobenzene	3
No other compounds detected	

LS31-B2 10-20-80

Priority Pollutants	
Chloroform	6
1,2-Dichloroethane	10
Di-n-butyl phthalate	1
Bis(ethylhexyl)phthalate	2

Additional Organic Compounds	
Dichloroazobenzene	1
No other compounds detected	

LS34-C2 1-06-81

Priority Pollutants	
1,2-Dichloroethane	83
Bis(ethylhexyl)phthalate	4,400
Benzene	8

Additional Organic Compounds	
2-Chloroaniline	2,400

LS1-B2 2-19-81

Priority Pollutants	
Chloroethane	1
1,2-Dichloroethane	1
Di-n-butyl phthalate	2

LS1-B2 (Cont'd) 2-19-81

Additional Organic Compounds	Concentration ($\mu g/l$)
Cresol	1
Methyl aniline	2
Ethyl aniline	3
No other compounds detected	

3B2 5-19-81

Priority Pollutants	
1,2-Dichloroethane	17
1,1,1-Trichloroethane	2
Tetrachloroethylene	1
Chloroethane	2

Additional Organic Compounds	
Carbon disulfide	1
Tetrahydrofuran*	11

* Plastic well, compound found in PVC Cement

34-C2 5-29-81

Priority Pollutants	
Chloroform	4
1,2-Dichloroethane	10
1,1,1-Trichloroethane	1
Benzene	1
Tetrachloroethylene	1

Additional Organic Compounds	
2-Chloroaniline	600

LS31-B2 3-24-81

Priority Pollutants	
Chloroform	2
Naphthalene	1
Di-n-butyl phthalate	2

Additional Organic Compounds	
Acetone*	34
Tetrahydrofuran*	38

LS31-B2 (Cont'd) 3-24-81

Additional Organic Compounds (Cont'd)	Concentration (μg/l)
Carbon disulfide	2
Aniline	1
2-Chloroaniline	2

* Plastic well, compounds found in PVC Cement

LS1-B2 3-11-81

Priority Pollutants	
Toluene	6
Naphthalene	1
Di-n-butyl phthalate	3
Additional Organic Compounds	
Methyl aniline	1
Ethyl aniline	1

Monitoring Wells

Well Group	Date	Compound and Concentration (μg/l)	
USGS 2	7/81	No detectable compounds	
2B2	7/81	Chloroethane	8
		1,2-Dichloroethane	3
		Tetrachloroethylene	3
		Toluene	9
1B2	8/81	Chloroethane	8
		Trans-1,2-dichloroethylene	1
		Trichloroethylene	1

WELLS

2B2 7-81

Priority Pollutants	Concentration (μg/l)
Chloroethane	8
1,2-Dichloroethane	3
Tetrachloroethylene	26
Toluene	9

2B2 (Cont'd) 7-81

Additional Organic Compounds	Concentration (μg/l)
No other compounds detected	

1B2 8-81

Priority Pollutants

Chloroethane	8
Trans-1,2-dichloroethylene	1
Trichloroethylene	1

Additional Organic Compounds

No other compounds detected

4B2 9-81

Priority Pollutants

Not detected, 1 μg/l

Additional Organic Compounds

Not detected

5B2 10-81

Priority Pollutants

Not detected, 1 μg/l

Additional Organic Compounds

Not detected

6B2 11-81

Priority Pollutants

Not detected, 1 μg/l

Additional Organic Compounds

Not detected

LAGOON SEEPAGE WELL SAMPLES

New Lagoon Seepage Wells
5/81

A-1
70 ft

Priority Pollutants	μg/l
Not detected at 1 g/l	
Additional Organic Compounds	
2-Chloroaniline	1
Substituted Benzene	1
Isopropylidenedioxyphenol	3
Vanillin	1

A-2
50 ft

Priority Pollutants

Not detected at 1 g/l

Additional Organic Compounds

Not detected

A-3
30 ft

Priority Pollutants

Not detected at 1 g/l

Additional Organic Compounds

Isopropylidenedioxyphenol	2
2-Chloroaniline	113

B-1
50 ft

Priority Pollutants

Trans-1,2-dichloroethane	1
Bis(ethylhexyl)phthalate	6

New Lagoon Seepage Wells
5/81

B-1
50 ft

Continued

Additional Organic Compounds	µg/l
N-Phenylacetamide	3
Ethyl aniline	7
2-Chloroaniline	250
N,N-Dimethylaniline	6

B-2
40 ft

Priority Pollutants	
1,1-Dichloroethane	1
Diethyl phthalate	1

Additional Organic Compounds	
Isopropylidene dioxyphenol	1
Methyl aniline	2
Ethyl aniline	8
2-Chloroaniline	22
Trimethyltriazene-trione	7
Atrazine	2

B-3
30 ft

Priority Pollutants	
Diethyl phthalate	1
Bis(ethylhexyl)phthalate	20

Additional Organic Compounds	
Isopropylidene dioxy phenol	2
Methyl aniline	10
2-Chloroaniline	80
Trimethyl triazene-trione	2
Atrazene	1

New Lagoon Seepage Wells
5/81

C-1
70 ft

Priority Pollutants	µg/l
Di-n-butyl phthalate	1

Additional Organic Compounds

Not detected

C-2
50 ft

Priority Pollutants	
Tetrachloroethylene	9

Additional Organic Compounds

Not detected

C-3
30 ft

Priority Pollutants

None

Additional Organic Compounds	
Isopropylidene dioxyphenol	6
Methyl aniline	1
2-Chloroaniline	29

D-1
70 ft

Priority Pollutants	
Tetrachloroethylene	18
Di-n-butyl phthalate	3
Bis(ethylhexyl)phthalate	430

New Lagoon Seepage Wells
5/81

D-1
70 ft

Continued

Additional Organic Compounds	µg/l
Not detected	

D-2
50 ft

Priority Pollutants

Not detected at 1 g/l

Additional Organic Compounds

Not detected

D-3
30 ft

Priority Pollutants	
1,2-Dichloroethane	9
Tetrachloroethylene	92
Toluene	2

Additional Organic Compounds	
Isopropylidene dioxyphenol	1
2-Chloroaniline	160
Methyl aniline	2
Tributyl phosphate	1
N,N-Dimethyl aniline	4
Trimethyltriazene-trione	1

New Lagoon Seepage Wells
9-81

A-2
50 ft

Priority Pollutants	µg/l
Not detected	

Additional Organic Compounds

Tributyl phosphate	1
Di-n-butyl phthalate	18

A-3
30 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Methyl aniline	11
2-Chloroaniline	170
Tributyl phosphate	8
Di-n-butyl phthalate	2

B-1
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

2-Chloroaniline	28

B-2
40 ft

Priority Pollutants

Not detected

B-2 (Cont'd)

Additional Organic Compounds	µg/l
Methyl aniline	4
2-Chloroaniline	45
Tributyl phosphate	2
Substituted triazine	2

B-3
30 ft

Priority Pollutants

Not detected

Additional Organic Compounds	
Methyl aniline	2
2-Chloroaniline	25

C-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

C-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

New Lagoon Seepage Wells
9/81 (Cont'd)

C-3
30 ft

Priority Pollutants	μg/l
Not detected	
Additional Organic Compounds	
2-Chloroaniline	47
Tributyl phosphate	9

D-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

D-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

New Lagoon Seepage Wells
9/81 (Cont'd)

D-3
30 ft

Priority Pollutants	µg/l
1,2-Dichloroethane	7
Additional Organic Compounds	
2-Chloroaniline	83
Tributyl phosphate	2
N,N-Dimethyl aniline	3

New Lagoon Seepage Wells
10/81

A-2
50 ft

Priority Pollutants	μg/l
Not detected	
Additional Organic Compounds	
2-Chloroaniline	2

A-3
30 ft

Priority Pollutants	
Not detected	
Additional Organic Compounds	
Methyl aniline	7
2-Chloroaniline	29
Isopropylidine dioxy phenol	1

B-1
50 ft

Priority Pollutants	
Not detected	
Additional Organic Compounds	
2-Chloroaniline	39
N,N-Dimethyl aniline	4

B-2
40 ft

Priority Pollutants

Not detected

B-2 (Cont'd)

Additional Organic Compounds	µg/l
Methyl aniline	4
2-Chloroaniline	19
Substituted triazine	5

B-3
30 ft

Priority Pollutants

Not detected

Additional Organic Compounds	
Methyl aniline	2
2-Chloroaniline	77
Substituted triazine	3

C-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

C-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

New Lagoon Seepage Wells
10/81 (Cont'd)

C-3
30-ft

Priority Pollutants	µg/l
Not detected	
Additional Organic Compounds	
Methyl aniline	2
2-Chloroaniline	44
Isopropylidine dioxy phenol	1

D-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

D-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

D-3
30 ft

Priority Pollutants	
1,2-Dichloroethane	8
Additional Organic Compounds	
2-Chloroaniline	74

New Lagoon Seepage Wells
11/81

A-2
50 ft

Priority Pollutants	μg/l
Not detected	
Additional Organic Compounds	
Not detected	

A-3
30 ft

Priority Pollutants	
Not detected	
Additional Organic Compounds	
2-Chloroaniline	260
Isopropylidine dioxy phenol	2

B-1
50 ft

Priority Pollutants	
Not detected	
Additional Organic Compounds	
2-Chloroaniline	360
N,N-Dimethyl aniline	3

B-2
40 ft

Priority Pollutants

Not detected

New Lagoon Seepage Wells
11/81 (Cont'd)

B-2 (Cont'd)

Additional Organic Compounds	µg/l
2-Chloroaniline	19
Substituted triazine	6

B-3
30 ft

Priority Pollutants

Not detected

Additional Organic Compounds	
2-Chloroaniline	6
Isopropylidine dioxy phenol	1

C-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

C-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds	
Phthalate	16

C-3
30 ft

Priority Pollutants	µg/l
Not detected	
Additional Organic Compounds	
2-Chloroaniline	37
Isopropylidine dioxy phenol	1

D-1
70 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

D-2
50 ft

Priority Pollutants

Not detected

Additional Organic Compounds

Not detected

D-3
30 ft

Priority Pollutants	
1,2-Dichloroethane	5
Additional Organic Compounds	
2-Chloroaniline	140
N,N-Dimethyl aniline	2

Lagoon Seepage Study

Chlorinated Aromatic Amines

(6/81)

Well	Concentration (μg/l) 2-Chloroaniline	3,3'-Dichlorobenzidine	2,4'-Diamino-3,3'-dichlorobiphenyl
A-1	Dry	< 1	< 1
A-2	9	< 1	< 1
A-3	300	< 1	< 1
B-1	190	< 1	< 1
B-2	190	< 1	< 1
B-3	70	< 1	< 1
C-1	< 1	< 1	< 1
C-2	< 1	< 1	< 1
C-3	63	< 1	< 1
D-1	< 1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	160	< 1	< 1
34-C2	190	< 1	< 1

Lagoon Seepage Study

Chlorinated Aromatic Amines

(7/81)
Concentration (μg/l)

Well	2-Chloro-aniline	3,3'-Dichloro-benzidine	2,4'-Diamino-3,3'-dichloro-biphenyl
A-1	Dry	< 1	< 1
A-2	7	< 1	< 1
A-3	420	< 1	< 1
B-1	195	< 1	< 1
B-2	180	< 1	< 1
B-3	90	< 1	< 1
C-1	1	< 1	< 1
C-2	1	< 1	< 1
C-3	59	< 1	< 1
D-1	1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	180	< 1	< 1
34-C2	240	< 1	< 1

Lagoon Seepage Study

Chlorinated Aromatic Amines

(8/81)
Concentration (μg/l)

Well	2-Chloro-aniline	3,3'-Dichloro-benzidine	2,4'-Diamino-3,3'-dichloro-biphenyl
A-1	Dry	< 1	< 1
A-2	4	< 1	< 1
A-3	510	< 1	< 1
B-1	230	< 1	< 1
B-2	210	< 1	< 1
B-3	100	< 1	< 1
C-1	1	< 1	< 1
C-2	1	< 1	< 1
C-3	69	< 1	< 1
D-1	< 1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	170	< 1	< 1
34-C2	210	< 1	< 1

Lagoon Seepage Study

Chlorinated Aromatic Amines

Well	2-Chloro-aniline	3,3'-Dichloro-benzidine	2,4'-Diamino-3,3'-dichloro-biphenyl
	Concentration (9/81) (μg/l)		
A-1	Dry		
A-2	3	< 1	< 1
A-3	140	< 1	< 1
B-1	29	< 1	< 1
B-2	55	< 1	< 1
B-3	25	< 1	< 1
C-1	< 1	< 1	< 1
C-2	< 1	< 1	< 1
C-3	49	< 1	< 1
D-1	< 1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	85	< 1	< 1
34C2	120	< 1	< 1

Lagoon Seepage Study

Chlorinated Aromatic Amines

	Concentration (10/81) (µg/l)		
Well	2-Chloro aniline	3,3'-Dichloro-benzidine	2,4'-Diamino-3,3'-dichloro-biphenyl
A-1	Dry		
A-2	3	< 1	< 1
A-3	29	< 1	< 1
B-1	45	< 1	< 1
B-2	20	< 1	< 1
B-3	77	< 1	< 1
C-1	< 1	< 1	< 1
C-2	< 1	< 1	< 1
C-3	5	< 1	< 1
D-1	< 1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	100	< 1	< 1
34-C2	100	< 1	< 1

Lagoon Seepage Study

Chlorinated Aromatic Amines

	Concentration (11/81) (μg/l)		
Wells	2-Chloro-aniline	3,3'-Dichloro-benzidine	2,4'-Diamino-3,3'-dichloro-biphenyl
A-1	Dry		
A-2	< 1	< 1	< 1
A-3	380	< 1	< 1
B-1	398	< 1	< 1
B-2	50	< 1	< 1
B-3	23	< 1	< 1
C-1	< 1	< 1	< 1
C-2	< 1	< 1	< 1
C-3	45	< 1	< 1
D-1	< 1	< 1	< 1
D-2	< 1	< 1	< 1
D-3	135	< 1	< 1
34-C2	85	< 1	< 1

Lagoon Seepage Study

1,2-Dichloroethane

	Concentration (μg/l)					
Wells	6/81	7/81	8/81	9/81	10/81	11/81
1-B2	< 1	< 1	< 1	< 1	< 1	< 1
2-B2	7.1	6.2	6.8	3.9	2.4	< 1
3-B2	3.3	4.1	4.5	1.9	3.2	2.7
4-B2	< 1	< 1	< 1	< 1	< 1	< 1
5-B2	< 1	< 1	< 1	< 1	< 1	< 1
6-B2	< 1	< 1	< 1	< 1	< 1	< 1
34-C2	10	12	8	6	3	4
A-1	< 1	< 1	< 1	< 1	< 1	< 1
A-2	< 1	< 1	< 1	< 1	< 1	< 1
A-3	< 1	< 1	< 1	< 1	< 1	< 1
B-1	< 1	< 1	< 1	< 1	< 1	< 1
B-2	< 1	< 1	< 1	< 1	< 1	< 1
B-3	< 1	< 1	< 1	< 1	< 1	< 1
C-1	< 1	< 1	< 1	< 1	< 1	< 1
C-2	< 1	< 1	< 1	< 1	< 1	< 1
C-3	< 1	< 1	< 1	< 1	< 1	< 1
D-1	< 1	< 1	< 1	< 1	< 1	< 1
D-2	< 1	< 1	< 1	< 1	< 1	< 1
D-3	15	9	12	12	8	6

Dike Wells

Compound	Date: 6/81 Well:	Concentration (μg/l) A2	A3	C1	C2	C3
Methyl aniline		1	4	1	1	4
2-Chloroaniline		7	290	1	1	58
	Date: 7/81					
Methyl aniline		1	6	1	1	1
2-Chloroaniline		6	390	1	1	54
	Date: 8/81					
Methyl aniline		1	3	1	1	2
2-Chloroaniline		4	450	1	1	62

SOIL SAMPLES

Soils, Circle 11, 1 foot, 11/80

Priority Pollutants	µg/g
Di-n-butyl phthalate	0.18
Bis(ethylhexyl)phthalate	0.25
Additional Organic Compounds	
2,2'-Dichloroazobenzene	0.10

Soils, Circle 11, 2 feet, 11/80

Priority Pollutants	
Diethyl phthalate	0.12
Di-n-butyl phthalate	2.2
Bis(ethylhexyl)phthalate	1.7
Additional Organic Compounds	
Xylene	1.0

Soils, Circle 11, 3 feet, 11/80

Priority Pollutants	
Diethyl phthalate	0.07
Di-n-butyl phthalate	1.7
Additional Organic Compounds	
Xylene	1.1

Soil, Circle 11, 1 foot, 4/81

Priority Pollutants	μg/g
Diethylphthalate	0.029
Butyl benzyl phthalate	1.5

Additional Organic Compounds	
Xylene	0.27
Dichloroazobenzene	0.055
Benzyl alcohol	0.040
Phenyl ethanone	0.029
Butyl-methylpropyl phthalate	0.21

Soil, Circle 11, 2 feet, 4/81

Priority Pollutants	
Diethylphthalate	0.037

Additional Organic Compounds	
Xylene	0.39

Soil, Circle 11, 3 feet, 4/81

Priority Pollutants	
Diethylphthalate	0.062
Di-n-butyl phthalate	0.20

Additional Organic Compounds	
Xylene	0.28
Benzyl alcohol	0.091

Soil Circle 11, 1 foot, 5/81

Priority Pollutants	μg/g
Diethylphthalate	0.072
Di-n-butyl phthalate	0.087
Bis(ethylhexyl)phthalate	0.093

Additional Organic Compounds	
Dichloroazobenzene	0.047

Soil Circle 11, 2 feet, 5/81

Priority Pollutants	
Diethylphthalate	0.10
Di-n-butyl phthalate	0.19
Butyl benzyl phthalate	0.14
Bis(ethylhexyl)phthalate	0.12

Additional Organic Compounds	
N-phenylaniline	0.023

Soil Circle 11, 3 feet, 5/81

Priority Pollutants	
Diethylphthalate	0.064
Di-n-butyl phthalate	0.10
Butyl benzyl phthalate	0.025
Bis(ethylhexyl)phthalate	1.2

Additional Organic Compounds	
Xylene	0.24
Ethenyl benzene	0.061

Soils, Circle 19, 1 foot, 11/80

Priority Pollutants	μg/g
Diethyl phthalate	0.06
Di-n-butyl phthalate	0.97
Bis(ethylhexyl)phthalate	8.9
Aroclor 1016	0.09
Additional Organic Compounds	
2,2'-Dichloroazobenzene	0.11

Soils, Circle 19, 2 feet, 11/80

Priority Pollutants	
Diethyl phthalate	0.05
Di-n-butyl phthalate	1.2
Bis(ethylhexyl)phthalate	1.3
Aroclor 1016	0.026
Additional Organic Compounds	
Xylene	0.23
2,2'-Dichloroazobenzene	0.04

Soils, Circle 19, 3 feet, 11/80

Priority Pollutants	
Di-n-butyl phthalate	0.68
Bis(ethylhexyl)phthalate	0.21
Aroclor 1016	0.016
Additional Organic Compounds	
Not detected	

Soil, Circle 19, 1 foot, 4/81

Priority Pollutants	µg/g
Diethyl phthalate	0.074
Di-n-butyl phthalate	0.64

Additional Organic Compounds	
Xylene	0.32
Ethenyl benzene	0.098
Dichloroazobenzene	0.038
Benzyl alcohol	0.061
Phenyl ethanone	0.079
Butyl-methylpropyl phthalate	3.9

Soil, Circle 19, 2 feet, 4/81

Priority Pollutants	
Diethylphthalate	0.034
Di-n-butyl phthalate	0.12

Additional Organic Compounds	
Xylene	0.25
Ethenyl benzene	0.080
Benzyl alcohol	0.062
Phenylethanone	0.055

Soil, Circle 19, 3 feet, 4/81

Priority Pollutants	
Diethylphthalate	0.038
Di-n-butyl phthalate	0.17

Additional Organic Compounds	
Xylene	0.25
Ethenyl benzene	0.088
Benzyl alcohol	0.048
Phenyl ethanone	0.057
Butyl-methylpropyl phthalate	0.27

Soil, Circle 19, 1 foot, 5/81

Priority Pollutants	µg/g
Not detected	
Additional Organic Compounds	
Xylene	0.15

Soil, Circle 19, 2 feet, 5/81

Priority Pollutants	
Diethylphthalate	0.007
Di-n-butyl phthalate	0.042
Additional Organic Compounds	
Xylene	0.14
Ethenyl benzene	0.15
Phenyl ethanone	0.056

Soil, Circle 19, 3 feet, 5/81

Priority Pollutants	
Bis(ethylhexyl)phthalate	0.97
Additional Organic Compounds	
Xylene	0.29
Ethenyl benzene	0.36
Phenyl ethanone	0.12

Soils, Circle 48, 1 foot, 11/80

Priority Pollutants	μg/g
Di-n-butyl phthalate	0.81
Bis(ethylhexyl)phthalate	1.4

Additional Organic Compounds

Xylene	0.21

Soils, Circle 48, 2 feet, 11/80

Priority Pollutants	
Diethyl phthalate	0.052
Di-n-butyl phthalate	0.12
Bis(ethylhexyl)phthalate	0.25

Additional Organic Compounds

Not detected

Soils, Circle 48, 3 feet, 11/80 .

Priority Pollutants	
Diethyl phthalate	0.048
Dibutyl phthalate	0.38
Bis(ethylhexyl)phthalate	0.38

Additional Organic Compounds

Not detected

Soil, Circle 48, 1 foot, 4/81

Priority Pollutants	µg/g
Diethylphthalate	0.092
Di-n-butyl phthalate	0.84
Butyl benzyl phthalate	0.11
Additional Organic Compounds	
Xylene	0.24
Ethenyl benzene	0.079
Dichloroazobenzene	0.068
Benzyl alcohol	0.068
Phenyl ethanone	0.034
Butyl-methylpropyl phthalate	0.25

Soil, Circle 48, 2 feet, 4/81

Priority Pollutants	
Diethylphthalate	0.061
Di-n-butyl phthalate	0.14
Butyl benzyl phthalate	0.78
Bis(ethyl hexyl)phthalate	0.28
Additional Organic Compounds	
Xylene	0.21
Ethenyl benzene	0.072
Benzyl alcohol	0.12
Phenyl ethanone	0.059
Butyl-methylpropyl phthalate	0.055

Soil, Circle 48, 3 feet, 4/81

Priority Pollutants	
Diethyl phthalate	0.038
Di-n-butyl phthalate	0.081
Butyl benzyl phthalate	0.39
Additional Organic Compounds	
Xylene	0.41
Benzyl alcohol	0.22

Soil, Circle 48, 1 foot, 5/81

Priority Pollutants	μg/g
Diethylphthalate	0.008
Di-n-butyl phthalate	0.062
Bis(ethylhexyl)phthalate	8.3
Additional Organic Compounds	
Dichloroazobenzene	0.012
Ethenyl benzene	0.099
Benzaldehyde	0.056
Phenyl ethanone	0.061
(methylpropyl) butyl phthalate	0.11

Soil, Circle 48, 2 feet, 5/81

Priority Pollutants	
Di-n-butyl phthalate	0.074
Bis(ethylhexyl)phthalate	4.4
Additional Organic Compounds	
Xylene	0.030
Benzyl alcohol	0.051

Soil, Circle 48, 3 feet, 5/81

Priority Pollutants	
Di-n-butyl phthalate	0.034
Bis(ethylhexyl)phthalate	4.9
Additional Organic Compounds	
Benzyl alcohol	0.044

Soil, Circle 11, 1 foot, 6/81

Priority Pollutants	µg/g
Diethyl phthalate	0.022
Di-n-butyl phthalate	0.13
Butyl benzyl phthalate	0.15
Additional Organic Compounds	
Xylene	0.32
2,2'-Dichloroazobenzene	0.14
Benzyl alcohol	0.045
Phenyl ethanone	0.038

Soil, Circle 11, 2 feet, 6/81

Priority Pollutants	
Diethyl phthalate	0.030
Di-n-butyl phthalate	0.095
Phenol	0.061
Additional Organic Compounds	
Xylene	0.25
Benzyl alcohol	0.058

Soil, Circle 11, 3 feet, 6/81

Priority Pollutants	
Di-n-butyl phthalate	0.12
Bis(ethylhexyl)phthalate	2.8
Phenol	0.087

Additional Organic Compounds

Not detected

Soil, Circle 11, 1 foot, 7/81

Priority Pollutants	µg/g
Di-n-butyl phthalate	0.094
Phenol	0.040
Trichloroethylene	0.006

Additional Organic Compounds

Not detected

Soil, Circle 11, 2 feet, 7/81

Priority Pollutants	
Phenol	0.047

Additional Organic Compounds

Not detected

Soil, Circle 11, 3 feet, 7/81

Priority Pollutants	
Diethyl phthalate	0.049
Di-n-butyl phthalate	0.71
Phenol	0.054

Additional Organic Compounds	
Benzyl alcohol	0.089
Butyl(2-methylpropyl)phthalate	2.6

Soil, Circle 11, 1 foot, 8/81

Priority Pollutants	μg/g
Diethyl phthalate	0.40
Di-n-butyl phthalate	0.38
Butyl benzyl phthalate	0.16
Tetrachloroethylene	0.046
Toluene	0.067
Additional Organic Compounds	
2,2'-Dichloroazobenzene	0.056

Soil, Circle 11, 2 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.065
Di-n-butyl phthalate	0.17
Bis(ethylhexyl)phthalate	0.49
Additional Organic Compounds	
Not detected	

Soil, Circle 11, 3 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.97
Di-n-butyl phthalate	0.19
Additional Organic Compounds	
Not detected	

Soil, Circle 19, 1 foot, 6/81

Priority Pollutants	μg/g
Bis(ethylhexyl)Phthalate	38
Phenol	0.062

Additional Organic Compounds

Not detected

Soil, Circle 19, 2 feet, 6/81

Priority Pollutants	
Bis(ethylhexyl)phthalate	0.49
1,1,1-Trichloroethane	0.001

Additional Organic Compounds	
Xylene	0.044

Soil, Circle 19, 3 feet, 6/81

Priority Pollutants

Not detected at 0.005 μg/g

Additional Organic Compounds

Not detected

Soil, Circle 19, 1 foot, 7/81

Priority Pollutants	μg/g
Di-n-butyl phthalate	0.068
Phenol	0.087

Additional Organic Compounds

Benzaldehyde	0.22

Soil, Circle 19, 2 feet, 7/81

Priority Pollutants	
Di-n-butyl phthalate	0.15
Bis(ethylhexyl)phthalate	0.14
Phenol	0.058

Additional Organic Compounds

Not detected

Soil, Circle 19, 3 feet, 7/81

Priority Pollutants	
Di-n-butyl phthalate	0.30
Phenol	0.053

Additional Organic Compounds

Not detected

Soil, Circle 19, 1 foot, 8/81

Priority Pollutants	µg/g
Diethyl phthalate	0.12
Di-n-butyl phthalate	0.083
Bis(ethylhexyl)phthalate	1.0
Additional Organic Compounds	
2,2'-Dichloroazobenzene	0.18
Benzaldehyde	2.3
Phenyl ethanone	0.32
Phenylacetic acid	1.2
Simazine	0.17
Atrazine	0.13
Vanillin	0.022

Soil, Circle 19, 2 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.071
Di-n-butyl phthalate	0.089
Bis(ethylhexyl)phthalate	1.8
Additional Organic Compounds	
Benzaldehyde	0.25

Soil, Circle 19, 3 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.10
Di-n-butyl phthalate	0.17
Additional Organic Compounds	
Butyl(2-methylpropyl)phthalate	1.5

Soil, Circle 48, 1 foot, 6/81

Priority Pollutants	μg/g
Di-n-butyl phthalate	0.052
Phenol	0.086

Additional Organic Compounds

Not detected

Soil, Circle 48, 2 feet, 6/81

Priority Pollutants	
Di-n-butyl phthalate	0.085
Phenol	0.032

Additional Organic Compounds

Xylene	0.046

Soil, Circle 48, 3 feet, 6/81

Priority Pollutants	
Diethyl phthalate	0.099
Di-n-butyl phthalate	0.47
Phenol	0.034

Additional Organic Compounds

Not detected

Soil, Circle 48, 1 foot, 7/81

Priority Pollutants	µg/g
Di-n-butyl phthalate	0.23

Additional Organic Compounds

Not detected

Soil, Circle 48, 2 feet, 7/81

Priority Pollutants	
Diethyl phthalate	0.12

Additional Organic Compounds

Not detected

Soil, Circle 48, 3 feet, 7/81

Priority Pollutants	
Diethyl phthalate	0.17
Di-n-butyl phthalate	0.11

Additional Organic Compounds

Not detected

Soil, Circle 48, 1 foot, 8/81

Priority Pollutants	μg/g
Diethyl phthalate	0.099
Phenol	0.045

Additional Organic Compounds

Not detected

Soil, Circle 48, 2 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.047
Di-n-butyl phthalate	0.14
Phenol	0.049

Additional Organic Compounds	
Butyl(2-methylpropyl)phthalate	0.98

Soil, Circle 48, 3 feet, 8/81

Priority Pollutants	
Diethyl phthalate	0.74
Di-n-butyl phthalate	0.35
Phenol	0.044

Additional Organic Compounds

Not detected

Soils, Circle 11, 1 foot, 9/81

Priority Pollutants	µg/g
Diethyl phthalate	0.18
Additional Organic Compounds	
Xylene	2.4
Dichloroazobenzene	0.043

Soils, Circle 11, 2 feet, 9/81

Priority Pollutants	
Diethyl phthalate	0.091
Additional Organic Compounds	
Xylene	0.39
Ethenyl benzene	0.16
Phenyl ethanone	0.070

Soils, Circle 11, 3 feet, 9/81

Diethyl phthalate	0.33
Di-*n*-butyl phthalate	0.092
Tetrachloroethylene	0.005
Toluene	0.004
Additional Organic Compounds	
Xylene	0.41
Phenyl ethanone	0.081

Soils, Circle 19, 1 foot, 9/81

Priority Pollutants	μg/g
Diethyl phthalate	0.043
Di-n-butyl phthalate	0.039
Additional Organic Compounds	
Xylene	0.39
Dichloroazobenzene	0.029
Ethenyl benzene	0.19
Phenyl ethanone	0.077

Soils, Circle 19, 2 feet, 9/81

Priority Pollutants	
Diethyl phthalate	0.019
Additional Organic Compounds	
Xylene	2.4
Ethenyl benzene	0.14
Phenyl ethanone	0.046

Soils, Circle 19, 3 feet, 9/81

Priority Pollutants	
Diethyl phthalate	0.17
Di-n-butyl phthalate	0.064
Additional Organic Compounds	
Xylene	0.46
Ethenyl benzene	0.20
Phenyl ethanone	0.087

Soils, Circle 48, 1 foot, 9/81

Priority Pollutants	µg/g
Diethyl phthalate	2.1
Di-n-butyl phthalate	0.26

Additional Organic Compounds

Not detected

Soils, Circle 48, 2 feet, 9/81

Priority Pollutants	
Diethyl phthalate	0.19

Additional Organic Compounds

Not detected

Soils, Circle 48, 3 feet, 9/81

Priority Pollutants	
Diethyl phthalate	0.91
Di-n-butyl phthalate	0.30

Additional Organic Compounds	
Xylene	0.55
Vanillin	0.11

Soils, Circle 11, 1 foot, 11/81

Priority Pollutants	µg/g
Di-n-butyl phthalate	0.061
1,1,1-Trichloroethane	0.020
1,2-Dichloroethane	0.002
Additional Organic Compounds	
Xylene	0.62
Vanillin	0.14

Soils, Circle 11, 2 feet, 11/81

Priority Pollutants	
Di-n-butyl phthalate	0.067
Additional Organic Compounds	
Xylene	0.54
Vanillin	0.072

Soils, Circle 11, 3 feet, 11/81

Priority Pollutants	
Diethyl phthalate	0.027
Di-n-butyl phthalate	0.066

Additional Organic Compounds

Not detected

Soils, Circle 19, 1 foot, 10/81

Priority Pollutants	µg/g
Not detected	
Additional Organic Compounds	
Benzeneacetic acid	0.18
Vanillin	0.063

Soils, Circle 19, 2 feet, 10/81

Priority Pollutants	
1,1,1-Trichloroethane	0.031
Additional Organic Compounds	
Xylene	1.2
Alkyl substituted benzene (4)	0.64

Soils, Circle 19, 3 feet, 10/81

Priority Pollutants	
Phenol	0.045
Additional Organic Compounds	
Xylene	0.69
Alkyl substituted benzene (4)	0.30
Vanillin	0.023

Soils, Circle 48, 1 foot, 10/81

Priority Pollutants	µg/g
Phenol	0.049
Additional Organic Compounds	
Xylene	0.60
Alkyl substituted benzenes (4)	0.41
Vanillin	0.15

Soils, Circle 48, 2 feet, 10/81

Priority Pollutants	
Not detected	
Additional Organic Compounds	
Xylene	0.41
Alkyl substituted benzenes (5)	0.29
Phenylacetic acid	0.22
Vanillin	0.075

Soils, Circle 48, 3 feet, 10/81

Priority Pollutants	
Di-n-butyl phthalate	0.037
Additional Organic Compounds	
Xylene	0.46

Soils, Circle 11, 1 foot, 11/81

Priority Pollutants	μg/g
Toluene	0.025
Additional Organic Compounds	
Xylene	0.53
Alkyl substituted benzenes (4)	0.29
Phenylacetic acid	0.073
Vanillin	0.065

Soils, Circle 11, 2 feet, 11/81

Priority Pollutants	
Di-n-butyl phthalate	0.062
Toluene	0.020
Additional Organic Compounds	
Xylene	1.1
Vanillin	0.061

Soils, Circle 11, 3 feet, 11/81

Priority Pollutants	
Diethyl phthalate	0.041
Di-n-butyl phthalate	0.074
Toluene	0.013
Additional Organic Compounds	
Xylene	0.26

Soils, Circle 17, 1 foot, 11/81

Priority Pollutants	μg/g
Di-n-butyl phthalate	0.094
Toluene	0.022
Additional Organic Compounds	
Xylene	0.31
Alkyl substituted benzenes (5)	0.31
Phenylacetic acid	0.21
Vanillin	0.068

Soils, Circle 17, 2 feet, 11/81

Priority Pollutants	
Di-n-butyl phthalate	0.076
Toluene	0.014
Additional Organic Compounds	
Xylene	0.55

Soils, Circle 17, 3 feet, 11/81

Priority Pollutants	
Diethyl phthalate	0.049
Toluene	0.010
Additional Organic Compounds	
Xylene	1.1
Alkyl substituted benzene (5)	0.69

Soils, Circle 48, 1 foot, 11/81

Priority Pollutants	μg/g
Di-n-butyl phthalate	0.17
Toluene	0.028
Additional Organic Compounds	
Xylene	0.41

Soils, Circle 48, 2 feet, 11/81

Priority Pollutants	
Toluene	0.015
Additional Organic Compounds	
Xylene	0.27

Soils, Circle 48, 3 feet, 11/81

Priority Pollutants	
Di-n-butyl phthalate	0.30
Toluene	0.014
Additional Organic Compounds	
Xylene	0.31
Vanillin	0.072

Wells 10/81	μg/l
USGS 3	
No detectable compounds	
USGS 4	
No detectable compounds	
9/81	
USGS 1	
No detectable compounds	
USGS 2	
No detectable compounds	
11/81	
3B2	
1,2-Dichloroethane	6
31B2	
1,2-Dichloroethane	8

SLUDGE SAMPLES

Concentration of Organic Chemicals
In Cell II Sludge (μg/Kg) 1980

Priority Pollutants	6/11	6/25	7/18	8/21	9/05	9/19
Acenaphthalene	-	-	-	-	-	-
Anthracene	-	-	-	-	-	-
Butyl benzyl phthalate	-	450	200	260	-	-
Benzo(a)anthracene	-	170	68	200	-	-
Bis(ethylhexyl)phthalate	4,400	3,300	1,340	7,800	3,500	2,500
Chrysene	170	-	-	-	-	1,000
Chlorobenzene	11	36	44	35	-	-
1,4-Dichlorobenzene	160	120	150	110	440	560
1,2-Dichlorobenzene	340	350	220	190	470	530
Dimethyl phthalate	-	-	-	-	-	-
Di-n-butyl phthalate	650	760	340	400	490	60
3,3'-dichlorobenzidine	20,600	15,400	12,600	14,100	78,800	66,800
Diethyl phthalate	-	-	-	-	-	-
Ethyl benzene	170	550	390	390	71	120
Fluoranthene	680	520	160	400	-	-
Fluorene	-	280	210	200	210	180
Naphthalene	900	600	440	400	820	870
Phenol	640	220	330	300	-	210
Pyrene	980	-	-	-	-	-
Phenanthrene	1,180	990	540	740	1,200	1,100
Tetrachloroethylene	4	5	-	42	-	-
Toluene	460	1,900	1,870	1,900	180	120
Additional Organic Compounds						
Alkyl substituted benzene	31,300	49,600	27,900	41,700	57,300	62,300
Alkyl substituted phenol	-	-	-	-	-	-
Biphenyl	-	-	-	-	-	-
Benzothiazole	-	-	-	-	-	-
2-Chloroaniline	46,500	28,000	11,300	6,600	62,800	50,500
Cresol	2,500	970	1,140	1,480	820	880
2,2'-Dichloroazobenzene	550	850	390	410	1,700	1,700
Dimethyl phenanthrene	-	-	-	-	-	-
Diethoxychlorobenzene	4,350	6,900	5,140	4,600	5,000	4,300
Dimethyl naphthalene	6,700	8,000	5,400	4,000	18,700	17,300
2,4'-Diamino-3,3'-dichlorobiphenyl	22,000	31,700	22,500	21,300	51,300	42,200
Benzaldehyde	-	-	-	-	-	-
Dimethyl disulfide	-	-	-	-	-	-
Ethyl phenol	-	-	-	-	-	-
Methyl naphthalene	1,700	1,850	1,300	1,400	4,400	5,200
2-Methoxy-1,1'-biphenyl	-	-	-	-	-	-

Concentration of Organic Chemicals
In Cell II Sludge (μg/Kg) 1980 (Cont'd)

Additional Organic Compounds (Cont'd)	6/11	6/25	7/18	8/21	9/05	9/19
Methyl dibenzothiophene	-	-	-	-	-	-
Methyl phenanthrene	-	-	-	-	-	-
N,N-Dimethylaniline	-	-	-	-	-	-
Substituted indene	-	-	-	-	-	-
Substituted phenanthrene-carboxaldehyde	-	-	-	-	-	-
Trimethyl naphthalene	6,600	6,000	5,000	4,200	11,900	13,600
Tributyl phosphate	630	1,180	850	900	1,200	1,200
Tetramethylbutyl phenol	-	-	-	-	-	-
Trimethyl phenanthrene	-	-	-	-	-	-
Tetramethyl phenanthrene	-	-	-	-	-	-
Vanillin	-	-	-	-	-	120

Concentration of Organic Chemicals In Cell II Sludge (μg/Kg) 1981

Priority Pollutants	3/81	7/81	9/81
Acenaphthalene	76	-	-
Butyl benzyl phthalate	1,300	-	280
Benzo (a) anthracene	85	-	-
Bis(ethylhexyl)phthalate	11,000	310	3,300
Chrysene	270	80	81
Chloroform	-	1	-
1,4-Dichlorobenzene	98	95	72
1,2-Dichlorobenzene	180	420	200
Dimethyl phthalate	630	150	-
Di-n-butyl phthalate	200	320	110
3,3'-Dichlorobenzidine	171,000	12,000	5,500
Diethyl phthalate	-	710	-
Ethyl benzene	-	10	-
Fluoranthene	200	130	-
Fluorene	120	120	110
Naphthalene	760	280	160
Phenol	95	320	53
Pyrene	480	260	-
Phenanthrene	500	610	430
Toluene	85	23	4
Additional Organic Compounds			
Alkyl substituted benzene	28,000	25,000	33,000
Alkyl substituted phenols	-	20,000	-
Biphenyl	430	-	-
Benzothiazole	-	400	260
2-Chloroaniline	21,000	6,600	6,500
Cresol	900	530	590
2,2'-Dichloroazobenzene	6,600	300	190
Dimethyl phenanthrene	4,600	9,300	9,300
Diethoxychlorobenzene	2,400	2,800	920
Diethoxydichlorobenzene	-	-	610
Dimethyl naphthalenes	6,700	8,300	9,600
2,4'-diamino-3,3'-dichlorobiphenyl	88,000	26,000	6,100
Benzaldehyde	-	-	160
Dimethyl disulfide	160	-	-
Ethyl phenol	90	-	-
Methyl naphthalenes	3,000	1,800	2,700
2-Methoxy-1,1'-biphenyl	-	740	-
Methyl dibenzothiophene	-	2,300	-
Methyl phenanthrene	3,300	3,500	-

Concentration of Organic Chemicals In
Cell II Sludge (μg/Kg) 1981
Continued

Additional Organic Compounds	3/81	7/81	9/81
N,N-Dimethylaniline	-	280	450
Substituted indene	480	-	-
Substituted phenanthrene-carboxaldehyde	2,450	4,500	5,100
Trimethyl naphthalenes	7,100	10,200	7,900
Tributyl phosphate	-	470	930
4-(2,2,3,3-tetramethylbutyl)phenol	-	2,700	-
Trimethyl phenanthrene	-	3,300	-
Tetramethyl phenanthrene	-	350	-
Xylene	-	120	-

Concentration of Organic Chemicals In East Lagoon Sludge (μg/Kg) 1980

Priority Pollutants	6/11	7/18	8/13	8/29	9/19
Anthracene	-	-	-	-	-
Bis(ethylhexyl)phthalate	1,900	600	1,370	-	5,000
Butyl benzyl phthalate	-	180	52	-	-
Benzo(a)anthracene	38	21	-	-	-
Chlorobenzene	15	-	-	-	-
Chrysene	-	-	-	2,500	630
1,2-Dichlorobenzene	100	-	-	90	-
3,3'-Dichlorobenzidine	1,850	230	-	7,300	5,900
Di-n-butyl phthalate	-	190	130	-	-
Dimethyl phthalate	-	-	-	490	-
Ethyl benzene	65	-	-	15	40
Fluoranthene	-	64	-	1,200	280
Fluorene	-	-	-	-	-
Naphthalene	160	35	26	110	50
Phenol	170	-	-	-	-
Pyrene	-	-	-	-	-
Phenanthrene	270	100	58	-	-
Toluene	440	19	-	15	-
Tetrachloroethylene	6	-	-	-	-

Additional Organic Compounds	6/11	7/18	8/13	8/29	9/19
Alkyl substituted benzenes	16,200	3,200	10,500	38,500	16,800
Benzyl alcohol	-	-	-	-	-
Benzaldehyde	-	-	-	-	260
Cresol	1,400	180	110	170	120
2-Chloroaniline	7,500	2,160	1,280	19,800	7,540
2,2'-Dichloroazobenzene	180	270	67	3,300	740
2,4'-Diamino-3,3'-dichloro-biphenyl	2,100	6,000	560	80,700	16,000
Diethoxychlorobenzene	790	640	150	1,400	300
Dimethyl naphthalene	1,700	680	3,700	3,000	1,000
Dimethyl trisulfide	-	-	-	-	-
Methyl naphthalene	570	130	90	740	290
N,N-Dimethylaniline	-	-	-	-	160
Substituted phenanthrenes	-	-	-	-	-
Substituted thiophenes	-	-	-	-	-
Trimethyl naphthalene	1,800	700	350	3,900	1,600
Vanillin	-	-	-	150	130
Xylene	-	-	-	-	-

Concentration of Organic Chemicals In East Lagoon Sludge (μg/Kg) 1980

Priority Pollutants	10/09	10/31	11/18
Anthracene	-	-	-
Bis(ethylhexyl)phthalate	1,100	4,400	2,200
Butyl benzyl phthalate	-	-	-
Benzo(a)anthracene	-	-	-
Chrysene	-	310	270
1,2-Dichlorobenzene	130	-	-
3,3'-Dichlorobenzidine	-	4,000	1,200
Di-n-butyl phthalate	-	600	-
Ethyl benzene	18	4	-
Dimethyl phthalate	-	80	80
Fluoranthene	320	220	160
Fluorene	-	-	-
Naphthalene	40	60	30
Phenol	120	-	-
Pyrene	-	-	-
Phenanthrene	-	-	-
Toluene	4	3	-
Tetrachlorobenzene	-	-	-
Additional Organic Compounds			
Alkyl substituted benzenes	25,200	17,600	12,900
Benzyl alcohol	-	-	-
Benzaldehyde	-	300	200
Cresol	610	-	-
2-Chloroaniline	6,100	5,700	4,800
2,2'-Dichloroazobenzene	530	940	620
2,4'-Diamino-3,3'-dichloro-biphenyl	6,500	13,100	7,300
Diethoxychlorobenzene	570	460	370
Dimethyl naphthalene	2,400	820	500
Dimethyl trisulfide	-	-	-
Methyl naphthalene	740	560	420
N,N-Dimethylaniline	420	140	70
Substituted phenanthrenes	-	-	-
Substituted thiophenes	-	-	-
Trimethyl naphthalene	5,200	1,200	1,000
Vanillin	-	170	-
Xylene	-	-	-

Concentration of Organic Chemicals In East Lagoon Sludge (µg/Kg) 1981

Priority Pollutants	3/81	7/81	9/81
Bis(ethylhexyl)phthalate	1,000	220	7,000
Butyl benzyl phthalate	2,500	100	-
Benzo (a) anthracene	-	98	-
Chrysene	180	120	210
1,2-Dichlorobenzene	51	-	-
3,3-Dichlorobenzidine	1,500	-	1,400
Di-n-butyl phthalate	160	260	-
Diethyl phthalate	-	460	-
Fluoranthene	66	78	-
Fluorene	25	-	-
Naphthalene	46	-	110
Phenol	-	-	64
Pyrene	140	100	-
Phenanthrene	65	-	490
Toluene	7	4	
Trichlorobenzene	170	-	-
Additional Organic Compounds			
Alkyl substituted benzenes	25,000	2,300	71,000
Benzyl alcohol	100	-	-
Benzaldehyde	470	-	350
Biphenyl	78	-	-
Cresol	57	-	560
Benzothiazole	-	290	390
2-Chloroaniline	4,800	110	9,500
2,2-Dichloroazobenzene	350	-	880
2,4'-Diamino-3,3'-dichlorobiphenyl	23,000	-	-
Diethoxychlorobenzene	120	49	-
Dimethyl naphthalenes	1,000	-	3,500
Dimethyl trisulfide	410	-	-
Methyl naphthalenes	510	170	2,800
N,N-Dimethylaniline	140	-	490
Substituted phenanthrenes	1,600	-	-
Substituted thiophenes	360	-	-
Trimethyl naphthalenes	1,200	230	7,500
Xylene	-	-	140

Concentration of Organic Chemicals
In West Lagoon Sludge ($\mu g/Kg$) 1980

Priority Pollutants	6/11	6/25	7/18	8/13	8/29
Anthracene	-	-	-	-	-
Bis(ethylhexyl)phthalate	1,700	-	400	1,940	13,400
Butyl benzyl phthalate	-	620	290	40	-
Benzo(a)anthracene	-	79	40	70	280
Chrysene	105	-	-	-	-
1,4-Dichlorobenzene	16	-	-	-	-
1,2-Dichlorobenzene	45	-	-	-	-
3,3'-Dichlorobenzidine	2,000	630	260	-	-
Di-n-butyl phthalate	-	-	210	-	-
Diethyl phthalate	-	-	30	-	-
Ethyl benzene	18	5	22	-	15
Fluoranthene	300	130	60	140	660
Fluorene	-	63	350	30	-
Naphthalene	140	60	40	30	20
Phenol	160	850	760	-	-
Pyrene	-	-	-	-	-
Phenanthrene	-	160	80	90	-
Toluene	15	5	3	-	10
Tetrachloroethylene	10	13	-	-	-

Additional Organic Compounds	6/11	6/25	7/18	8/13	8/29
Alkyl substituted benzenes	22,700	25,400	3,100	33,800	11,700
Benzyl alcohol	-	-	-	-	-
Benzaldehyde	220	-	-	-	210
Cresol	600	-	-	150	70
2-Chloroaniline	5,700	1,400	860	2,500	1,100
2,2'-Dichloroazobenzene	410	630	160	630	350
2,4'-Diamino-3,3'-dichloro-biphenyl	3,400	7,120	3,100	3,800	6,700
Diethoxychlorobenzene	390	590	220	110	60
Dimethyl naphthalene	2,640	1,180	490	500	550
Dimethyl trisulfide	-	-	-	-	-
Methyl naphthalene	490	280	130	90	630
N,N-Dimethylaniline	72	-	-	-	140
Substituted phenanthrenes	-	-	-	-	-
Substituted thiophenes	-	-	-	-	-
Trimethyl naphthalene	2,560	1,720	460	550	840
Xylene	-	-	-	-	660

Concentration of Organic Chemicals
In West Lagoon Sludge (μg/Kg) 1980

Priority Pollutants	9/17	10/09	10/22	11/18
Anthracene	-	-	-	-
Bis(ethylhexyl)phthalate	13,600	10,800	*	11,700
Butyl benzyl phthalate	-	-	-	-
Benzo(a)anthracene	-	-	-	-
Chrysene	-	590	1,170	700
1,2-Dichlorobenzene	50	30	-	-
3,3'-Dichlorobenzidine	-	21,400	17,200	11,200
Di-n-butyl phthalate	-	-	-	-
Diethyl phthalate	-	-	-	-
Ethyl benzene	-	5	-	-
Fluoroanthene	1,150	1,120	1,200	1,260
Fluorene	-	-	-	-
Naphthalene	50	50	90	50
Phenol	-	-	-	-
Pyrene	-	-	-	-
Phenanthrene	-	320	350	200
Toluene	-	-	-	-
Tetrachlorobenzene	-	-	-	-
Additional Organic Compounds				
Alkyl substituted benzenes	37,000	50,200	49,000	17,000
Benzyl alcohol	-	-	-	-
Benzaldehyde	440	210	290	200
Cresol	380	300	-	-
2-Chloroaniline	5,100	5,700	5,050	2,500
2,2'-Dichloroazobenzene	1,240	1,100	2,400	440
2,4'-Diamino-3,3'-dichloro-biphenyl	27,800	34,900	93,500	52,000
Diethoxychlorobenzene	100	90	300	90
Dimethyl naphthalene	1,130	2,000	3,200	1,400
Dimethyl trisulfide	100	90	180	90
Methyl naphthalene	780	730	660	420
N,N-Dimethylaniline	450	220	-	140
Substituted phenanthrenes	-	-	2,000	800
Substituted thiophenes	-	-	-	-
Trimethyl naphthalene	1,650	3,600	3,700	2,200
Vanillin	180	220	-	-
Xylene	-	-	-	-

* Contaminated.

Concentration of Organic Chemicals In West Lagoon Sludge (μg/Kg) 1981

Priority Pollutants	3/81	7/81	9/81
Bis(ethylhexyl)phthalate	1,300	13,000	6,800
1,2-Dichlorobenzene	41	-	64
3,3-Dichlorobenzidine	6,500	6,100	2,100
1,2-Dichloroethane	-	12	-
Chrysene	-	420	500
Di-n-butyl phthalate	-	-	280
1,4-Dichlorobenzene	-	-	59
Diethyl phthalate	30	-	-
Dimethyl phthalate	33	-	-
Ethyl benzene	-	3	-
Fluoranthene	190	-	-
Fluorene	23	-	-
Naphthalene	34	81	120
Phenol	-	230	45
Phenanthrene	92	1,500	210
Trichlorobenzene	87	-	-
Toluene	6	21	13
Additional Organic Compounds			
Alkyl substituted benzenes	12,700	91,000	34,000
Benzaldehyde	-	120	290
Benzothiazole	-	1,600	720
2-Chloroaniline	3,500	3,900	6,200
Cresol	89	1,300	420
2,4'-Diamino-3,3'-dichlorobiphenyl	27,000	21,000	-
Diethoxychlorobenzene	90	850	-
Dimethyl naphthalenes	-	8,400	3,400
2,2-Dichloroazobenzene	-	-	590
Dimethyl trisulfide	240	-	-
Dimethyl phenanthrene	-	6,600	-
Methyl naphthalenes	-	1,400	1,400
Methyl dibenzothiophene	-	3,100	-
Methyl phenanthrene	-	4,100	-
Substituted benzoic acid	250	-	-
Substituted thiophene	340	-	-
Tetramethylphenanthrene	-	1,500	-
Trimethyl naphthalene	-	11,400	5,300
Trimethyl phenanthrene	-	3,700	2,300
N,N-Dimethyl aniline	-	-	240
Xylene	-	410	130

CORN SAMPLES

CORN: 10/80

Circle 15

Circle 4

Circle 29

Circle 39

Circle 50

Circle 54

No priority pollutants detected <0.01 mg/Kg

CORN: 11/81

Circle 11

Circle 18

Circle 48

Circle 50

No priority pollutants detected at <0.01 mg/Kg

APPENDIX B

Quality Control

QUALITY CONTROL

A rigorous quality control program was undertaken to produce data of known precision and accuracy levels. The goal of the program was to assure validity of the monitoring data and to control the daily analytical process. Because of the variety of sample types studied in this project, it was necessary to verify the methodology for each category. Samples verified and corresponding categories are given in Table B-1.

TABLE B-1
Verification Categories

Sample	Category
West Lagoon Sludge	Sludge: East and West Lagoons, Cell II
Influent	Raw and partially treated sewage: Influent, Spillway
West Lagoon	Treated Sewage: East and West Lagoons, Outlet Lagoon
South Ditch	Discharge: Ø5, Drain Tiles, 34 Wells, South Ditch

Samples were spiked with priority pollutants to determine the precision and accuracy within a given matrix. In addition, surrogate standards were used to act as a measure of daily analytical quality control.

The quality control program employed was similar to that described by the EPA (14). For water samples, two-liter aliquots were used. Three replicates were spiked and analyzed at two concentration levels. In addition, background levels were determined as the average of three replicate analyses. Extraction and analytical procedures were identical to those described earlier. Standard precision and accuracy calculations were made for each level and sample type.

Results of the quality control samples are given in Appendix B according to category. Also included are check samples received from the Kerr Environmental Research Laboratory.

1980
South Ditch Volatile Fraction Quality Control (μg/l)

Compound	Initial	Spiked Amount	High Level Spike: Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	<1	13	13	.8	100
Chlorobenzene	<1	18	17	.9	94
Toluene	<1	10	9.8	.5	98
Perchloroethylene	<1	31	27	2	86
Tetrachloroethane	<1	33	27	1	83
Bromoform	<1	82	84	3	102
Trichloroethylene	<1	9.1	7.6	.8	83
1,1,2-Trichloroethane	<1	28	25	.9	90
Benzene	<1	18	18	.2	10
Cis-1,3-Dichloropropene	<1	26	25	.3	97
1,1,1-Trichloroethane	<1	32	32	.4	100
Trans-1,3-Dichloropropene	<1	24	24	.2	100
1,2-Dichloropropane	<1	24	23	.3	97
1,2-Dichloroethane	5	22	26	.3	95
1,1-Dichloroethane	<1	24	23	.2	97
Acetone	<1	10	7.9	.8	79
Acrolein	<1	12	8.4	1.2	70
Acrylonitrile	<1	13	9.4	1.3	72
Isopropanol	<1	13	8.8	1.8	68
Trichlorofluoromethane	<1	33	27	.4	83
1,1-Dichloroethene	<1	22	20	.2	91
Methylene chloride	<1	24	23	.2	96
Chloroform	<1	28	26	.4	94
Bromochloromethane	<1	39	37	2	95
2-Bromo-1-chloropropane	<1	30	28	1	93
1,4-Dichlorobutane	<1	23	21	1	91

1980
South Ditch Volatile Fraction Quality Control (μg/l)

			Low Level Spike		
Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	<1	1.3	1.2	.1	92
Chlorobenzene	<1	1.8	1.7	.1	92
Toluene	<1	1.0	.82	.2	82
Perchloroethylene	<1	3.1	2.5	.3	82
Tetrachloroethane	<1	3.3	2.6	.2	80
Bromoform	<1	8.2	5.1	.4	62
Trichloroethylene	<1	0.90	.48	.3	53
1,1,2-Trichloroethane	<1	2.8	2.2	.2	80
Benzene	<1	1.8	1.7	.1	93
Cis-1,3-Dichloropropene	<1	2.6	1.9	.2	72
1,1,1-Trichloroethane	<1	3.2	2.4	.2	74
Trans-1,3-Dichloropropene	<1	2.4	1.9	.1	78
1,2-Dichloropropane	<1	2.4	2.1	.3	86
1,2-Dichloroethane	5	2.2	7.0	.3	96
1,1-Dichloroethane	<1	2.4	2.3	.7	97
Trichlorofluoromethane	<1	3.3	2.8	.1	84
1,1-Dichloroethene	<1	2.2	1.9	.1	81
Methylene chloride	<1	2.4	2.4	.2	100
Chloroform	<1	2.8	2.4	.2	85
Bromochloromethane	<1	39	37	2	95
2-Bromo-1-chloropropane	<1	30	30	1	100
1,4-Dichlorobutane	<1	23	22	1	96

1980

SOUTH DITCH BASE NEUTRAL FRACTION QUALITY CONTROL (μg/l)

HIGH LEVEL SPIKE

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	%R
Bis(2-chloroethyl)ether	≤ 1	35	33	5	94
1,3-Dichlorobenzene	≤ 1	39	29	3	74
1,4-Dichlorobenzene	≤ 1	28	27	5	96
1,2-Dichlorobenzene	≤ 1	13	9	2	70
N-Nitrosodi-n-propylamine	≤ 1	51	44	5	86
Hexachloroethane	≤ 1	42	34	3	81
Nitrobenzene	≤ 1	46	46	3	100
Isophorone	≤ 1	40	32	2	80
2-Chloroaniline	22	86	96	5	86
Bis(2-chloroethoxy)methane	≤ 1	50	32	2	64
Trichlorobenzene	≤ 1	46	34	2	74
Naphthalene	≤ 1	40	38	3	95
2-Chloronaphthalene	≤ 1	37	26	3	70
2,6-Dinitrotoluene	≤ 1	42	31	2	74
Dimethyl phthalate	≤ 1	42	36	1	86
Acenaphthylene	≤ 1	40	26	2	65
Acenaphthene	≤ 1	42	34	1	81
2,4-Dinitrotoluene	≤ 1	40	34	2	85
Diethyl phthlate	≤ 1	42	34	1	81
Fluorene	≤ 1	36	28	1	78
1,2-Diphenylhydrazine	≤ 1	40	31	2	78
4-Bromophenyl phenyl ether	≤ 1	42	31	3	74
Hexachlorobenzene	≤ 1	36	29	3	81
Anthracene	≤ 1	38	25	2	67
Phenathrene	≤ 1	38	25	2	67
Di-n-butyl phthalate	≤ 1	44	37	3	84
Pyrene	≤ 1	40	25	1	63
Fluoranthene	≤ 1	40	26	1	66
Butyl benzyl phthalate	≤ 1	46	28	3	61
Dichlorobenzidine	≤ 1	63	33	3	52
Benzo(a)pyrene	≤ 1	40	28	3	70

1980

SOUTH DITCH BASE-NEUTRAL FRACTION QUALITY CONTROL (µg/l)

LOW LEVEL SPIKE

Compound	Initial	Spiked Amount	Recovered $\bar{X}$	S	%R
Bis(2-chloroethyl)ether	<1	3.5	2.7	.3	78
1,3-Dichlorobenzene	<1	3.9	2.7	.3	69
1,4-Dichlorobenzene	<1	2.8	2.0	.2	70
1,2-Dichlorobenzene	<1	1.3	0.95	.2	73
N-Nitrosodi-n-propylamine	<1	5.1	1.8	.4	35
Hexachloroethane	<1	4.6	2.4	.4	53
Nitrobenzene	<1	4.2	2.5	.3	59
Isophorone	<1	4.0	2.6	.4	66
2-Chloroaniline	22	8.6	28.6	.8	77
Bis(2-chloroethoxy)methane	<1	5.0	1.7	.3	34
Trichlorobenzene	<1	4.6	1.6	.2	35
Naphthalene	<1	4.0	2.4	.3	61
2-Chloronaphthalene	<1	3.7	1.2	.3	37
2,6-Dinitrotoluene	<1	4.2	1.7	.2	40
Dimethyl phthalate	<1	4.2	2.4	.2	56
Acenaphthylene	<1	4.0	2.0	.2	50
Acenaphthene	<1	4.2	2.4	.1	58
2,4-Dinitrotoluene	<1	4.0	2.1	.3	52
Diethyl phthlate	<1	4.2	3.7	.4	87
Fluorene	<1	3.6	1.9	.2	54
1,2-Diphenylhydrazine	<1	4.0	2.3	.2	57
4-Bromophenyl phenyl ether	<1	4.2	2.1	.3	50
Hexachlorobenzene	<1	3.8	2.9	.3	77
Anthracene	<1	3.8	2.2	.4	60
Phenathrene	<1	3.8	2.6	.4	67
Di-n-butyl phthalate	<1	4.4	2.9	.5	65
Pyrene	<1	4.0	2.2	.3	55
Fluoranthene	<1	4.0	2.4	.2	59
Butyl benzyl phthalate	<1	4.6	2.5	.3	55
Dichlorobenzidine	<1	12.6	4.1	.6	32
Benzo(a)pyrene	<1	4.0	2.4	.3	61

1980

South Ditch Acid Fraction Quality Control (μg/l)

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
			High Level Spike		
2-Chlorophenol	<1	74	53	4	72
Phenol	<1	274	134	8	49
2,4-Dimethylphenol	<1	119	96	8	81
2,4-Dichlorophenol	<1	113	89	7	79
2,4,6-Trichlorophenol	<1	106	87	8	82
4-Chloro-3-methylphenol	<1	101	81	6	80
Pentachlorophenol	<1	48	38	6	79
D_{10} Phenol	<1	100	50	6	50
			Low Level Spike		
2-Chlorophenol	<1	7.4	5.1	2	69
Phenol	<1	27	13	4	48
2,4-Dimethylphenol	<1	12	9.1	2	76
2,4-Dichlorophenol	<1	11	8.3	2	75
2,4,6-Trichlorophenol	<1	11	8.8	1	80
4-Chloro-3-methylphenol	<1	10	7.9	2	79
Pentachlorophenol	<1	4.8	3.3	1	69
D_{10} Phenol	<1	100	51	6	51

1980

West Lagoon Volatile Fraction Quality Control (μg/l)

High Level Spike

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	<1	13	9.4	.6	72
Chlorobenzene	<1	18	15	2	86
Toluene	<1	10	9.8	.5	98
Perchloroethylene	<1	31	30	.8	98
Tetrachloroethane	<1	33	32	.3	97
Bromoform	<1	82	68	2	83
Trichloroethylene	<1	9.1	9.1	.3	100
1,1,2-Trichloroethane	<1	28	28	.2	100
Benzene	<1	18	19	.3	106
Cis-1,3-Dichloropropene	<1	26	25	.2	97
1,1,1-Trichloroethane	<1	32	28	.9	89
Trans-1,3-Dichloropropene	<1	24	22	.5	93
1,2-Dichloropropane	<1	24	23	.3	98
1,2-Dichloroethane	25	22	46	.4	95
1,1-Dichloroethane	<1	24	24	.3	100
Acetone	<1	10	6	2	60
Acrolein	<1	12	8	1	67
Acrylonitrile	<1	13	8	2	63
Isopropanol	<1	13	8	3	63
Trichlorofluoromethane	<1	33	33	.4	100
1,1-Dichloroethene	<1	22	21	.3	98
Methylene chloride	<1	24	25	.3	106
Chloroform	6	28	33	.2	97
Bromochloromethane	<1	39	38	1.0	97
2-Bromo-1-chloropropane	<1	30	29	1.0	97
1,4-Dichlorobutane	<1	23	23	.5	100

1980

West Lagoon Volatile Fraction Quality Control (µg/l)

Low Level Spike

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	<1	1.3	0.9	.1	69
Chlorobenzene	<1	1.8	1.6	.2	86
Toluene	<1	1.0	.6	.1	60
Perchloroethylene	<1	3.1	3.0	.3	97
Tetrachloroethane	<1	3.3	3.2	.2	97
Bromoform	<1	8.2	4.2	.3	51
Trichloroethylene	<1	.90	0.60	.1	69
1,1,2-Trichloroethane	<1	2.8	2.2	.1	80
Benzene	<1	1.8	1.4	.2	75
Cis-1,3-Dichloropropene	<1	2.6	1.6	.2	61
1,1,1-Trichloroethane	<1	3.2	3.1	.3	97
Trans-1,3-Dichloropropene	<1	2.4	1.5	.2	63
1,2-Dichloropropane	<1	2.4	2.1	.1	89
1,2-Dichloroethane	25	2.2	26.9	.1	86
1,1-Dichloroethane	<1	2.4	2.2	.2	92
Trichlorofluoromethane	<1	3.3	2.9	.2	89
1,1-Dichloroethene	<1	2.2	1.7	.2	78
Methylene chloride	<1	2.4	2.3	.2	98
Chloroform	6	2.8	8.8	.1	100
Bromochloromethane	<1	39	39	.51	100
2-Bromo-1-chloropropane	<1	30	30	1.0	100
1,4-Dichlorobutane	<1	23	23	.50	100

1980

WEST LAGOON BASE-NEUTRAL QUALITY CONTROL (µg/l)

HIGH LEVEL SPIKE (ug/l)

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< 1	35	31	4	88
1,3-Dichlorobenzene	< 1	39	26	3	67
1,4-Dichlorobenzene	< 1	28	21	3	75
1,2-Dichlorobenzene	< 1	13	8	3	62
N-Nitrosodi-n-propylamine	< 1	51	43	5	86
Hexachloroethane	< 1	46	31	5	68
Nitrobenzene	< 1	42	33	2	79
Isophorone	< 1	40	36	7	91
2-Chloroaniline	3	86	84	6	93
Bis(2-chloroethoxy)methane	< 1	50	46	6	92
Trichlorobenzene	< 1	46	32	3	70
Naphthalene	< 1	40	38	6	95
2-Chloronaphthalene	< 1	37	30	5	82
2,6-Dinitrotoluene	< 1	42	36	4	85
Dimethyl phthalate	< 1	42	33	7	80
Acenaphthylene	< 1	40	31	4	78
Acenaphthene	< 1	42	34	3	81
2,4-Dinitrotoluene	< 1	40	34	2	84
Diethyl phthlate	< 1	42	32	4	77
Fluorene	< 1	36	28	3	78
1,2-Diphenylhydrazine	< 1	40	30	4	75
4-Bromophenyl phenyl ether	< 1	42	25	3	60
Hexachlorobenzene	< 1	38	31	3	81
Anthracene	< 1	38	30	4	79
Phenathrene	< 1	38	29	2	75
Di-n-butyl phthalate	< 1	44	32	3	73
Pyrene	< 1	40	29	3	72
Fluoranthene	< 1	40	28	3	70
Butyl benzyl phthalate	< 1	46	36	4	78
Dichlorobenzidine	< 1	63	32	7	51
Benzo(a)pyrene	< 1	40	28	3	71
Chrysene	< 1	40	30	3	76

1980

WEST LAGOON BASE-NEUTRAL QUALITY CONTROL (µg/l)

LOW LEVEL SPIKE

Compound	Initial	Spiked Amount	Recovered $\bar{X}$	S	%R
Bis(2-chloroethyl)ether	<1	3.5	2.7	.3	76
1,3-Dichlorobenzene	<1	3.9	1.7	.4	44
1,4-Dichlorobenzene	<1	2.8	1.0	.5	35
1,2-Dichlorobenzene	<1	1.3	0.6	.4	43
N-Nitrosodi-n-propylamine	<1	5.1	3.3	.4	64
Hexachloroethane	<1	4.6	1.5	.2	33
Nitrobenzene	<1	4.2	1.6	.2	38
Isophorone	<1	4.0	3.4	.5	86
2-Chloroaniline	3	8.6	9.3	1.0	72
Bis(2-chloroethoxy)methane	<1	5.0	3.6	.3	72
Trichlorobenzene	<1	4.6	2.4	.4	52
Naphthalene	<1	4.0	2.8	.3	71
2-Chloronaphthalene	<1	3.7	1.2	.4	33
2,6-Dinitrotoluene	<1	4.2	1.1	.3	25
Dimethyl phthalate	<1	4.2	1.7	.3	41
Acenaphthylene	<1	4.0	1.4	.2	36
Acenaphthene	<1	4.2	1.8	.2	42
2,4-Dinitrotoluene	<1	4.0	0.6	.1	15
Diethyl phthlate	<1	4.2	2.4	.2	58
Fluorene	<1	3.6	1.6	.2	45
1,2-Diphenylhydrazine	<1	4.0	2.3	.3	58
4-Bromophenyl phenyl ether	<1	4.2	2.2	.3	53
Hexachlorobenzene	<1	3.8	2.4	.3	64
Anthracene	<1	3.8	3.1	.3	82
Phenathrene	<1	3.8	2.6	.3	70
Di-n-butyl phthalate	<1	4.4	3.3	.4	76
Pyrene	<1	4.0	2.6	.5	68
Fluoranthene	<1	4.0	2.7	.4	67
Butyl benzyl phthalate	<1	4.6	3.0	.6	66
Dichlorobenzidine	<1	12.6	3.2	1.5	26
Benzo(a)pyrene	<1	4.0	2.0	.2	50
Chrysene	<1	4.0	1.8	.2	45

1980
West Lagoon Acid Fraction Quality Control (μg/l)

High Level Spike

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	< 1	74	61	3	83
Phenol	3	274	135	9	48
2,4-Dimethylphenol	< 1	119	71	9	60
2,4-Dichlorophenol	< 1	113	84	8	74
2,4,6-Trichlorophenol	< 1	106	80	7	75
4-Chloro-3-methylphenol	< 1	101	73	8	72
Pentachlorophenol	< 1	48	42	8	88
D_{10} Phenol	< 1	100	50	7	50

Low Level Spike

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	<1	7.4	4.8	2	65
Phenol	3	27	17	3	52
2,4-Dimethylphenol	<1	12	6	3	48
2,4-Dichlorophenol	<1	11	7.8	4	71
2,4,6-Trichlorophenol	<1	11	8.7	3	79
4-Chloro-3-methylphenol	<1	10	6.5	4	65
Pentachlorophenol	<1	4.8	2.1	2	43
D_{10} Phenol	<1	100	51	8	51

1980
Influent Volatile Fraction Quality Control (μg/l)

Compound	Initial	Spiked Amount	High Level Spike: Recovered $\bar{X}$	S	$\bar{\%R}$
Ethylbenzene	<1	13	11	1	88
Chlorobenzene	2	18	17	2	85
Toluene	550	10	Spike too low		
Perchloroethylene	160	31	188	9	91
Tetrachloroethane	<1	33	26	3	80
Bromoform	<1	82	71	6	87
Trichloroethylene	9	9.1	175	2	93
1,1,2-Trichloroethane	<1	28	25	1	90
Benzene	26	18	43	4	94
Cis-1,3-Dichloropropene	<1	26	22	2	86
1,1,1-Trichloroethane	60	32	88	8	88
Trans-1,3-Dichloropropene	<1	24	22	3	92
1,2-Dichloropropane	<1	24	27	2	95
1,2-Dichloroethane	510	22	Spike too low		
1,1-Dichloroethane	<1	24	21	2	88
Acetone	<1	10	6.2	2	62
Acrolein	<1	12	8.3	3	69
Acrylonitrile	<1	13	7.8	3	60
Isopropanol	<1	13	7.5	4	58
Trichlorofluoromethane	<1	33	26	3	79
1,1-Dichloroethene	<1	22	18	3	83
Methylene chloride	<1	24	22	2	92
Chloroform	610	28	Spike too low		
Bromochloromethane	<1	39	37	3	97
2-Bromo-1-chloropropane	<1	30	29	2	97
1,4-Dichlorobutane	<1	23	21	2	97

1980

Influent Volatile Fraction Quality Control (µg/l)

Low Level Spike

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	< 1	1.3	1.0	.2	79
Chlorobenzene	2	1.8	3.5	.3	81
Toluene	550	1.0	Spike too low		
Perchloroethylene	160	3.1	Spike too low		
Tetrachloroethane	< 1	3.3	2.6	.5	80
Bromoform	< 1	8.2	5.3	1	65
Trichloroethylene	9	.91	Spike too low		
1,1,2-Trichloroethane	< 1	2.8	2.3	.3	83
Benzene	26	1.8	Spike too low.		
1,1,1-Trichloroethane	60	3.2	Spike too low		
Trans-1,3-Dichloropropene	< 1	2.4	1.9	.4	80
1,2-Dichloropropane	< 1	2.4	2.0	.2	83
1,2-Dichloroethane	510	2.2	Spike too low		
1,1-Dichloroethane	< 1	2.4	2.2	.3	90
Trichlorofluoromethane	< 1	3.3	2.7	.5	81
1,1-Dichloroethene	< 1	2.2	1.9	.2	86
Methylene chloride	< 1	2.4	1.9	.2	79
Chloroform	610	2.8	Spike too low		
Bromochloromethane	< 1	39	38	3	98
2-Bromo-1-chloropropane	< 1	30	29	2	97
1,4-Dichlorobutane	< 1	23	22	2	97
Cis-1,3-Dichloropropene	< 1	2.6	2.2	.5	86

1980

INFLUENT BASE-NEUTRAL FRACTION QUALITY CONTROL (µg/l)

HIGH LEVEL SPIKE

Compound	Initial	Spiked Amount	Recovered $\bar{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< 1	35	21	3	60
1,3-Dichlorobenzene	< 1	39	12	2	32
1,4-Dichlorobenzene	< 1	28	9	2	33
1,2-Dichlorobenzene	2	13	6	2	31
N-Nitrosodi-n-propylamine	< 1	51	22	2	44
Hexachloroethane	< 1	46	10	2	23
Nitrobenzene	< 1	42	12	2	28
Isophorone	< 1	40	20	2	50
2-Chloroaniline	121	86	163	8	49
Bis(2-chloroethoxy)methane	< 1	50	25	3	50
Trichlorobenzene	< 1	46	18	3	39
Naphthalene	2	40	18	2	40
2-Chloronaphthalene	< 1	37	18	2	48
2,6-Dinitrotoluene	< 1	42	29	4	68
Dimethyl phthalate	< 1	42	18	2	42
Acenaphthalene	< 1	40	25	2	63
Acenaphthene	< 1	42	29	8	68
2,4-Dinitrotoluene	< 1	40	24	4	60
Diethyl phthlate	< 1	42	21	2	50
Fluorene	< 1	36	17	2	47
1,2-Diphenylhydrazine	< 1	40	19	2	48
4-Bromophenyl phenyl ether	< 1	42	25	5	59
Hexachlorobenzene	< 1	36	17	3	46
Anthracene	< 1	38	23	2	60
Phenathrene	< 1	38	23	2	61
Di-n-butyl phthalate	< 1	44	26	3	59
Pyrene	< 1	40	27	3	67
Fluoranthene	< 1	40	28	3	71
Butyl benzyl phthalate	< 1	46	25	3	55
Dichlorobenzidine	< 1	63	12	4	20
Benzo(a)pyrene	< 1	40	17	4	43
Chrysene	< 1	40	16	3	40

1980

INFLUENT BASE-NEUTRAL FRACTION QUALITY CONTROL (μg/l)

LOW LEVEL SPIKE

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< 1	3.5	2.4	.8	69
1,3-Dichlorobenzene	< 1	3.9	1.1	.2	28
1,4-Dichlorobenzene	< 1	2.8	.8	.2	30
1,2-Dichlorobenzene	2	1.3	2.3	.1	20
N-Nitrosodi-n-propylamine	< 1	5.1	2.7	.8	52
Hexachloroethane	< 1	4.6	.7	.3	16
Nitrobenzene	< 1	4.2	1.4	.6	34
Isophorone	< 1	4.0	2.0	.7	50
2-Chloroaniline	121	8.6	124.0	.7	35
Bis(2-chloroethoxy)methane	< 1	5.0	3.2	1.3	65
Trichlorobenzene	< 1	4.6	1.4	.6	31
Naphthalene	2	4.0	3.9	1.2	47
2-Chloronaphthalene	< 1	3.7	1.8	.7	50
2,6-Dinitrotoluene	< 1	4.2	1.5	.6	35
Dimethyl phthalate	< 1	4.2	.7	.3	17
Acenaphthalene	< 1	4.0	2.0	.9	50
Acenaphthene	< 1	4.2	2.1	1.3	51
2,4-Dinitrotoluene	< 1	4.0	2.4	1.2	59
Diethyl phthlate	< 1	4.2	1.9	.8	46
Fluorene	< 1	3.6	1.6	.2	45
1,2-Diphenylhydrazine	< 1	4.0	1.8	.9	45
4-Bromophenyl phenyl ether	< 1	4.2	2.0	.8	47
Hexachlorobenzene	< 1	3.8	1.5	.8	40
Anthracene	< 1	3.8	2.2	1.1	57
Phenathrene	< 1	3.8	1.9	.9	49
Di-n-butyl phthalate	< 1	4.4	2.4	.7	54
Pyrene	< 1	4.0	2.4	.8	60
Fluoranthene	< 1	4.0	2.5	1.4	62
Butyl benzyl phthalate	< 1	4.0	2.5	1.4	62
Dichlorobenzidine	< 1	12.6	1.2	.9	10
Benzo(a)pyrene	< 1	4.0	1.4	1.3	36
Chrysene	< 1	4.0	1.6	1.1	41

1980
Influent Acid Fraction Quality Control (µg/l)

			High Level Spike		
Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	8	74	56	3	65
Phenol	17	274	157	8	51
2,4-Dimethylphenol	< 1	119	69	8	58
2,4-Dichlorophenol	1	113	88	10	77
2,4,6-Trichlorophenol	2	106	95	9	88
4-Chloro-3-methylphenol	< 1	101	71	8	70
Pentachlorophenol	< 1	48	33	8	68
D_{10} Phenol	< 1	100	53	7	53

			Low Level Spike		
2-Chlorophenol	8	7.4	12	2	60
Phenol	17	27	30	5	48
2,4-Dimethylphenol	< 1	12	6.5	2	54
2,4-Dichlorophenol	1	11	9.0	2	73
2,4,6-Trichlorophenol	2	11	11	3	81
4-Chloro-3-methylphenol	< 1	10	6.8	2	68
Pentachlorophenol	< 1	4.8	2.8	1	59
D_{10} Phenol	< 1	100	52	7	52

1980
West Lagoon Sludge Volatile Fraction Quality Control (µg/kg)

			High Level Spike		
Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	11	13	20	3	69
Chlorobenzene	2	18	16	4	81
Toluene	40	10	45	15	51
Perchloroethylene	3	31	29	3	84
Tetrachloroethane	< 1	33	29	3	88
Bromoform	< 1	82	9.8	6	12
Trichloroethylene	2	9.1	9.9	1	88
1,1,2-Trichloroethane	< 1	28	26	2	94
Benzene	2	18	19	2	95
Cis-1,3-Dichloropropene	< 1	26	15	3	59
1,1,1-Trichloroethane	< 1	32	31	6	98
Trans-1,3-Dichloropropene	< 1	24	11	2	47
1,2-Dichloropropane	< 1	24	21	2	88
1,2-Dichloroethane	8	22	26	3	80
1,1-Dichloroethane	< 1	24	20	4	85
Acetone	< 1	10	6	4	60
Acrolein	< 1	12	8.2	5	68
Acrylonitrile	< 1	13	9.0	4	69
Isopropanol	< 1	13	11	6	83
Trichlorofluoromethane	< 1	33	27	10	81
1,1-Dichloroethene	< 1	22	18	5	82
Methylene chloride	2	24	22	2	85
Chloroform	< 1	28	20	6	71
Bromochloromethane	< 1	39	36	3	92
2-Bromo-1-chloropropane	< 1	30	26	4	87
1,4-Dichlorobutane	< 1	23	20	3	87

1980
West Lagoon Sludge Volatile Fraction Quality Control (μg/kg)

			Low Level Spike		
Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	11	1.3	Spike too low		
Chlorobenzene	2	1.8	3.1	.3	62
Toluene	40	1.0	Spike too low		
Perchloroethylene	3	3.1	4.3	.5	43
Tetrachloroethane	< 1	3.3	1.2	.3	40
Bromoform	< 1	8.2	.49	.2	6
Trichloroethylene	2	.90	2.5	.5	55
1,1,2-Trichloroethane	< 1	2.8	1.8	.5	65
Benzene	2	1.8	3.3	.8	74
Cis-1,3-Dichloropropene	< 1	2.6	.85	.3	34
1,1,1-Trichloroethane	< 1	3.2	1.8	.2	56
Trans-1,3-Dichloropropene	< 1	2.4	.74	.3	31
1,2-Dichloropropane	< 1	2.4	1.6	.3	65
1,2-Dichloroethane	8	2.2	9.3	.4	60
1,1-Dichloroethane	< 1	2.4	1.5	.6	64
Trichlorofluoromethane	< 1	2.8	.39	.2	14
1,1-Dichloroethene	< 1	1.9	1.0	.5	53
Methylene chloride	2	2.4	3.3	.6	55
Chloroform	< 1	2.4	1.8	.5	74
Bromochloromethane	< 1	39	36	4	92
2-Bromo-1-chloropropane	< 1	30	25	3	86
1,4-Dichlorobutane	< 1	23	20	3	87

1980
WEST LAGOON SLUDGE BASE-NEUTRAL FRACTION QUALITY CONTROL (mg/kg)

HIGH LEVEL SPIKE - SOXHLET METHOD

Compound	Initial	Spiked Amount	Recovered $\bar{X}$	S	%R
Bis(2-chloroethyl)ether	<.05	7.0	4.5	.6	65
1,3-Dichlorobenzene	<.05	7.8	2.1	.1	27
1,4-Dichlorobenzene	<.05	5.6	2.0	.2	36
1,2-Dichlorobenzene	.05	2.6	1.1	.2	41
N-Nitrosodi-n-propylamine	<.05	10.2	7.2	1.3	71
Hexachloroethane	<.05	7.2	1.6	.4	17
Nitrobenzene	<.05	8.4	6.3	.8	75
Isophorone	<.05	8.0	6.6	2	83
2-Chloroaniline	3.6	17.2	16.3	3	74
Bis(2-chloroethoxy)methane	<.05	10.0	7.1	3	71
Trichlorobenzene	<.05	9.2	8.2	.9	89
Naphthalene	.71	8.0	6.9	1	77
2-Chloronaphthalene	<.05	7.4	6.4	.5	87
2,6-Dinitrotoluene	<.05	8.4	7.8	.9	93
Dimethyl phthalate	<.05	8.4	5.4	.8	64
Acenaphthylene	<.05	8.0	5.1	.7	64
Acenaphthene	<.05	8.4	5.3	.6	63
2,4-Dinitrotoluene					
Diethyl phthlate	<.05	8.4	7.6	.6	91
Fluorene	<.05	7.2	5.2	.8	72
1,2-Diphenylhydrazine	<.05	8.0	4.8	.5	60
4-Bromophenyl phenyl ether	<.05	8.4	5.6	.5	67
Hexachlorobenzene	<.05	7.2	3.6	.4	50
Anthracene	.34	7.6	5.7	.6	71
Phenathrene	<.05	7.6	5.4	.8	71
Di-n-butyl phthalate	.13	8.8	6.6	2	75
Pyrene	<.05	8.0	6.7	1	84
Fluoranthene	<.05	8.0	6.6	.8	83
Butyl benzyl phthalate	<.05	9.2	6.6	1.9	72
Dichlorobenzidine	3.4	12.6	7.8	1	35
Benzo(a)pyrene	<.05	8.0	3.8	.8	48
Chrysene	<.05	8.0	3.9	.6	49

1980

WEST LAGOON SLUDGE BASE-NEUTRAL FRACTION QUALITY CONTROL (mg/kg)

LOW LEVEL SPIKE - SOXHLET METHOD

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< .05	.70	.45	.40	64
1,3-Dichlorobenzene	< .05	.78	.29	.13	37
1,4-Dichlorobenzene	< .05	.56	.27	.09	48
1,2-Dichlorobenzene	< .05	.26	.17	.09	46
N-Nitrosodi-n-propylamine	< .05	1.0	.62	.26	62
Hexachloroethane	< .05	.92	.20	.13	22
Nitrobenzene	< .05	.84	.48	.24	58
Isophorone	< .05	.80	.56	.31	70
2-Chloroaniline	3.6	1.7	4.6	2.8	61
Bis(2-chloroethoxy)methane	< .05	1.0	.71	.38	71
Trichlorobenzene	< .05	.92	.52	.20	57
Naphthalene	.71	.80	1.2	.46	62
2-Chloronaphthalene	< .05	.74	.42	.25	57
2,6-Dinitrotoluene	< .05	.84	.43	.28	51
Dimethyl phthalate	< .05	.84	.52	.16	62
Acenaphthylene	< .05	.80	.47	.20	59
Acenaphthene	< .05	.84	.58	.12	69
2,4-Dinitrotoluene					
Diethyl phthlate	< .05	.84	.39	.17	47
Fluorene	< .05	.72	.47	.21	65
1,2-Diphenylhydrazine	< .05	.80	.24	.14	30
4-Bromophenyl phenyl ether	< .05	.84	.39	.28	47
Hexachlorobenzene	< .05	.72	.19	.09	26
Anthracene	.34	.76	.86	.09	68
Phenathrene	< .05	.76	.56	.17	74
Di-n-butyl phthalate	.13	.88	.67	.27	61
Pyrene	< .05	.80	.42	.11	52
Fluoranthene	< .05	.80	.54	.11	68
Butyl benzyl phthalate	< .05	.92	.32	.30	35
Dichlorobenzidine	3.4	.13	Spike too low		
Benzo(a)pyrene	< .05	.80	.58	.18	72
Chrysene	< .05	.80	.37	.12	46

1980

West Lagoon Sludge Quality Control (mg/kg)

			High Level Spike		
Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	<.05	15	13	3	84
Phenol	<.05	55	38	6	69
2,4-Dimethylphenol	<.05	24	20	4	84
2,4-Dichlorophenol	<.05	23	21	3	90
2,4,6-Trichlorophenol	<.05	21	18	5	85
4-Chloro-3-methylphenol	<.05	20	17	5	86
Pentachlorophenol	<.05	9.6	7.8	4	80
D_{10} Phenol	<.05	10	7.1	3	71

			Low Level Spike		
2-Chlorophenol	<.05	1.5	1.2	.8	80
Phenol	<.05	5.5	3.4	1.0	65
2,4-Dimethylphenol	<.05	2.4	1.9	1.1	78
2,4-Dichlorophenol	<.05	2.3	1.9	1.1	81
2,4,6-Trichlorophenol	<.05	2.1	1.7	1.4	82
4-Chloro-3-methylphenol	<.05	2.0	1.6	1.1	80
Pentachlorophenol	<.05	1.0	.75	.35	75
D_{10} Phenol	<.05	10	7.0	3	70

INFLUENT QUALITY CONTROL BASE-NEUTRAL FRACTION (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	1	43.7	42.0	2.7	96
1,3-Dichlorobenzene	1	49.4	42.0	2.7	85
1,4-Dichlorobenzene	1	34.5	29.0	1.4	84
N-Nitrosodi-n-propylamine	1	62.9	54.1	2.5	86
Hexachloroethane	1	57.5	48.9	2.0	85
Nitrobenzene	1	51.7	43.9	2.3	85
Isophorone	1	53.4	45.4	2.1	85
2-Chloroaniline	130	54.7	180	7.2	91
Bis(2-chloroethoxy)methane	1	61.7	56.1	6.8	91
Trichlorobenzene	1	57.9	50.4	3.3	87
Naphthalene	5.6	49.2	48.4	3.3	87
2-Chloronaphthalene	1	46.0	45.1	2.8	98
2,6-Dinitrotoluene	1	52.0	40.0	1.2	77
Dimethyl phthalate	3.6	53.2	49.4	1.1	86
Acenaphthalene	1	50.1	45.6	3.1	91
Acenaphthene	1	51.2	44.0	3.6	86
2,4-Dinitrotoluene	1	49.6	45.1	2.3	91
Diethyl phthlate	1.6	51.6	47.0	2.7	88
Fluorene	1	44.0	37.0	2.0	84
1,2-Diphenylhydrazine	1	47.8	42.1	2.4	88
4-Bromophenyl phenyl ether	1	52.0	44.2	0.6	85
Hexachlorobenzene	1	46.8	37.9	2.1	81
Anthracene	1	48.5	42.7	3,4	88
Phenathrene	0.7	48.6	46.9	0.7	95
Di-n-butyl phthalate	1.2	55.9	52.6	1.7	92
Pyrene	1	50.2	43.7	1.0	87
Fluoranthene	1	48.0	41.3	110	86
Butyl benzyl phthalate	1	57.0	48.5	1.0	85
Dichlorobenzidine	6.8	52.6	65.2	6.4	111
Benzo(a)pyrene	1	49.7	42.7	3.1	86
Chrysene	1	48.5	40.3	1.0	83

INFLUENT VOLATILE FRACTION QUALITY CONTROL (μg/l)

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethylbenzene	1	17.3	15.9	.7	92
Chlorobenzene	1	22.1	21.0	.9	95
Toluene	1,150	17.3	1,165	.9	85
Perchloroethylene	250	32.5	280	1.6	92
Tetrachloroethane	1	31.9	30.0	.6	94
Bromoform	1	57.8	51.4	2.4	89
Trichloroethylene	25	29.3	54.0	.8	99
1,1,2-Trichloroethane	1	27.9	27.6	2.7	99
Benzene	150	17.6	164.6	.2	83
Cis-1,3-Dichloropropene	1	23.6	22.9	1.3	97
1,1,1-Trichloroethane	100	26.8	125.5	.2	95
Trans-1,3-Dichloropropene	1	24.1	22.6	.4	94
1,2-Dichloropropane	1	23.1	22.6	.5	98
1,2-Dichloroethane	100	24.7	21.5	1.2	87
1,1-Dichloroethane	1	23.5	22.3	.4	95
Trichlorofluoromethane	1	26.2	24.6	.4	94
1,1-Dichloroethene	1	24.4	24.2	.4	99
Chloroform	1,000	29.7	1,028	.6	94
Trans 1,2-dichloroethylene	20	25.1	45.3	.7	101

INFLUENT QUALITY CONTROL ACID FRACTION (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	1	37	33.7	1.9	91
Phenol	8	137	112	2.7	76
2,4-Dimethylphenol	1	59.3	36.8	2.9	62
2,4-Dichlorophenol	1	56.6	51.5	2.1	91
2,4,6-Trichlorophenol	1	53.1	51.0	0.8	96
4-Chloro-3-methylphenol	1	50.7	43.6	3.6	86
Pentachlorophenol	1	24.7	24.2	0.7	98
2-Fluorophenol	1	25	16.8	0.4	67

SOUTH DITCH QUALITY CONTROL BASE-NEUTRAL FRACTION (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< 1	43.7	39.8	4.2	91
1,3-Dichlorobenzene	< 1	49.4	36.6	3.7	74
1,4-Dichlorobenzene	< 1	34.5	33.1	5.6	96
1,2-Dichlorobenzene	< 1	12.2	9.4	3.1	77
N-Nitrosodi-n-propylamine	< 1	62.9	54.1	4.7	86
Hexachloroethane	< 1	57.5	47.7	4.2	82
Nitrobenzene	< 1	51.7	50.7	3.7	98
Isophorone	< 1	53.4	42.7	3.6	80
2-Chloroaniline	5	54.7	60.0	5.2	95
Bis(2-chloroethoxy)methane	< 1	61.7	41.9	3.1	68
Trichlorobenzene	< 1	57.9	45.2	2.7	78
Naphthalene	< 1	49.2	45.8	4.4	93
2-Chloronaphthalene	< 1	46.0	34.9	4.3	76
2,6-Dinitrotoluene	< 1	52.0	39.5	3.1	76
Dimethyl phthalate	< 1	53.2	45.8	2.0	86
Acenaphthalene	< 1	50.1	40.1	2.2	80
Acenaphthene	< 1	51.2	46.1	3.6	90
2,4-Dinitrotoluene	< 1	49.6	42.2	2.1	85
Diethyl phthalate	< 1	51.6	41.8	2.5	81
Fluorene	< 1	44.0	34.3	2.7	78
1,2-Diphenylhydrazine	< 1	47.8	40.6	3.1	85
4-Bromophenyl phenyl ether	< 1	42.0	41.1	4.6	79
Hexachlorobenzene	< 1	46.8	37.9	3.8	81
Anthracene	< 1	48.5	35.9	3.7	74
Phenathrene	< 1	48.6	33.0	2.3	68
Di-n-butyl phthalate	< 1	55.9	48.1	3.4	86
Pyrene	< 1	50.2	32.6	3.6	65
Fluoranthene	< 1	48.0	31.7	2.2	66
Butyl benzyl phthalate	< 1	57.0	34.8	3.4	61
Dichlorobenzidine	< 1	52.6	42.1	4.9	80
Benzo (a) pyrene	< 1	49.7	34.8	3.6	70
Chrysene	< 1	48.5	36.4	3.4	75

SOUTH DITCH VOLATILE FRACTION QUALITY CONTROL (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethyl benzene	< 1	17.3	17.1	.9	93
Chlorobenzene	< 1	22.1	20.8	.8	94
Toluene	11	17.3	17.1	.5	99
Perchloroethylene	< 1	32.5	29.3	1	90
Tetrachloroethane	< 1	31.9	28.1	2	88
Bromoform	< 1	57.8	57.2	2	99
Trichloroethylene	< 1	29.3	25.2	.9	86
1,1,2-Trichloroethane	< 1	27.9	25.9	.8	93
Benzene	< 1	17.6	19.6	.4	100
Cis-1,3-Dichloropropene	< 1	23.6	22.7	.4	96
1,1,1-Trichloroethane	< 1	26.8	27.6	.3	103
Trans-1,3-Dichloropropene	< 1	24.1	23.1	.3	96
1,2-Dichloropropane	< 1	23.1	22.4	.3	97
1,2-Dichloroethane	5	24.7	24.7	.4	100
1,1-Dichloroethane	< 1	23.5	22.8	.2	97
Trichlorofluoromethane	< 1	26.2	19.9	.6	76
1,1-Dichloroethene	< 1	24.4	16.6	1.4	68
Methylene chloride	< 1	26.5	24.4	.3	92
Chloroform	< 1	29.7	27.9	.4	94
Trans-1,2-Dichloroethylene	< 1	25.1	23.1	.8	92

SOUTH DITCH QUALITY CONTROL ACID FRACTION (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	< 1	37	33.3	2.2	90
Phenol	< 1	137	106.9	3.1	78
2,4-Dimethylphenol	< 1	59.3	37.9	3.4	64
2,4-Dichlorophenol	< 1	56.6	50.1	2.0	90
2,4,6-Trichlorophenol	< 1	53.1	50.4	1.0	95
4-Chloro-3-methylphenol	< 1	50.7	44.6	3.3	88
Pentachlorophenol	< 1	24.7	23.5	1.0	95
2-Fluorophenol	< 1	25	17.5	0.6	70

WEST LAGOON QUALITY CONTROL BASE-NEUTRAL FRACTION (µg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Bis(2-chloroethyl)ether	< 1	43.7	42.0	3.1	96
1,3-Dichlorobenzene	< 1	49.4	43.5	4.2	88
1,4-Dichlorobenzene	< 1	34.5	30.7	2.0	89
1,2-Dichlorobenzene	< 1	12.2	10.6	1.0	87
N-Nitrosodi-n-propylamine	< 1	62.9	62.9	4.5	100
Hexachloroethane	< 1	57.5	48.9	3.5	85
Nitrobenzene	< 1	51.7	53.3	2.4	103
Isophorone	< 1	53.4	41.1	2.8	77
2-Chloroaniline	120	54.7	173	8.0	97
Bis(2-chloroethoxy)methane	< 1	61.7	60.5	3.6	98
Trichlorobenzene	< 1	57.9	61.0	4.7	88
Naphthalene	< 1	49.2	46.7	3.7	95
2-Chloronaphthalene	< 1	46.0	42.3	4.7	92
2,6-Dinitrotoluene	< 1	52.0	42.1	3.9	81
Dimethyl phthalate	< 1	53.2	48.4	0.8	91
Acenaphthalene	< 1	50.1	46.1	0.9	92
Acenaphthene	< 1	51.2	44.5	2.3	87
2,4-Dinitrotoluene	< 1	49.6	43.6	3.2	88
Diethyl phthalate	< 1	51.6	49.5	1.7	96
Fluorene	< 1	44.0	38.3	1.6	87
1,2-Diphenylhydrazine	< 1	47.8	42.5	0.8	89
4-Bromophenyl phenyl ether	< 1	52.0	44.7	2.3	86
Hexachlorobenzene	< 1	46.8	42.1	0.5	90
Anthracene	< 1	48.5	45.6	3.0	94
Phenanthrene	< 1	48.6	44.7	1.3	92
Di-n-butyl phthalate	< 1	55.9	50.3	2.9	90
Pyrene	< 1	50.2	43.7	3.5	87
Fluoranthene	< 1	48.0	39.4	2.4	82
Butyl benzyl phthalate	< 1	57.0	45.0	4.6	79
Dichlorobenzidine	< 1	52.6	41.6	8.9	79
Benzo (a) pyrene	< 1	49.7	43.2	5.8	87
Chrysene	< 1	48.5	39.8	4.6	82

WEST LAGOON VOLATILE FRACTION QUALITY CONTROL (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
Ethyl benzene	< 1	17.3	15.2	.9	88
Chlorobenzene	< 1	22.1	18.8	.7	85
Toluene	11	17.3	26.9	.5	92
Perchloroethylene	10	32.5	35.0	2.9	77
Tetrachloroethane	< 1	31.9	33.5	.7	105
Bromoform	< 1	57.8	59.5	3.5	103
Trichloroethylene	3	29.3	28.8	1.8	88
1,1,2-Trichloroethane	< 1	27.9	27.3	1.6	98
Benzene	2	17.6	17.5	.3	88
Cis-1,3-Dichloropropene	< 1	23.6	23.6	.4	98
1,1,1-Trichloroethane	5	26.8	26.7	.8	81
Trans-1,3-Dichloropropene	< 1	24.1	23.4	.6	97
1,2-Dichloropropane	< 1	23.1	22.9	.7	99
1,2-Dichloroethane	46	24.7	71.7	1.0	104
1,1-Dichloroethane	< 1	23.5	26.3	.3	112
Trichlorofluoromethane	< 1	26.2	25.9	2.1	99
1,1-Dichloroethene	< 1	24.4	24.6	1.2	101
Methylene chloride	< 1	26.5	21.5	.4	81
Chloroform	55	29.7	77.3	.9	75
Trans-1,2-Dichloroethylene	< 1	25.1	26.6	1.5	102

WEST LAGOON QUALITY CONTROL ACID FRACTION (μg/l) 1981

Compound	Initial	Spiked Amount	Recovered $\overline{X}$	S	$\overline{\%R}$
2-Chlorophenol	< 1	37	34.8	1.5	94
Phenol	4	137	78.0	5.2	54
2,4-Dimethylphenol	< 1	59.3	40.3	.6	68
2,4-Dichlorophenol	< 1	56.6	54.9	1.1	97
2,4,6-Trichlorophenol	< 1	53.1	54.2	2.7	102
4-Chloro-3-methylphenol	< 1	50.7	47.7	3.4	94
Pentachlorophenol	< 1	24.7	23.5	1.9	95
2-Fluorophenol	< 1	25	17.5	1.2	70

Results of Kerr Laboratory Check Samples

PCB Concentration, µg/l

PCB Ident.	Sample No.	Reported Value	True Value
1254	1	0.86	0.96
1016	2	0.62	0.65
1254	3	0.66	0.58
1016	3	0.30	0.26

Volatile Organics, µg/l

Parameter	Reported Value	True Value
Chloroform #1	9.1	9.13
#2	61	68.46
1,2 Dichloroethane #1	1.9	1.39
#2	27	27.21
Dibromochloromethane #1	2.3	2.74
#2	15	17.15
Bromodichloromethane #1	1.6	1.19
#2	15	11.90
Bromoform #1	3.5	2.85
#2	11	14.24
Carbon Tetrachloride #1	2.9	1.68
#2	11	12.57
1,1,1 Trichloroethane #1	<1	--
#2	13	11.19
Trichloroethylene #1	<1	--
#2	21	18.97
Perchloroethylene #1	<1	--
#2	13	8.76

APPENDIX C

Sludge Distribution Map for 1980

EAST LAGOON

Sample No.	Angle of Degrees "F" Structure	Distance in Yards	Depth of Sludge
1	155	200	4 "
2	135	200	4 "
3	115	200	6 "
4	105	300	3 "
5	125	300	5 "
6	135	300	8 "
7	145	300	6 "
8	165	300	3 "
9	155	400	3 "
10	135	400	7 "
11	115	400	3 "
12	105	500	No Sample
13	125	500	2 "
14	135	500	5 "
15	145	500	3 "
16	165	500	4 "
*Extra Samples			
*1	135	550	3 "
*2	150	450	1½-2 "

WEST LAGOON

Sample No.	Angle of Degrees "F" Structure	Distance in Yards	Depth of Sludge
1	245	200	3 "
2	225	200	2½"
3	205	200	½"
4	195	300	½"
5	215	300	½"
6	225	300	1 "
7	235	300	0 "
8	255	300	3 "
9	245	400	1 "
10	225	400	0 "
11	205	400	0 "
12	195	500	0 "
13	215	500	*0 "
14	225	500	*0 "
15	235	500	*0 "
16	255	500	*0 "

* No Sludge - No Sample Taken

APPENDIX D

ANALYTICAL PROCEDURES

Gas Chromatography-Mass Spectrometry

Water samples were analyzed according to EPA protocol (4&5) using combined gas chromatography-mass spectrometry and gas chromatography.

Table D-1 represents the volatile fraction as described in the EPA list of priority pollutants. Additional compounds have been added to this list along with the detection limits of this laboratory. Volatile fraction compounds were analyzed by the purge-trap technique using a Tekmar LSC-2 Liquid Sample Concentrator coupled to a Finnigan 4021 GC/MS system. A 5-ml sample was purged for 11 minutes with a helium flow of 30 ml/min. The effluent was trapped on a Tenax-Silica gel column which was held at ambient temperature. After the purge cycle was completed, the trap was flash-heated to 180^oC with the GC carrier gas routed through it to the analytical column. Instrumental conditions were as follows:

Column:	8 ft stainless steel, 1% SP-1000 on Carbopack B (60/80 mesh)
Carrier:	Helium, 20 ml/min.
Injector:	200^oC
Program:	3 min. hold at ambient, then rapidly heated to 50^oC for 3 min. and programmed to 200^oC at 8^o/min.
Separator:	Glass-jet, 250^oC
Transfer Line:	250^oC
Filament:	.3 ma
Electron Energy:	70 ev

TABLE D-1
VOLATILE FRACTION

Compound	Water Detection Limit (mg/l)	Sludge, Soil, & Corn Detection Limit (mg/l)
Chloromethane	.01	.05
Bromomethane	.01	.05
Vinyl chloride	.01	.05
Chloroethane	.01	.05
Methylene chloride	.001	.01
Trifluorochloromethane	.001	.01
1,1-Dichloroethylene	.001	.01
1,1-Dichloroethane	.001	.01
Trans-1,2-dichloroethylene	.001	.01
Chloroform	.001	.01
1,2-Dichloroethane	.001	.01
1,1,1-Trichloroethane	.001	.01
Carbon tetrachloride	.005	.01
Bromodichloromethane	.001	.01
1,3-Dichloropropane	.001	.01
Trichloroethylene	.001	.01
Bis-1,2-dichloropropane	.001	.01
Trans-1,2-dichloropropane	.001	.01
1,1,2-Trichloroethane	.001	.01
Benzene	.001	.01
2-Chloroethyl vinyl ether	.01	.05
Bromoform	.01	.05
1,1,2,2-Tetrachloroethane	.001	.01
Perchloroethylene	.001	.01
Toluene	.001	.01
Chlorobenzene	.001	.01
Ethyl benzene	.001	.01
Acrolein	.01	.1
Acrylonitrile	.01	.1
Styrene*	.01	.1
Chloroprene*	.001	.01
Dibromochloromethane	.001	.01

* Not present on EPA's list of priority pollutants

Scan: 33-250 amu: 1.95 sec. up; .05 sec. down

Quantitation was based on internal standards, using bromochloromethane, 2-bromo-1-chloropropane, and 1,4-dichlorobutane as representative of early, middle, and late eluting compounds. A mixed volatile priority pollutant standard was analyzed daily to determine response factors and overall system performance.

Semi-volatile compounds as given on the EPA priority pollutant list are detailed in Tables D-2 - D-4. Additional compounds have again been added to this list along with the detection limits of this laboratory. Semi-volatile compounds were extracted from water samples using a two-step procedure. A 2-liter sample was adjusted to pH 12 with 6N NaOH and serially extracted with 150-, 50-, and 50-ml portions of dichloromethane. The solvent layer was dried with sodium sulfate and concentrated in a Kuderna-Danish evaporator. This was used for the analysis of the base-neutral fraction as listed in Table 5. The aqueous phase was then made acidic (ph<1) with 6N H_2SO_4 and extracted in the same manner. The extract was dried and concentrated as before. This extract was analyzed for the acid fraction compounds listed in Table 6.

A 2-ml portion of the base-neutral was removed for pesticide analysis. Compounds analyzed for in this fraction included those given in Table 7. The dichloromethane was exchanged for hexane by adding it to 200 mls of the solvent and concentrating it in a Kuderna-Danish. The concentrate was then fractionated on a Florisil column using 6%, 15%, and 50% ethyl ether in petroleum ether elutates. Each eluent was concentrated as above. Instrumental conditions for the analysis of base-neutral compounds were as follows:

TABLE D-2
BASE-NEUTRAL FRACTION

Compound	Water Detection Limit (mg/l)	Sludge, Soil, & Corn Detection Limit (mg/l)
Dichlorobenzene (3 isomers)	.001	.05
Hexachloroethane	.001	.05
Pentachloroethane	.001	.05
Hexachlorobutadiene	.001	.05
1,2,4-Trichlorobenzene	.001	.05
Naphthalene	.001	.05
Hexachlorocyclopentadiene	.001	.05
Nitrobenzene	.001	.05
2-Chloronaphthalene	.001	.05
Acenaphthene	.001	.05
Isophorone	.001	.05
Fluorene	.001	.05
2,4-Dinitrotoluene	.01	.05
1,2-Diphenylhydrazine	.001	.05
2,6-Dinitrotoluene	.01	.08
N-Nitrosodiphenylamine	.005	.08
Hexachlorobenzene	.001	.05
4-Bromophenyl phenyl ether	.001	.05
4-Chlorophenyl phenyl ether	.001	.05
Anthracene	.001	.05
Phenanthrene	.001	.05
Dimethyl phthalate	.001	.05
Bis(2-chloroethyl)ether	.001	.05
Di-n-butyl phthalate	.001	.05
Diethyl phthalate	.001	.05
Butyl benzyl phthalate	.001	.05
Benzidine	.01	.10
Pyrene	.001	.05
Fluoranthene	.001	.05
Chrysene	.001	.05
Bis(ethylhexyl)phthalate	.001	.05
Benzo(a)anthracene	.001	.05
Benzo(k)fluoranthene	.001	.05
Benzo(a)pyrene	.005	.08
Indeno(1,2,3-cd)pyrene	.01	.10
Dibenzo(a,h)anthracene	.01	.10
Benzo(g,h,i)perylene	.01	.10
3,3'-Dichlorobenzidine	.001	.05
Tetrachlorodibenzo-p-dioxin	.01	.10
N-Nitrosopropylamine	.001	.05
Pentachloronitrobenzene*	.001	.05

(Continued)

TABLE D-2
(Continued)

Compound	Water Detection Limit (mg/l)	Sludge, Soil, & Corn Detection Limit (mg/l)
Aniline*	.001	.05
Chloroanilines*	.001	.05
Acenaphthalene	.001	.05
Bis(2-chloroisopropyl)ether	.001	.05
Bis(2-chloroethoxy)methane	.001	.05

* Not present on EPA's list of priority pollutants

TABLE D-3
ACID FRACTION

Compound	Water Detection Limit (mg/l)	Sludge, Soil, & Corn Detection Limit (mg/l)
2-Chlorophenol	.001	.05
Phenol	.001	.05
2,4-Dichlorophenol	.001	.05
2-Nitrophenol	.01	.1
4-Chloro-3-methylphenol	.001	.05
2,4,6-Trichlorophenol	.001	.05
2,4-Dimethylphenol	.001	.05
2,4-Dinitrophenol	.01	.5
2-Methyl-4,6-Dinitrophenol	.01	.5
4-Nitrophenol	.01	.1
Pentachlorophenol	.01	.1
Methylphenols*	.001	.05

* Not present on EPA's list of priority pollutants

TABLE D-4
PESTICIDES AND PCB FRACTION

Compound	Water Detection Limit (μg/l)	Sludge, Soil, & Corn Detection Limit (μg/l)
Mirex	0.1	1
Methoxychlor	0.5	5
Endosulfan	0.1	1
α BHC	0.1	1
γ BHC	0.1	1
β BHC	0.1	1
Aldrin	0.1	1
Heptachlor	0.1	1
Heptachlor epoxide	0.1	1
Endosulfan sulfate	0.1	1
Endrin	0.1	1
Chlordane	1.0	10
Toxaphene	1.0	10
Dieldrin	0.1	1
DDT and Analogs	0.1	1
Aroclor 1016	1.0	10
Aroclor 1221	1.0	10
Aroclor 1232	1.0	10
Aroclor 1242	1.0	10
Aroclor 1248	1.0	10
Aroclor 1254	1.0	10
Aroclor 1260	1.0	10

Column:	30m Fused Silica, SE-30
Carrier:	Helium, 1 ml/min.
Program:	50^{o} for 5 min., then to 270^{o} @ 8^{o}/min.
Injection:	Splitless
Injector:	$250^{o}C$
Transfer Line:	$270^{o}C$
Filament:	.3 ma
Electron Energy:	70 ev
Scan:	33-505 amu: .95 sec. up; .05 sec. down

Quantitation was based on internal standardization with deuterated anthracene ($D_{10}A$). A mixed priority pollutant standard was analyzed daily to determine response factors and overall system performance. The standard also contained 20 ng of decafluorotriphenylphosphine (DFTPP) and 40 ng of benzidine. The GC/MS system had to meet required calibration and performance criteria (6) before samples were processed. Acid compounds were analyzed under the following conditions:

Column:	1% SP-1240DA, 6 ft glass
Carrier:	Helium, 20 ml/min.
Program:	80^{o} for 2 min., then to 200^{o} @ 12^{o}/min.
Injector:	$200^{o}C$
Transfer Lines:	$270^{o}C$
Filament:	.3 ma
Electron Energy:	70 ev

Scan:	33-300 amu: 1.95 sec. up; .05 sec. down

Quantitation was based on internal standardization with $D_{10}A$. A mixed standard was analyzed daily to determine response factors. Performance criteria for DFTPP and pentachlorophenol were checked daily before samples were analyzed. Pesticides were analyzed by gas chromatography using electron capture (ECD) and Hall Electrolytic Conductivity (HECD) Detectors. Pesticides were confirmed on polar and nonpolar columns using the two-detector system. Instrumental conditions were as follows:

	System 1	System 2
Column:	3% OV-1, glass	3% SP2250, glass
Temperature:	150-250^{o} @ 8^{o}/min.	220^{o}C Isothermal
Final Hold:	15 min.	________
Injector:	200^{o}	200^{o}
Detector:	HECD	Ni^{63}, 350^{o}C
Carrier:	He, 20 ml/min.	N_2, 25 ml/min.
Reactor:	910^{o}C	________
Solvent:	N-propanol, .5 ml/min.	________
Reaction Gas:	H_2, 20 ml/min.	________

All samples for GC/MS analysis were searched for three selected ions maximizing at a given retention time as described in the protocol (4&5). Peaks not corresponding to priority pollutant standard were subjected to library searches for identification. If the search revealed a good spectral match (> 90% fit), the peak was quantitated using the response of a similar compound or a 1:1 ratio with the internal standard. Surrogate standard recovery was monitored for each sample as a measure of quality control. A Soxhlet extraction was used for sludge and soil analysis. A 50-gram sample of wet solid was allowed to air dry for 24 hours (7). The material was then extracted in a Soxhlet extractor with a 50/50 mixture of acetone-hexane for 18 hours. The extract was then concentrated in Kuderna-Danish evaporator and the concentrate extracted three times with 1.0 N NaOH. The hexane layer was saved as the base-neutral extract. The NaOH layer was then made acidic to pH 3 with 1.0 N HCL and extracted three times with dichloromethane. Both solvent layers were concentrated as before and analyzed under the same instrumental conditions as water samples. Volatile analysis of sludge samples was performed by slurrying 8 grams of material in 32 ml of blank water and adding 5 ml of slurry to the purge and trap apparatus. Analytical conditions were identical to water samples.

Corn samples were ground in a high-speed blender and the resulting material was Soxhlet-extracted under the same conditions as the sludge and soil samples. Base-neutral and acid separations were also identical. No volatile analysis was performed on the corn samples.

Additional Testing Methods

Analysis of 1,2-dichlorethane for the lagoon seepage study was performed using Method 601 (8). Analysis was conducted using a Tekmar LSC-3 sample concentrator coupled to a Tracor 560 gas chromatograph with a Hall 700A detector. A 5-ml sample was purged for 11 minutes with a helium flow of 30 ml/min. The effluent was trapped on a Tenax-Silica gel column which was held at ambient temperature. After the purge cycle was complete, the trap was flash-heated to 180° with the GC carrier gas routed through it to the analytical column. Instrumental conditions were as follows:

Column:	8 ft stainless steel, 1% SP-1000 on Carbopack B (60/80 mesh)
Carrier:	Helium, 20 ml/min.
Program:	3 min. hold at ambient, then rapidly heated to 50°C for 3 min. and programmed to 200°C at 8°/min.
Reaction gas:	H_2, 20 ml/min.
Solvent:	1-propanol, 0.5 ml/min.
Reactor	850°C

Quantitation was based on internal standardization with bromochloromethane. Three standards were analyzed daily to determine linearity.

Analysis of 2-chloroaniline, 3,3'-dichlorobenzidine, and 2,4'-diamino-3,3'-dichlorobiphenyl in the lagoon seepage wells was performed using Method 605 (9). The technique was modified by operating the electrode potential at 0.9 volts to facilitate detection of 2-chloroaniline. This compound is not oxidized at the recommended 0.8 volts.

A 2-ml aliquot of the methylene chloride base-neutral extract was exchanged for methanol by adding it to 200 ml MeOH and concentrating the solvent in a Kuderna-Danish evaporator. The concentrate was reduced to 3 ml and then diluted to 6 ml with HPLC grade water. The sample was then stored at 4°C for analysis.

Analysis was performed by high pressure liquid chromatography (HPLC) using a Spectra Physics SP8700 solvent delivery system connected to a BAS LC-3 electrochemical detector. Instrumental conditions were as follows:

Mobile Phase:	50% acetonitrile, 50% 0.1 N acetate buffer at pH 4.7
Column:	Lichrosorb RP-2, 5 micron
Injection:	100 ul, loop
Electrode:	Glassy carbon
Potential:	0.9 volts
Flow:	1.7 ml/min.

The instrument was calibrated daily by duplicate standard injections at three concentration levels. Samples that contained peaks with matching retention times were quantitated in the linear range of the standard.

<u>Air Samples</u>

Air samples were collected and analyzed according to standard NIOSH procedures (10). Samples were collected at the down wind wall of Aeration Cell I, approximately 5 feet from water level. A three hour sample was taken, using a large size (200/400 mg) charcoal tube hooked to a Bendix Personal Sampling Pump calibrated at 100 ml/min. At the end of the sampling interval, the tubes were capped and stored at $4^{o}C$ prior to desorption and analysis.

Samples were desorbed by breaking the glass tube and transferring the two charcoal sections into separate, 5 ml, teflon-capped vials. Three mls of carbon disulfide was added to each vial. The sealed container was placed in an ultrasonic water bath for 30 minutes. After desorption, the samples were analyzed by gas chromatography under the following conditions:

Instrument:	Varian 2100
Injector:	$200^{o}C$

Column:	20 ft, Stainless Steel, 10% SP-1000 on 80/100 mesh Supelcoport
Program:	$100^{o}C$ for 6 min., then to $140^{o}C$ @ 10^{o}/min.
Detector:	FID, $300^{o}C$
Carrier:	Helium, 30 ml/min.

Sample concentration was calculated by the analysis of desorbed standards.