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DATE REPORT ACCEPTED 9-24-92
DISPOSITION SEA
SAM SIGNATURE Cynthia K. Gurley

FINAL

PRELIMINARY ASSESSMENT
GATE CITY
AKA: GATE CITY DOOR AND SASH
AKA: SUN BANK PROPERTY
BROWARD COUNTY, FLORIDA
FLD984170860

PA

AUGUST 26, 1992

Florida Department of Environmental Regulation
Division of Waste Management
Bureau of Waste Cleanup
Technical Review Section

Prepared by

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Environmental Specialist III

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Site:

Gate City
aka: Gate City Door and Sash
aka: Sun Bank Property
300 West Broward Blvd.
Fort Lauderdale, Broward County, Florida

EPA ID No: FLD984170860

1. Introduction

Under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Re-authorization Act of 1986 (SARA), the Florida Department of Environmental Regulation, Division of Waste Management, Site Screening Superfund Subsection conducted a Preliminary Assessment for the Gate City site (aka: Sun Bank Property) in Fort Lauderdale, Broward County, Florida. The purpose of this investigation was to assess the threat posed to human health and the environment, and to determine the need for additional investigation under CERCLA/SARA or other action. The scope of the investigation included review of available file information, a comprehensive target survey and interviews with FDER personnel familiar with the site.

2. Site Description, Operational History, and Waste Characteristics

2.1 Site Location

The Gate City Door and Sash (GCDS) site, aka: Sun Bank Property, is located at 300 West Broward Boulevard, Fort Lauderdale, Broward County, Florida. This site is located in a predominantly commercial/light industrial and low to medium density residential area of Fort Lauderdale [1-4,6,12] (Figures 1-4). This approximate latitudinal and longitudinal coordinates of this site are 26° 07' 17'' N and 80° 07' 47" W, respectively [3,4,6,12] (Figure 1). To get to this site take Interstate 95 South to Fort Lauderdale. At the West Broward Boulevard exit (SR 842), head east. Go approximately 1.25 miles on West Broward Blvd. and take a right onto S.W. 4th Avenue. The GCDS site is located in the southeast corner of this intersection [3,4,6,12] (Figures 1,2,3).

Broward County is located in a semi-tropical marine climate, characterized by warm humid summers and mild dry winters. The mean annual temperature is 73° F. The temperature extremes range from 29° F to 96° F. The average annual rainfall in Broward County ranges from 52 inches (") in western Broward County to as high as 60" along the coast. Most of the rain (75%) falls between June and October [6,15,16]. The local net annual rainfall and 2-yr./24-hr rainfall are approximately 8" and 5.75", respectively [13,14].

2.2 Site Description

The former GCDS site occupied a four city block area of downtown Fort Lauderdale. The large warehouse building, which occupied the GCDS lumber processing building, occupied approximately 90% of the site and was demolished in 12/88 for construction of a parking lot. A small portion of the site (northern part) is paved and used as a parking lot by Sun Bank. Four storm sewer drains (French drain system) are located in the central and southern portions of the site. Storm water runoff not collected by the French drains is collected by storm drains located on W. Broward Blvd. and S.W. 4th Ave and directed to the New River, located approximately 800 feet south of the GCDS site [3,4,6,12,21] (Figures 1,7).

The FDER Southeast District reports that the GCDS site is entirely fenced [3,4,6,10] (Figures 1,4-7).

2.3 Operational History and Waste Characteristics

The GCDS facility began lumber processing at this site as early as 1949. This facility occupied a four city block section of Fort Lauderdale until the late 1960's or early 1970's. The GCDS property was purchased by Sun Bank in 1972 for future use. In 12/88, the large warehouse building was demolished in preparation for the construction of a parking lot. Construction of the parking lot commenced on 1/30/89 [2,3,4,6] (Figures 3-7).

On 2/27/89, during the construction of the parking lot, four 2,000 gallon underground storage tanks (USTs) were discovered. Enviropact, Inc., retained by Sun Bank, initiated the unearthing of the four tanks on 2/28/89. During the excavation, a heavy rainfall occurred causing the excavation to fill with water and float one of the tanks. The shifting of this tank caused an estimated volume of between 6 to 89 gallons of liquid to spill out of the tank and into the excavation [2,3,4,6] (Figure 6).

The Broward County Environmental Quality Control Board (BCEQCB) directed Enviropact to remove the spilled product/rainwater and pump it into two vacuum tanker trucks. These liquids were later transferred to drums for storage. Approximately 500 gallons of product/rainwater were recovered from the excavation. The contents of the four USTs (liquids and sludges) were subsequently removed and also placed in drums. The drums were placed on wooden pallets within a visqueen lined fenced area located on the Sun Bank property [2,3,4,6] (Figures 5,6).

Analysis of the Tank 1 and 3 contents indicated the presence of a mineral spirits/pentachlorophenol mixture and mineral spirits, respectively. The remaining two tanks were found to contain water. Some of the parameters of concern found in Tanks 1 and/or 3 included: naphthalene (4,000-5,000

mg/kg), pentachlorophenol [PCP] (2,000-14,000 mg/kg) styrene (2,250-21,250 mg/kg), total xylene (1,600-2,250 mg/kg) and 2-methyl naphthalene (2,000-4,000 mg/kg). Tank 4, although containing mostly water (64.3%), was found to contain naphthalene (3,000 mg/kg), total xylene (11,620 mg/kg) and 2-methyl naphthalene (400 mg/kg) [2,3,4,6] (Figures 3-7).

After the tanks had been removed, an inspection of their integrity and condition was performed. Tanks 1 and 3 did not show any visual evidence of corrosion or leakage. Tank 2 had six small holes on the side while Tank 4 had a 3" x 6" hole in its side. It is believed that these tanks were installed prior to 1972 as part of the lumber operations. Prior to the modern use of CCA (copper, chromium and arsenic salts), a pentachlorophenol/diesel fuel mixture was commonly used in the wood preserving industry [2,3,4,6,11] (Figure 6).

A Preliminary Contamination Assessment of the site was conducted by Enviropact, Inc. on 3/21/89. One soil boring (SB-1) and one monitoring well (MW#1) were installed at that time. Soil samples were collected from the monitoring well borehole located in the center of the UST area. These samples were collected from the 0-2 feet interval and at the soil/water table interface (6-8 feet below land surface [bls]). Mineral spirits (46.7 mg/kg) and (76.4 mg/kg) were found in the 0-2' and soil/water table interface samples, respectively. Xylene (0.39 mg/kg) was detected in the soil/water table sample. The monitor well (MW#1) was installed in the same borehole approximately 15 feet bls. A sample from the well was collected 3/27/89 and analyzed for mineral spirits, EPA method 601, 602, 608 and 625 parameters. Elevated levels of benzene (2.1 ug/l), bis (2-ethylhexyl) phthalate (24.6 ug/l), ethyl benzene (13.3 ug/l), mineral spirits (1,670 ug/l), PCP (6,120 ug/l), toluene (23.3 ug/l), xylene (195 ug/l), 2-chloronaphthalene (2.6 ug/l) and 2,4-dimethylphenol (3.6 ug/l) were detected in surficial aquifer system ground water. Benzene was found above state Primary Drinking Water Standards (PDWS). Bis (2-ethylhexyl) phthalate, ethyl benzene, PCP and xylene were elevated above the Florida Ground Water Guidance Concentrations (FGWGCs) [3,22,23] (Figure 5).

On 5/18/89, Enviropact conducted a soil gas survey in the vicinity of the UST excavation. A total of fourteen locations (two soil samples per location-24 samples) were surveyed with an organic vapor analyzer (OVA) using the ground probe technique method. The probe was placed at depths of approximately 2.5 feet and 4.7 feet bls. The results of the soil-gas survey indicated that soil contamination was restricted primarily to the immediate area around MW#1. The highest readings were detected at Point 10, (90 ppm/2.5' bls and >500 ppm/4.7' bls) [3] (Figures 4,5).

In 7/89, Sun Bank completed installation of a Temporary Drum Storage Area (TDSA) to temporarily contain and secure the drummed wastes from the four USTs. On 8/25/89, Sun Bank's contractor Conestoga-Rovers and Associates (CRA) submitted a workplan to FDER addressing the processing of the containerized aqueous material and sludge at the site [4,6] (Figures 4-6).

In 12/89, in the absence of a final Consent Order, Sun Bank and FDER agreed to implement the final workplan (as modified by FDER) starting 1/2/90. Sun Bank retained the services of CRA and Chemical Waste Management, Inc., ENRAC Division (ENRAC) to perform the processing activities. A final Consent Order between Sun Bank and FDER was signed on 2/1/90 [4,6,9] (Figures 4-6).

The remedial construction activities occurred from 1/2/90 to 3/16/90. These activities included: 1) mineral spirits volume reduction through the separation of the mineral spirits and water, 2) processing drummed water through an activated carbon adsorption system for testing and ultimate discharge to the sanitary sewer system, 3) rinsing of the drummed sludges with water, 4) disposal of K001 sludges off-site, 5) temporary storage of mineral spirit (F027) wastes at an off-site permitted facility for ultimate recycling and 6) removal and disposal of all other materials from the site The TDSA was demolished and removed upon completion of the remedial activities[4,6] (Figures 4-6).

As part of the initial remedial work, CRA and ENRAC conducted an inventory and characterization of the drums in the TDSA. The original number of drums in the TDSA totaled 189 [4,6]. Some of this material

included the bulk disposal of contaminated clothing. A drummed material inventory estimate indicated mineral spirits (2,600 gallons), water (2,900 gallons), sludge-water mixture (1,950 gallons) and sludge (500 gallons) to be present in the drums [4,6] (Figures 4-6).

Various samples of mineral spirits, wastewater and sludge were collected and analyzed from various points in the remedial process prior to sale or disposal. Five (5) of the mineral spirits samples were analyzed for PCP. PCP levels varied from less than detection limits (>100 mg/l) in a TDSA drum composite sample to 28,000 mg/l in a sample taken from the tanker. Treated wastewater samples were diluted 1,000 times prior to testing. The diluted wastewater analysis was compared to the sewage treatment plant influent (toxicity values) prior to discharge to the sanitary sewer system. Three samples of sludge were collected. One of the samples was submitted to disposal contractors for approval. Two samples were submitted to an analytical laboratory for extraction and testing for lead (per 40 CFR 268.41). A drum composite sample was found to contain lead (33 ug/l) [4,6] (Figures 4-6).

Between 11/90 and 2/91, CRA conducted a Contamination Assessment of the site. Six monitoring wells (2" diameter/Polyvinyl chloride [PVC]) were installed on-site during 11/27-29/90. Five of the wells (MW#s2-6) were installed between 11.5 to 13.5 feet bls (10 foot screen interval) and one well (MW#1A) was installed 25 feet bls (5 foot screen length). An HNu photoionization detector (HNu) indicated 15 ppm total organic vapors in MW#2 downhole at the water table. HNu readings remained at background levels in the remaining boreholes [6] (Figure 7).

Soil samples were collected for chemical analysis during the drilling of monitor wells MW#2 and MW#4. These samples were collected from the 1 to 3-foot and 8 to 10 foot depth intervals. The samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), base-neutral/acid extractables (BNAs), pesticides, PCBs, benzene-toluene-ethylbenzene-xylene (BTEX) compounds and polychlorinated dibenzo-p-dioxins and dibenzofuran isomers. Low levels (below detection limits) of 10 polynuclear aromatic hydrocarbons (PAHs) were detected in the soil

samples ranging from 0.01 mg/kg (anthracene) to 0.3 mg/kg (benzo(k)fluoranthene). PCP (0.28 mg/kg) was also detected. The highest levels of PAHs and the PCP detection were found in the MW#2 1-3' soil sample. These concentrations represent estimated values (J values) since they were detected below the quantitation limit. Low levels of polychlorinated dibenzo-p-dioxins and dibenzofuran isomers were detected in the MW#2 and MW#4 soil samples. The levels ranged from 0.002 ug/kg (1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF and total TCDF) to 852 ug/kg (OCDD). The highest level was detected in the MW#2 1 to 3' sample. No pesticides or PCBs were detected in any of the soil samples [6] (Figure 7; Table 1)

CRA sampled the monitor wells in 11/90 (Round 1) and 2/91 (Round 2). The samples were analyzed for VOCs, BNAs chlorinated pesticides/PCBs and dibenzo-p-dioxins and dibenzofuran isomers. The highest levels of VOCs detected in on-site ground water included: benzene (3 ug/l), ethylbenzene (73 ug/l), total xylenes (51 ug/l). The highest levels of VOCs were found in monitor well MW#1A. No site attributable VOCs were detected in wells MW#s 3-6. Naphthalene (85 ug/l) and (11 ug/l) was the only BNA compound detected and was found in monitor wells MW#1A and MW#2, respectively. Dibenzo-p-dioxin and dibenzofuran isomers were detected in all the monitor wells. The majority of these contaminants were found in samples from wells MW#2 and MW#5. The highest levels of dioxin contaminants included: OCCD (7,530 ng/l), OCDF (719 ng/l), total HpCDD (647 ng/l) and 1,2,3,4,6,7,8-HpCDD (319 ng/l). No pesticides or PCBs were detected in any of the ground water samples. Benzene exceeded the state PDWS. Ethylbenzene, xylene, and naphthalene were detected above PGWGCs [6,11,22,23]] (Figure 7; Table 2).

On 7/24/91, FDER and the Florida State University Toxicology Department completed a review of the dioxin/dibenzofuran analytical data from the GCDS/Sun Bank site. It was determined that the dioxin and furan levels detected in on-site soil and ground water were low in comparison with health-based guidance concentrations. FDER recommended quarterly monitoring for one year for all parameters of concern (i.e. PCP, dioxins,

dibenzofurans and mineral spirits). If contaminant concentrations didn't decrease below toxicity equivalent concentrations (dioxins/dibenzofurans) or other criteria (other contaminants) at the conclusion of the one year quarterly monitoring, FDER recommended that additional assessment and/or remedial work be performed at the site [5].

On 10/4/91, FDER completed the review of the GCDS/Sun Bank Contamination Assessment Report (CAR). FDER recommended that at least one new deep monitoring well be placed near MW#1A to better delineate the extent of vertical contamination at the site. They also reiterated the need for one year quarterly monitoring for the contaminants of concern. Further investigation concerning the origin of the dioxin/dibenzofuran isomers was also requested [6]. However, at a latter date (1/17/92), FDER concluded that there was no evidence to link the source of the dioxin/dibenzofuran isomers to past activities at this site [7].

On 4/13/92, Sun Bank's contractor (CRA) proposed to install one additional well 35 feet deep adjacent to monitor well MW#1A. CRA also proposed implementation of the quarterly monitoring program using existing monitor wells MW#s1A, 2-6 and the new well (MW#7). These wells would be sampled for only VOCs for one year [8] (Figure 8).

As of 7/24/92, FDER was awaiting additional comments regarding the monitoring program and additional contamination assessment work [10].

3. Ground-Water Pathway

3.1 Hydrogeologic Setting

This site is located on the Atlantic Coastal Ridge situated in the Southern (or Distal) Zone geomorphologic province. The geologic framework of Broward County includes, in ascending order, the Oldsmar Formation (Fm), Avon Park Fm, Ocala Limestone, Suwannee Limestone, Hawthorn Group, Tamiami Fm, Caloosahatchee Fm, Fort Thompson Fm, Anastasia Fm, Key Largo Limestone, Miami Limestone and undifferentiated sediments [12,15-20].

The Eocene age Oldsmar Fm consists of primarily limestone interbedded with vuggy dolostone. The lower part of the section is usually more dolomitized than the upper part. Gypsum may occur as thin beds and within pores in some places of the formation [19]. The Avon Park Fm is composed primarily of middle Eocene age fossiliferous limestone interbedded with vuggy dolostone [19]. The upper Eocene age Ocala Limestone consists of muddy (carbonate) to finely pelletal limestone in southern Florida. However, the Ocala Limestone may be absent in portions of southeast Florida [19].

The Suwannee Limestone of Oligocene age consists primarily of variably vuggy and muddy (carbonate) limestone (grainstone to packstone) in southern Florida [18,19].

The Miocene age Hawthorn Group consists of the Arcadia and Peace River Fms in southern Florida. The Peace River Fm is composed of interbedded quartz sands, clays and carbonates. The carbonates consist of variably sandy, clayey phosphatic limestones and micro- to very fine crystalline, variably sandy phosphatic dolostones. However, the siliciclastic portion of the formation predominates. The Arcadia Fm. consists of predominantly limestone and dolostone with varying amounts of quartz sand, clay and phosphate grains. Dolomite is the most abundant carbonate component of the Arcadia Fm. The Hawthorn Group is found approximately 330 feet below land surface (bls) and is approximately 700 feet thick in the site area [12,15-20].

The Tamiami Fm consists of sediments of upper Pliocene age ranging in composition from pure quartz sand to nearly pure limestone. The limestone is generally white to gray in color. The Tamiami Fm consists of the Pinecrest Sand, Ochopee Limestone and the Buckingham Limestone Members. These facies of the Tamiami Fm occur over a wide area of southern Florida [15-17,19,20].

The Pleistocene age Caloosahatchee Fm consists of fossiliferous quartz sand with variable amounts of carbonate matrix interbedded with variably

sandy, shelly limestones. The sediments show a wide range of induration (nonindurated to well indurated). This unit also contains fresh water limestones. However, this unit is not often encountered while drilling in Broward County [15-17,19,20].

The Pleistocene age Fort Thompson Fm consists of interbedded shell beds and limestones. The shell beds are generally variably sandy and slightly indurated to nonindurated. The sandy limestones within the Fort Thompson Fm were deposited under both fresh water and marine conditions [15-17,19,20].

The Anastasia Fm consists of interbedded quartz sands and coquinoid limestones of Pleistocene age. The sand beds are composed of fine to medium grained, variably fossiliferous, calcareous, quartz sand. The limestone beds (coquina) are composed of mostly broken/abraded mollusk shell fragments, scattered whole shells and quartz sand enclosed in a calcareous matrix. This matrix usually consists of sparry calcite cement. The Anastasia Fm thins toward the central and southern portions of the county where it interfingers with the Fort Thompson Fm. The Anastasia Fm grades into the Miami Limestone south of Boca Raton, Palm Beach County [15-17,19,20].

The Miami Limestone (Pleistocene age) consists of an oolitic facies and bryozoan facies. The oolitic facies underlies the Atlantic Coastal Ridge southward from southern most Palm Beach County to southern Dade County. The oolitic facies consists of variably sandy limestone composed primarily of oolites with scattered concentrations of fossils. The bryozoan facies underlies and extends west of the western boundary of the oolitic facies. The bryozoan facies consists of calcareous bryozoan colonies imbedded in a matrix of ooids, pellets and skeletal sand. It is commonly found as a variably sandy, recrystallized, fossiliferous limestone. The Key Largo Limestone of Pleistocene age consists of a highly crystalline, reefal limestone composed of coral heads in a calcarenite matrix [15-17,19,20].

The undifferentiated sediments (Pamlico Sand) are a late Pleistocene age terrace deposit of marine origin. These sediments are composed of a pale

orange to brown, very fine to coarse, mostly medium grained quartz sand with varying amounts of iron oxide. This deposit attains a maximum thickness of 18 feet on the coastal ridge and is generally 2 to 5 feet thick west of the ridge. Lithologic logs of the on-site monitoring wells indicated the uppermost 7.5 to 9 feet consisted of medium to fine grained, dark brown-light gray sand. Underlying this uppermost unit to the depth of investigation (25 feet bls) was a tan colored, fine grained sand with some lime mud [6,15-17,19,20].

The surficial aquifer system, also known as the Biscayne aquifer, of Broward County is composed of limestone, sandstone, shell, limemud, silt, clay and an admixture of these materials. These sediments were deposited during the Pliocene to Pleistocene ages. These units include, in ascending order, the Tamiami Fm, Caloosahatchee Fm, Fort Thompson Fm, Key Largo Limestone, Anastasia Fm, Miami Limestone and the Pamlico Sand. The Biscayne aquifer has been designated by the federal government as a sole-source aquifer [15-17,19,20].

The surficial aquifer system is thickest along the coast where it attains a maximum thickness of up to 400 feet. The aquifer gradually thins inland to the west and southwest where it is approximately 70 feet thick in central Broward County and pinches out near the western county line. The surficial aquifer system is composed of distinct lithologic units exhibiting numerous facies changes caused by changes in sea level. The surficial aquifer system is recharged primarily by rainfall and from area canals. The water table is found approximately 2.5 to 4 feet below land surface (bls) in the site area. The hydraulic conductivity of the surficial aquifer system varies from 0.1 to greater than 1,000 feet/day and wells near the coast (at least 100 feet deep) yield more than 1,000 gallons per minute (gpm). Water from the Biscayne aquifer is generally hard, calcium bicarbonate type and contains varying quantities of iron. Mineralization increases inland and with depth in the aquifer. The regional ground water flow direction within the Biscayne aquifer is generally to the east and southeast. Ground water elevations taken (2/21/91) from the on-site monitor wells indicates a southeasterly ground water flow direction [6,15-17,19,20] (Figure 7).

The Intermediate confining unit consists of the relatively impermeable marl; greenish, sandy clay and silt units located in the lower part of the Tamiami Fm (Pliocene age) and the Hawthorn Group (Miocene age). This intermediate confining unit underlies the Biscayne aquifer to a depth of 950 feet in Broward County and forms the upper confining unit for the Floridan aquifer system [15-20].

The artesian Floridan aquifer system is composed of carbonate and evaporite units ranging from Eocene to Oligocene age. The Floridan aquifer system consists of, in ascending order, the Oldsmar Fm, Avon Park Fm, Ocala Limestone and the Suwannee Limestone. The top of the Floridan aquifer system is found approximately 950 feet bls and the aquifer is about 2,750 feet thick in eastern Broward County. Water from the Floridan aquifer system is highly mineralized and unsuitable for potable water supplies. The water contains more than 1,500 mg/l of chloride, 3,500 mg/l dissolved solids and is sulfurous, hard and corrosive [15-20].

3.2 Ground-Water Targets

The majority of area residents and businesses are served by the City of Fort Lauderdale and Broward County Utilities water supply systems. Area well field systems tap the Biscayne aquifer, which is the sole source of water in Broward County. However, there are no County well field systems present within a 4-mile radius of the site [12,17,19,24,26-30].

The nearest wellfield system to the site is the City of Fort Lauderdale Peele-Dixie well field, located between 3.5 (Well #11) and 4.5 miles west-southwest of the site. There are currently 17 active wells in this well field. Seven of these wells are located within 4 miles of the site. The Peele-Dixie well field system normally supplies 30% of the City of Fort Lauderdale water demand. The Fiveash-Prospect/Executive well field system, located approximately 4.5 miles north-northwest of the site, normally provides 70% of the water demand. [12,24,26,27-30].

The communities of Oakland Park and Wilton Manors purchase all their water from the City of Fort Lauderdale Fiveash well field system. The City of Fort Lauderdale water system currently serves a population (including Oakland Park and Wilton Manors) of 284,398 (49,350 service connections) [12,24,26,27-30].

A review of the FDER Public Water System (PWS) database indicates that there is only one other public well system located within 4 miles of the site. This system, the Broward Christian School, has 1 well and is located approximately 3.85 miles north-northwest of the site. This system reportedly serves 130 people [12,24].

A well inventory and water use investigation of the site area, using South Florida Water Management District well permits, was performed by CRA as part of the CAR. The majority of the wells in the immediate site area (0.5 mile) were found to be utilized for ground water monitoring. Two irrigation wells were located approximately 1 mile northeast of the site. No public wells were located within 4 miles of the site A breakdown of the public and municipal well systems by distance is included in Table 3 [6,12].

Table 3

0 to 1/4 mile	0	0
> 1/4 to 1/2 mile	0	0
> 1/2 to 1 mile	0	0
> 1 to 2 miles	0	0
> 2 to 3 miles	0	0
> 3 to 4 miles	35262 [1]	8

Footnote

1 City of Ft Lauderdale population is 284,398 people. The Peele-Dixie WTP supplies approximately 30% of the systems needs, which equals 85,319 people. There are 17 wells in the Peele-Dixie system. Approximately 5,018 people are served by each of the seven wells located within 4 miles of the site or 35,132 people are served by the seven wells. The Broward Christian School well serves 130 people [12,24,26-30].

3.3 Ground-Water Conclusions

Releases of leftover mineral spirit and pentachlorophenol wood treating solutions from four USTs has resulted in contamination of on-site soil and/or ground water from a number of contaminants including: mineral spirits, VOCs (benzene, ethylbenzene, toluene, xylene), BNAs (2,4-dimethylphenol, pentachlorophenol) and PAHs (naphthalene, 2-chloronaphthalene, benzo(b)fluoranthene, benzo(k)fluoranthene). Benzene has been detected above state PDWS. Several organic compounds, including naphthalene, ethylbenzene, pentachlorophenol and xylene, have been found to exceed FGWGCs during past sampling events [3,6] (Figures 3-7, Tables 1,2).

Dibenzo-p-dioxins and dibenzofuran isomers have also been detected in on-site soil and ground water. However, these contaminants do not appear related to former wood preserving activities at the site and are probably related to general industrial activity in the area [6,7] (Figures 3-7, Tables 1,2).

Remedial action at this site in early 1989 resulted in the removal of the UST tanks. During the excavation, an intense rainstorm floated one of the tanks causing spillage of some of the tank's contents into the excavation. The contents of the tanks and the spilled product/rainwater from the excavation were placed into 55-gallon drums and placed in a temporary drum storage area located on-site. In early 1990, additional remedial work was conducted at the site including separation of water from the mineral spirits and subsequent recycling of the mineral spirits at an off-site permitted facility and disposal of K001 sludges off-site at a permitted Chemical Waste Management, Inc. (CWM) disposal facility [3,4,6] (Figures 3-7).

FDER has requested an additional deep monitor well (screened below well MW#1A) in order to define the extent of vertical contamination in the former UST area. The vertical extent of contamination needs to be assessed due to the fact that VOA concentrations in deep well MW#1A

were 5 to 10 times the concentrations in the shallow well. In addition, although practically insoluble, several of the organic contaminants (i.e. ethylbenzene, naphthalene, pentachlorophenol) have specific gravity's greater than water. These dense non aqueous phase liquid (DNAPLs) contaminants may sink through the aquifer and pool on top of a lower permeability boundary. Monitor wells screened in the upper portion of the aquifer may not fully characterize the vertical extent of contamination [6-8,35,36] (Figure 8).

A portion of the City of Fort Lauderdale Peele-Dixie well field is present between 3.5 and 4 miles of the site. However, the rest of the municipal and county well fields are more than 4 miles from the site [12, 24-30].

4. Surface Water Pathway

4.1 Physical Conditions

In general, site area soils consist of the Immokalee-Urban land association. This soil is a poorly drained, nearly level sandy soil, approximately 40 inches in depth and underlain by limestone. Most of the site area has been modified for urban use. The immediate GCDS site is located at the border of the Urban land and Immokalee-Urban land soil associations. The Urban land association, which exists over the majority of the site, is covered more than 70% by parking lots, buildings and streets. Open land areas (lawns, vacant lots, etc.) consist of soils in the Hallandale, Margate, Immokalee and Basinger series that have been altered by fill material approximately 12 inches thick. The fill consists of sand mixed with limestone and shell fragments. The Immokalee-Urban land soil association, which is present immediately west of S.W. 4th Ave., contains between 20 to 45% open land. The open land areas consist of level, poorly drained Immokalee soils that have been modified in most places by the spreading of sandy fill. This soil type has been classified as being in the B/D Hydrologic group [6,12,42]. The site area is located in an area designated as being in a 100-year flood plain [12,37].

The northern portion of the site is asphalt paved. As of 8/92, the majority of the south and central portions were unpaved [6,7,10]. Storm water runoff not collected by the on-site French drains or that does not infiltrate into unpaved areas, is directed to the City of Fort Lauderdale storm water sewer system. There are storm drains along West Broward Blvd. and S.W. 4th Ave. that direct storm water runoff to the New River, located approximately 800 feet south of the site. It has been reported that surficial aquifer system ground water in the area discharges into the New River. The New River is also reportedly tidally influenced [6,12,15,21] (Figures 3-7).

4.2 Surface Water Targets

The New River generally flows eastward through Fort Lauderdale and meets with the confluence of the Stranahan River and the Intracoastal Waterway approximately 1.8 miles east-southeast of the site. The New River is used for recreational boating. There are several boat ramps, yacht clubs and marinas located along the length of the New River. Recreational fishing most likely takes place at homes adjacent to and from bridges overlying the New River [6,12,31,32] (Figures 1-3).

The New River is a habitat for the federally designated endangered West Indian manatee (*Trichechus manatus latirostris*). The river has been designated a Manatee Protection Zone (state of Florida), which places special restrictions on power boating in order to protect the manatee from injury. Historically, many rare, threatened and endangered plants and wildlife inhabited the New River. However, with the intense development taking place and channelization of parts of the New River, it is doubtful that many of these species still exist in the New River watershed. A review of the Florida Natural Areas Inventory indicates the presence of a manatee aggregation in the Port Everglades section of the Intracoastal Waterway [12,31,33,34] (Figure 1).

4.3 Surface Water Pathway Conclusions

Mineral spirit, pentachlorophenol and PAH contaminants have been detected in shallow soil samples (0-3 feet bls) collected from the former UST area. Past soil contamination investigations, including a soil gas investigation, have focused on the immediate tank area. It is recommended that additional soil investigation work be conducted to assess possible contamination due to other past wood treating (aboveground) activities conducted by GCDS including location and evaluation of the former dip tank and drip pad areas [3,6,11] (Figures 4,6,7).

The majority of the central and southern parts of this site are currently unpaved. Only the northern portion of the site is paved [6,7,10] (Figure 8). Surface water runoff not collected by the on-site French drain system is collected by the municipal stormwater sewer system and directed to the New River. In addition, the ground water to surface water migration component may be a threat given the close proximity of the site to the New River and the potential of on-site contaminants, such as DNAPLs (pentachlorophenol), to discharge to the river. The New River contains numerous food chain and sensitive environment (endangered West Indian manatee habitat) targets [12,31,32,34,36,40] (Figure 1).

5. Soil Exposure and Air Pathways

5.1 Physical Conditions

As of 8/92, only the northern portion of the site was paved. The majority of the south and central portions were unpaved [6,7,10] (Figure 8). Future plans for the site call for paving the remainder of the site and using the site for Sun Bank parking [3,4,6,7] (Figures 4-8).

5.2 Soil and Air Targets

This site is only partially paved and is used or will be used for Sun Bank parking. No actual on-site workers are present at the site. The population of Fort Lauderdale (1990 Census) is 144,355 and the average number of persons per household in Broward County is 2.35 [3,6,7,10,38].

U.S. Fish and Wildlife Service information (1982) indicates that a migratory habitat for songbirds and a habitat for the state designated species of special concern (SSC) Little blue heron (*Egretta caerulea*) exists approximately 2.4 miles northeast of the site. The Hugh Taylor Birch State Recreation Area, located approximately 3.3 miles northeast of the site, is also a habitat for a number of songbirds [12,34].

Ann Kolbe Park (aka: Pond Apple Slough) is located on the New River, approximately 3.5 miles southwest of the site. This 243-acre sawgrass slough is a habitat for a number of endangered or threatened plants and wildlife. Some of the endangered (federally designated) wildlife known to inhabit the slough include: the Florida grasshopper sparrow (*Ammodramus savannarum floridanus*) and the Wood stork (*Mycteria americana*). The slough has also been a habitat for the federal and state designated threatened Arctic peregrine falcon (*Falco peregrinus tundrius*) and the Florida black bear (*Ursus americanus floridanus*), respectively [12,31,34].

5.3 Soil Exposure and Air Pathway Conclusions

Only a portion of this site is paved. The possibility exists for any potentially contaminated soil to be transported off-site as wind born particulates or through gas migration. However, the site is fenced thus reducing the threat via the soil exposure route. If in the future the entire site is paved, the soil exposure and air migration pathways may not be a major concern at this site. However, further soil assessment work needs to be conducted to fully delineate the horizontal extent of any surficial shallow soil contamination. Any additional (unpaved) contaminated surficial (0-2 feet bls) soils, located in areas missed during past soil investigations, may pose a threat to pedestrians or Sun Bank employees [3,4,6,7,10] (Figures 4-8).

6. Summary and Conclusions

The GCDS facility conducted lumber operations, including wood preserving, at this site as early as 1949 until the late 1960's or early 1970's. This site was purchased by Sun Bank in 1972. In 12/88, the former warehouse building was razed and construction of a parking lot for the adjacent Sun Bank branch was initiated in 1/89. During the construction of the parking lot, four UST tanks, two of which contained mineral spirits and pentachlorophenol, were discovered. As the tanks were being removed, a heavy rainfall occurred causing one of the tanks to shift. This shifting caused the release of between 6 to 89 gallons of liquid. Subsequent remedial actions have resulted in the removal of the tanks (and their contents) and the removal of the spilled product/water mixture.

Past environmental assessments of the site have resulted in the detection of mineral spirit, pentachlorophenol, VOC, PAH and dioxin/dibenzofuran isomer contaminants in tank area soils and/or ground water. The dioxin/dibenzofuran isomer contaminants probably are not related to GCDS operations.

The ground water migration pathway does not appear to be a major concern at this site due to the absence of ground water targets. The nearest known wells (Peele-Dixie wellfield) are located 3.5 miles from the site. No wellfields or small public well systems are known present within 3 miles of the site. Area businesses and residents receive most of their drinking water from municipal wellfields located more than 4 miles from the site.

This site is not completely paved. However, the site may be entirely paved in the near future. Therefore, the overland flow/flood migration component of the surface water migration pathway may not be a major concern at this site. However, the ground water to surface water migration component may be a threat given the close proximity of the site to the New River. The New River contains numerous food chain and sensitive environment targets.

The soil exposure migration pathway probably is not a major concern given the fact that the site is fenced and limited to parking on the existing paved area. The air migration pathway may be of concern since most of the site is currently unpaved and is located in a densely populated area. However, the air migration pathway may also not be of concern at this site due to plans to pave the remainder of the site. The pavement would significantly reduce the threat of exposure via these two routes.

No known groundwater targets are present near the site and access to the site is restricted. The response actions conducted at this site during 1989-90 appear to meet the EPA criteria for a "qualifying removal", thus limiting the Hazardous Waste Quantity that can be counted in a Hazard Ranking System (HRS) evaluation of this site. Therefore, unless and until supplemental information becomes available that shows additional concerns at this site, a Site Evaluation Accomplished (SEA) recommendation is warranted. If in the future new information becomes available indicating additional concerns, this site will be reevaluated for possible CERCLA consideration.

ANALYTICAL RESULTS FOR SOIL SAMPLING
SUNBANK PROPERTY, FT. LAUDERDALE, FLORIDA

Triangle Lab Identification	*OK 3004-4*		*OK 3004-3*		*OK 3004-5*		*OL 0302-7*		*OL 0302-8*	
Wadsworth Identification	*S-112890-PS-10*		*S-112890-PS-09*		*S-112890-PS-11*		*S-112990-PS-12*		*S-112990-PS-13*	
Well Identification	*MW 2 (1'-3')*		*MW 2 (Duplicate)*		*MW 2 (8'-10')*		*MW 4 (1'-3')*		*MW 4 (8'-10')*	
	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit
Volatile Organics *(mg/kg)*					17	5	36	5	27	5
Acetone										
Benzene										
Bromodichloromethane										
Chloroform										
Ethylbenzene										
Total Xylenes										
Selected Organic Compounds *NOT DETECTED*										
Xylenes										
Benzene										
Ethylbenzene										
Base/Neutral Extractable Organics *(mg/kg)*										
Acenaphthylene	0.03	J	0.35		0.02	J	0.36			
Anthracene	0.01	J	0.35							
Benzo(b)fluoranthene	0.26	J	0.35							
Benzo(k)fluroanthene	0.3	J	0.35							
Benzo(a)pyrene	0.14	J	0.35							
Chrysene	0.08	J	0.35							
Dibenzofuran	0.02	J	0.35		0.04	J	0.36			
Fluoranthene	0.07	J	0.35		0.02	J	0.36			
Phenanthrene	0.02	J	0.35		0.08	J	0.36			
Pyrene	0.09	J	0.35							
Acid Extractable Organics *(mg/kg)*										
Pentachlorophenol	0.28	J	0.35							
Pesticides *NOT DETECTED*										
Polychlorinated Biphenyls *NOT DETECTED*										

TABLE 1 Source CRA 1991 Ref.6

ANALYTICAL RESULTS FOR SOIL SAMPLING
SUNBANK PROPERTY, FT. LAUDERDALE, FLORIDA

Triangle Lab Identification		*OK 3004-4*		*OK 3004-3*		*OK 3004-5*		*OL 0302-7*		*OL 0302-8*	
Wadsworth Identification		*S-112890-PS-10*		*S-112890-PS-09*		*S-112890-PS-11*		*S-112990-PS-12*		*S-112990-PS-13*	
Well Identification		*MW 2 (1'-3')*		*MW 2 (Duplicate)*		*MW 2 (8'-10')*		*MW 4 (1'-3')*		*MW 4 (8'-10')*	
		Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit
Dioxins	(µg/kg)										
123478-HxCDD		1.2		0.03		0.16		0.88		0.03	
123678-HxCDD		0.14		1.5		0.01		0.11		1.5	
123789-HxCDD		38.2	J	0.15		6.2		32.6		21	
1234678-HpCDD		684		72.3	J	65.4		357		0.006	
OCDD		0.16		852		0.01		0.13		0.002	(1)
123478-HxCDF		0.06		0.17				0.05		0.002	
123678-HxCDF		0.03		0.04				0.04		0.46	
234678-HxCDF		13.6		0.04		1.8		9.8		0.01	
1234678-HpCDF		0.5		16.1		0.07		0.33		1.6	
1234789-HpCDF		64.1		0.6		6.6		34.1		0.03	
OCDF		0.53	(1)U	79.6		0.24	(1)U	0.01			
Total TCDD		0.15		0.46	(1)U			.014 (1)		0.1	
Total PeCDD		3.9				0.55		2.6		2.8	
Total HxCDD		7.09	J	5.5		11		59.3		0.002	
Total HpCDD		0.05	(1)U	131	J	0.17	(1)	0.005			
Total TCDF		0.45	J	0.04	(1)U			0.05		0.24	
Total PeCDF		10.1		0.08	J	1.5		5.6		1.9	
Total HxCDF		70.3		11.2		11.5		45.1			
Total HpCDF				124							

NOTES:

(1) = Estimated maximum possible concentration.

U = Not detected. The material was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.

J = The associated numerical quantity is estimated.

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		Round 1 (duplicate)		Round 2	Round 2 (duplicate)	Exceedances of Criteria
MW 1A									
VOCs	(µg/l)	benzene	2	J	ND (1)		3		(A) Rounds 1 and 2
		ethylbenzene	62	J	12	J	51	J	(A) Rounds 1 and 2
		total xylenes	51	J	8	J	4		(A) Round 1
		dichloroethene, 1,2-			8	J	1		
		chloroform							
SOCs	(µg/l)	total xylenes	19		18		2		
		benzene	2	J	2	J	3		
		ethylbenzene	73		68		51	J	
							85		(A) Round 2
BNAs	(µg/l)	napthalene					0.47		
Dioxins	(ng/l)	1,2,3,4,6,7,8-HpCDD	0.17	J	0.37		61.2		
		OCDD	17	J	26.7		0.07	(1)	
		1,2,3,4,6,7,8-HpCDF	0.06	J	0.28	J	0.86		
		OCDF	0.1		5.6	U (1)	0.29		
		Total TCDD	0.23		ND (0.2)		0.32		
		Total PeCDD	2	J	3.2	J	8		
		Total HxCDD	1.7	J	3.1	J	5.4		
		Total HpCDD	0.33	U (1)	0.36	U (1)	0.2	(1)	
		Total TCDF	0.1		0.12	(1)			
		Total PeCDF	ND (0.03)		0.07	(1)	0.08		
		Total HxCDF	0.05		0.16	J	0.32		
		Total HpCDF							
MW 2									
VOCs	(µg/l)	ethylbenzene	6						
		total xylenes	5						
SOCs	(µg/l)	ethylbenzene	7						
		total xylenes	4						(A) Round 2
BNAs	(µg/l)	napthalene					11		11
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD					3.7		5.5
		1,2,3,7,8,9-HxCDD					0.21		0.31
		1,2,3,4,6,7,8-HpCDD	2.1				126		199 (B) Rounds 1 and 2
		OCDD	25.5				1810		2340
		1,2,3,4,7,8-HxCDF					0.21	(1)	0.49
		1,2,3,6,7,8-HxCDF					0.11		0.23
		2,3,4,6,7,8-HxCDF					0.13		0.05
		1,2,3,4,6,7,8-HpCDF	0.54				40.2		54.9 (C)
		1,2,3,4,7,8,9-HpCDF					0.91	(1)	1.66
		OCDF	2.1				165		221
		Total TCDD	0.29				4.6	(1)	0.05
		Total PeCDD					1.5	(1)	4.2
		Total HxCDD	0.11				13.5		22.7
		Total HpCDD	3.7				216		350
		Total TCDF	0.36	U (1)			0.19	(1)	0.18
		Total PeCDF					0.85		1.9
		Total HxCDF	0.33				35.3		51.2
		Total HpCDF	2.6				205		258

TABLE 2 Source CRA 8/91 Ref.6

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		*Round 1 (duplicate)*		*Round 2*		*Exceedances of Criteria*
MW 3									
VOCs	*(µg/l)*	acetone	48	J					
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD					0.22		
		1,2,3,4,6,7,8-HpCDD	0.15				6.2		
		OCDD	3.5				124		
		1,2,3,4,6,7,8-HpCDF	0.04	(1)			2.4		
		OCDF	0.24				12		
		Total TCDD	5.6	U (1)			4.9	(1)	(B) Rounds 1 and 2
		Total HxCDD	0.18	(1)			0.38		
		Total HpCDD	0.15				11.5		
		Total TCDF	0.27	U (1)			0.22	(1)	
		Total HxCDF	0.02				1.5		
		Total HpCDF	0.15				11.4		
MW 4									
VOCs	*(µg/l)*	acetone	79						
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD					0.38	(1)	
		1,2,3,4,6,7,8-HpCDD					16.8		
		OCDD	0.98				319		
		1,2,3,4,6,7,8-HpCDF					6.1		
		OCDF	0.04				26.3		
		Total TCDD	5.5	U (1)			12.36	(1)	
		Total HxCDD					0.15		
		Total HpCDD					29.3		
		Total TCDF	0.3	U (1)			0.4	(1)	
		Total HxCDF					4.4		
		Total HpCDF					26.9		
MW 5									
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD	0.77				9.3		(B) Round 2
		1,2,3,7,8,9-HxCDD					0.31		
		1,2,3,4,6,7,8-HpCDD					319		(B) Round 2
		OCDD	948				7530		
		1,2,3,4,7,8-HxCDF	0.08				1.1		
		1,2,3,6,7,8-HxCDF					0.22	(1)	
		1,2,3,4,6,7,8-HpCDF	14.2				133		(B) Round 2
		1,2,3,4,7,8,9-HpCDF	0.33	(1)			4.78	(1)	
		OCDF	55.4				719		
		Total TCDD	4.9	U (1)			0.46		
		Total PeCDD	0.65	(1)			5		
		Total HxCDD	15.5				56.4		
		Total HpCDD	46.3				647		
		Total TCDF	0.23	U (1)			0.12		
		Total PeCDF	0.05	(1)			2.1		
		Total HxCDF	1.8				108		
		Total HpCDF	68.8				787		

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1	*Round 1 (duplicate)*	*Round 2*	*Round 2 (duplicate)*	*Exceedances of Criteria*
MW 6							
Dioxins	(ng/l)	1,2,3,4,6,7,8-HpCDD	3.1		4.1		
		OCDD	0.05		77.3		
		1,2,3,4,6,7,8-HpCDF	0.21		1.6		
		OCDF	6	U (1)	7.3		
		Total TCDD			6.1	(1)	
		Total HxCDD			0.09	(1)	
		Total HpCDD	0.37	U (1)	7.3		
		Total TCDF			0.2	(1)	
		Total HxCDF	0.22		0.95		
		Total HpCDF			7.5		

NOTES

VOCs Volatile Organic Compounds
SOCs Selected Organic Compounds
BNAs Base Neutral Acid Extractable Organic Compounds
µg/l micrograms per litre = parts per billion
ng/l nanograms per litre = parts per trillion
ND Not detected (the detection limit is in brackets)
(1) Estimated Maximum Possible Concentration (EMPC)

U The material was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
J The associated numerical quantity is estimated.
(A) Exceedence in based on the Florida Groundwater Guidance Concentrations
(B) Exceedence is based on the TEC's shown in Table 7 for the proposed MCL for 2,3,7,8-TCDD
(C) The mean of detection for round 2 was 47.6 which is less than the TEC of 50 ng/l based on the proposed MCL for 2,3,7,8-TCDD.

FIGURES

Sources: USGS, Rand McNally, Enviropact and CRA

SITE LOCATION MAP
GATE CITY AKA: SUN BANK PROPERTY
FT. LAUDERDALE, BROWARD CO., FLA.

USGS QUADs FT. LAUDERDALE NORTH AND SOUTH (Photorevised 1983)

FIGURE 1

FORT LAUDERDALE
FLORIDA
© 1985 RAND McNALLY & COMPANY
4278 28th St. North, St. Petersburg, Fla. 33714
Telephone 813-525-0879
Chief Cartographer: W. Eugene Ingle
CARTOGRAPHERS: Richard Ingle, Mark MacNeill, Jack Hamilton, Vizminde
Schatz, Thomas Lusk, John Demato, Laura Haynes, Joe Jackson, Kathy Burklew
APPROXIMATE SCALE IN KILOMETERS
APPROXIMATE SCALE IN MILES
WILTON
MANORS
FORT
LAUDERDALE
Atlanti
Ocean
PORT
EVERGLADES
Lake Mabel
T 49 S
T 50 S
95
A1A

Figure 2

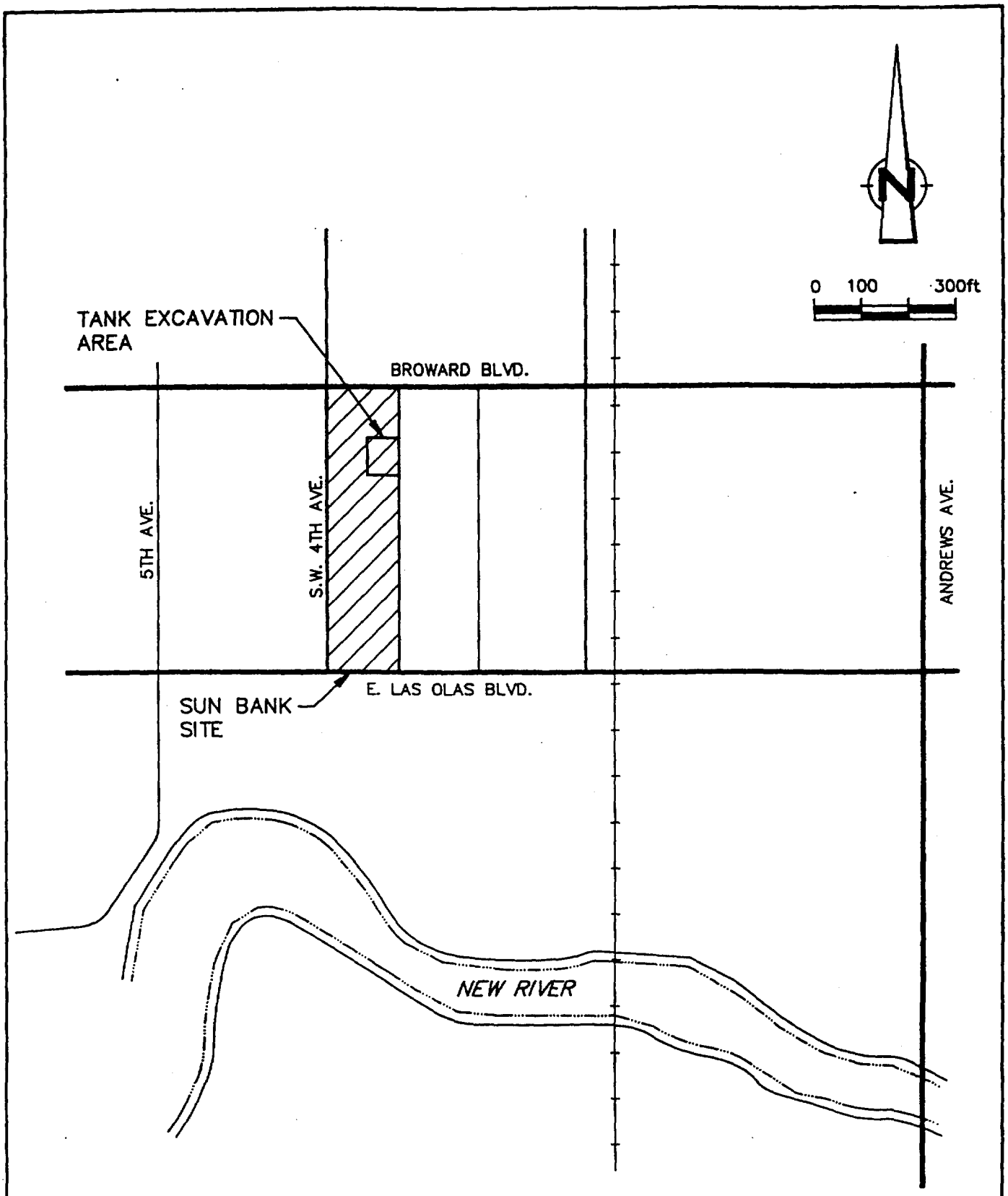
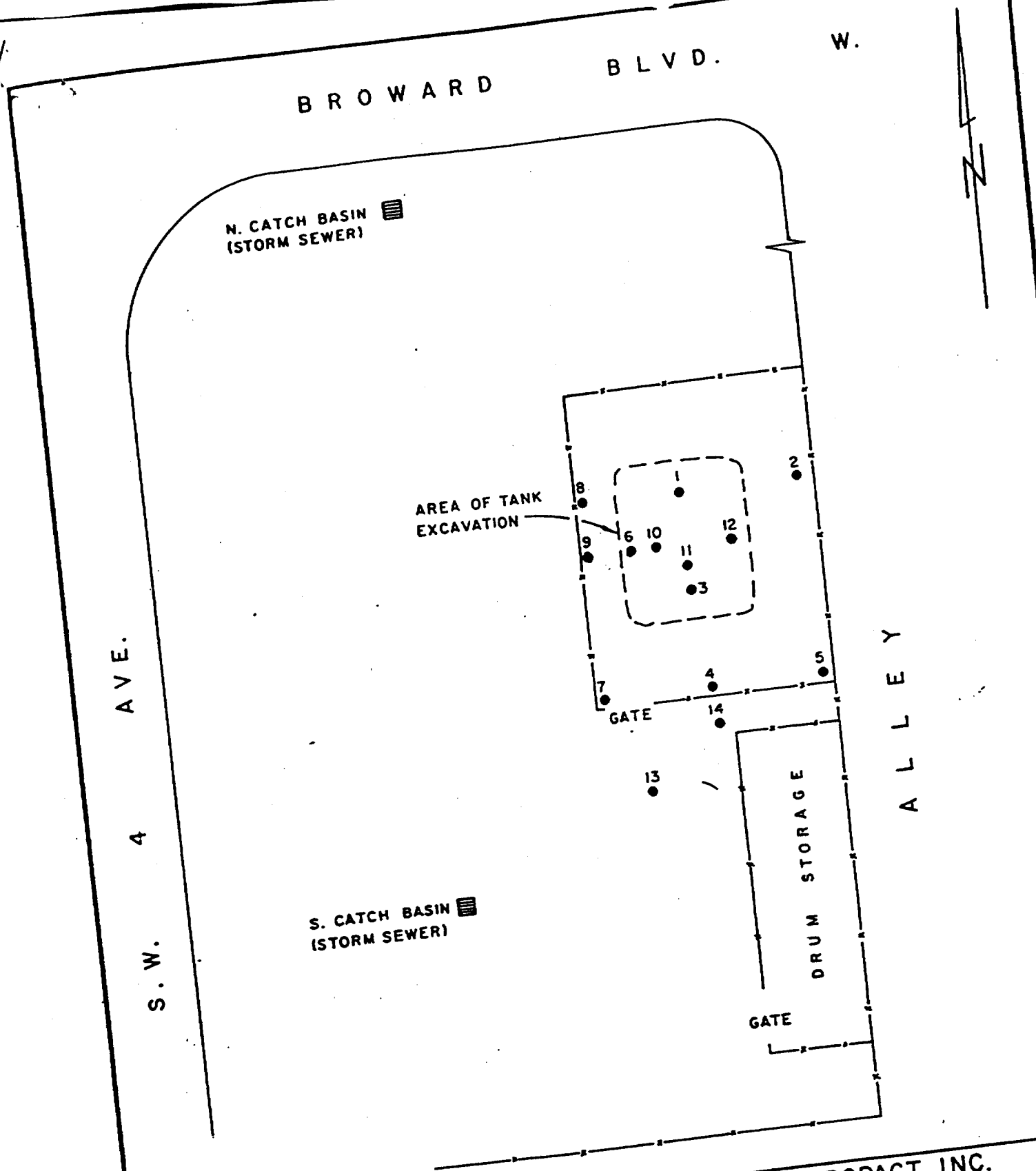


figure 2.1
LOCAL SURFACE WATER
Sun Bank Ft Lauderdale, Florida

CRA

3050-17/05/91-8-0 (

Figure 3



LEGEND

● SOIL GAS MONITORING POINT

FIGURE 4

ENVIROPACT INC.
ENVIRONMENTAL CONSULTING AND ANALYSIS

SCALE: 1" = 30'
APPROVED BY: J. M. PETERSON, P.G.
DRAWN BY
REVISED
DATE:

BROWARD BLVD. SITE
SUN BANK

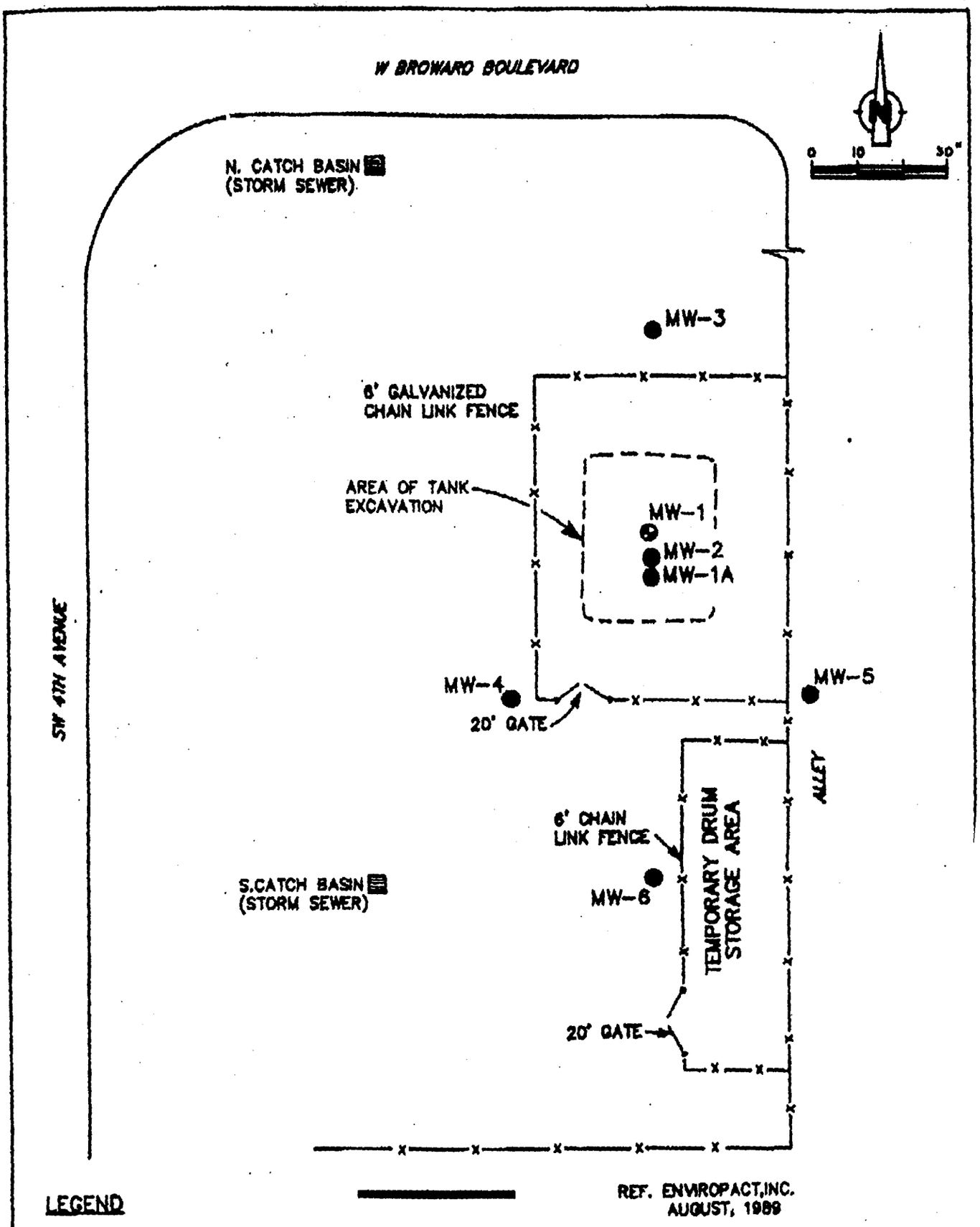
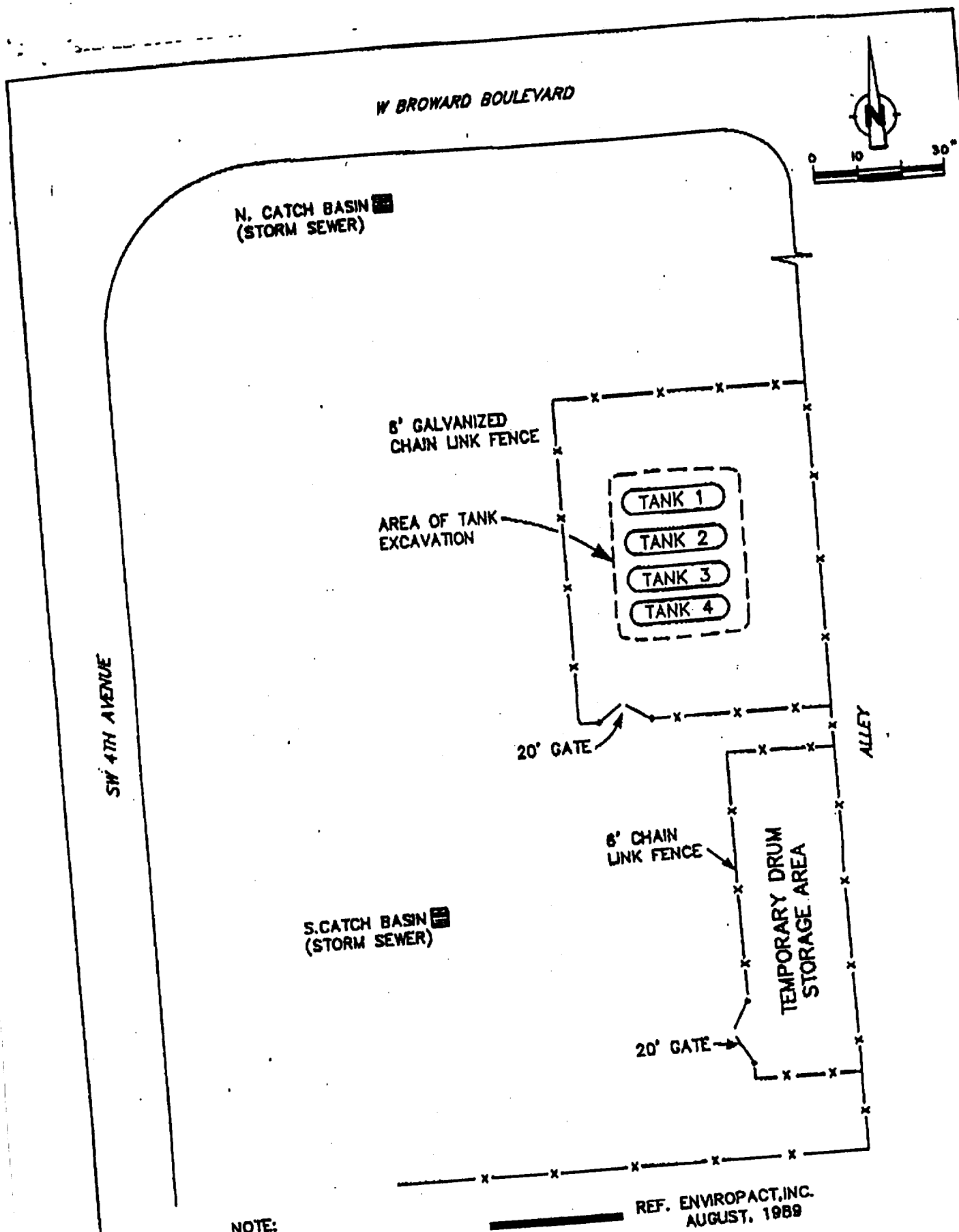


Figure 5

PROPOSED MONITORING WELL LOCATION
Sun Bank, Ft. Lauderdale, Florid



NOTE:
TANK 1 OVERTURNED
DURING EXCAVATION.

Figure 6

figure 2

FORMER STORAGE TANK LOCATIONS
Sun Bank, Ft. Lauderdale, Florida

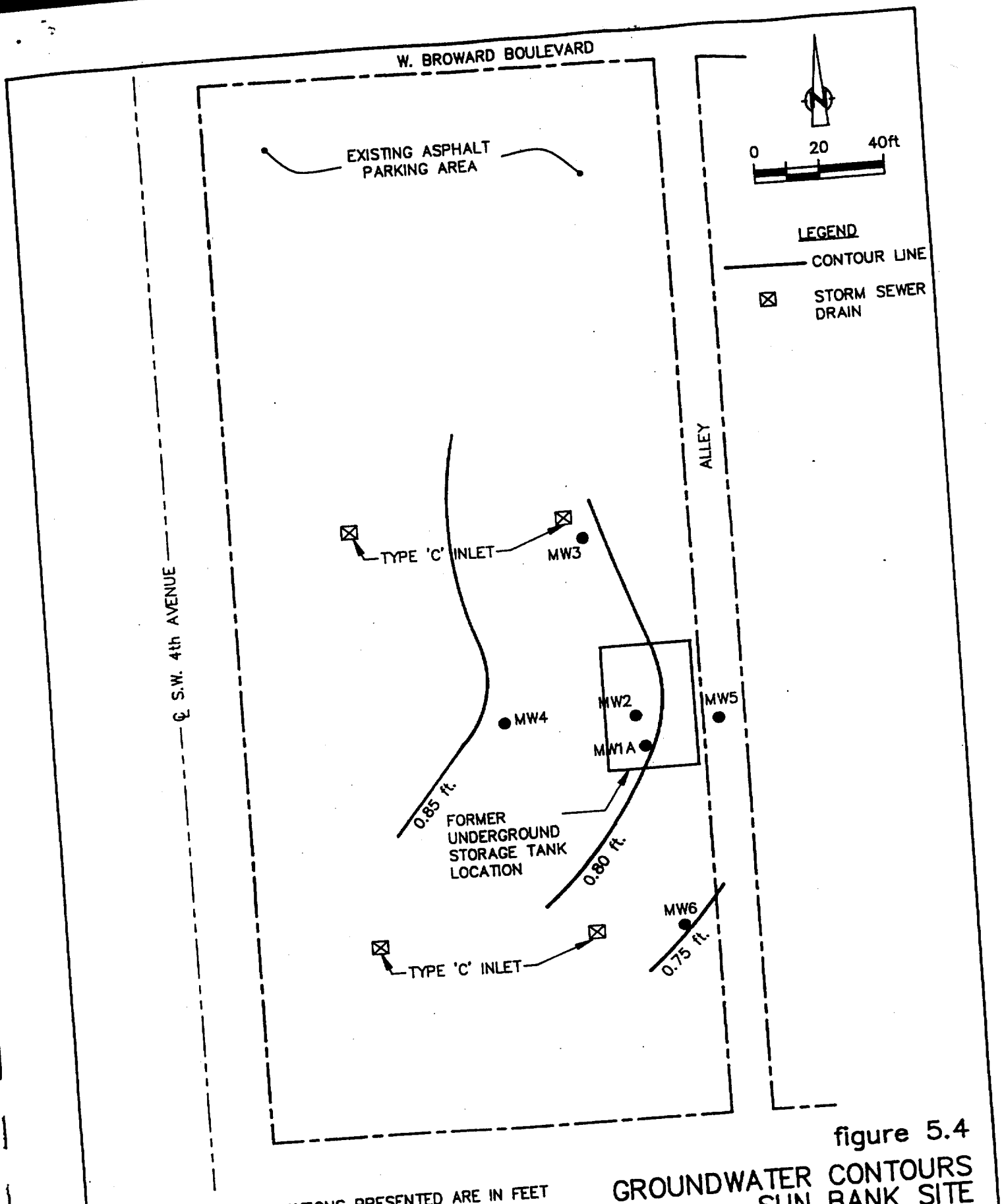


figure 5.4

GROUNDWATER CONTOURS
SUN BANK SITE
Ft. Lauderdale, Florida

1) ALL ELEVATIONS PRESENTED ARE IN FEET ABOVE MEAN SEA LEVEL.

2) ELEVATIONS ARE AS OF 02/21/

CRA

Figure 7

CRA 15/07/91-8-0 (P-05)

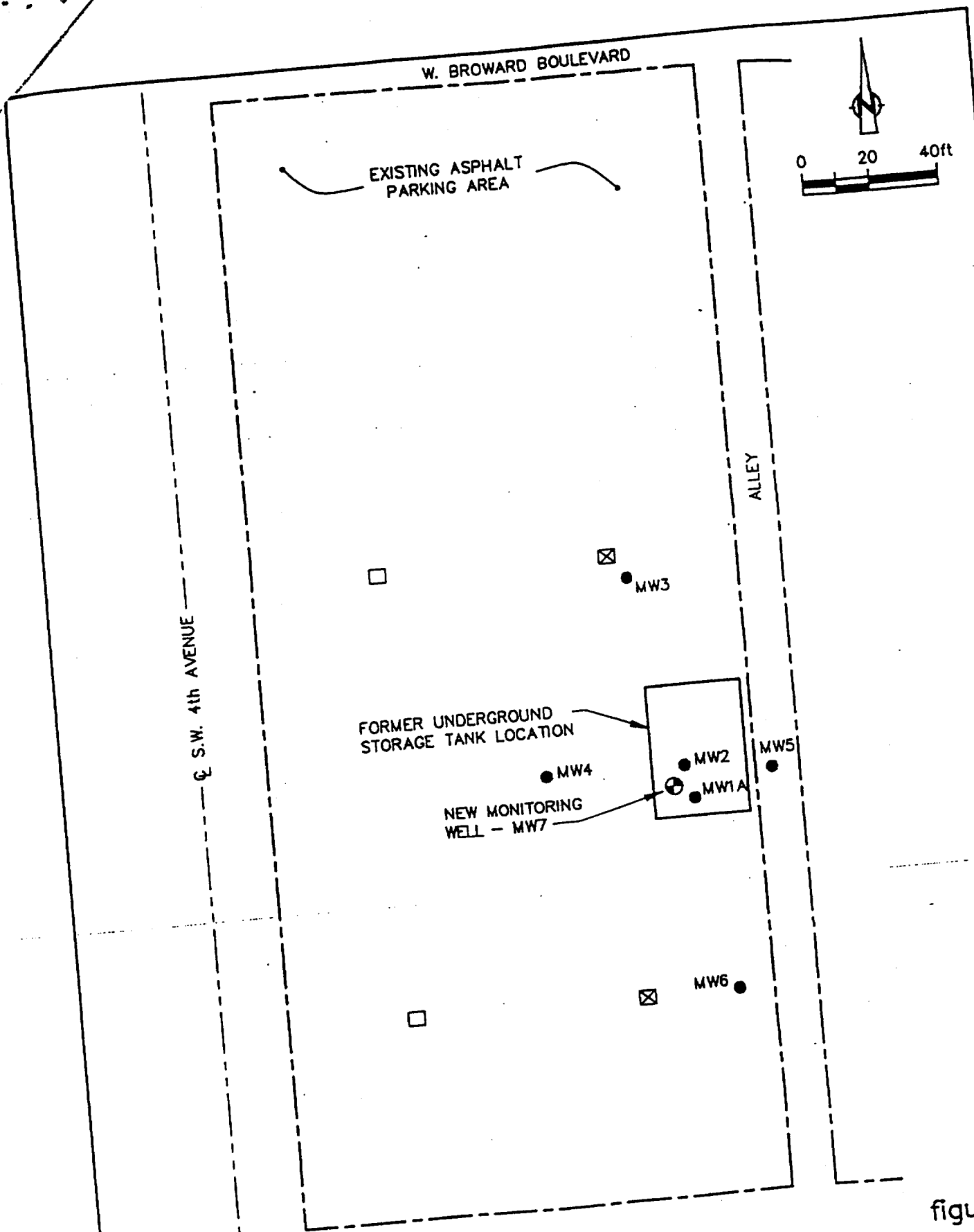


figure 1

NEW MONITORING WELL LOCATION
SUN BANK SITE
Ft. Lauderdale, Florida

Figure 8

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OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

Site Name: Gate City Door and Sash/Sun Bank Pr
CERCLIS ID No.: D984170860
Street Address: 300 West Broward Blvd.
City/State/Zip: Fort Lauderdale, Fl 33312

Investigator: A. James McCarthy Jr.
Agency/Organization: Florida DER
Street Address: 2600 Blair Stone Road
City/State: Tallahassee, Fl

Date: 8/25/92

FOIA Exempt.

OMB Approval Number: 2050-0095
Approved for Use Through: 1/92

POTENTIAL HAZARDOUS WASTE SITE

PRELIMINARY ASSESSMENT FORM

IDENTIFICATION	
State: Fl	CERCLIS Number: D984170860
CERCLIS Discovery Date: 9/22/89	

1. General Site Information

Name:	Street Address:
Gate City Door and Sash/Sun Bank Pr	300 West Broward Blvd.

City:	State:	Zip Code:	County:	Co. Code:	Cong. Dist:
Fort Lauderdale	Fl	33312	Broward	11	22

Latitude:	Longitude:	Approx. Area of Site:	Status of Site:
26 7' 17.0"	80 7' 47.0"	33750 sq feet	Inactive

2. Owner/Operator Information

Owner:	Operator:
Sun Bank/South Florida	Sun Bank/South Florida
Street Address: P.O. Box 405100	Street Address: same
City: Fort Lauderdale, F	City: same
State: Fl / Zip Code: 33340-5100 / Telephone: (305) 467-5000	State: Fl / Zip Code: 33340-5100 / Telephone: (305) 467-5000
Type of Ownership: Private	How Initially Identified: Other

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: Fl	CERCLIS Number: D984170860
	CERCLIS Discovery Date: 9/22/89	

3. Site Evaluator Information

Name of Evaluator:	Agency/Organization:	Date Prepared:
A. James McCarthy Jr.	Florida DER	8/25/92

Street Address:	City:	State:
2600 Blair Stone Road	Tallahassee	Fl

Name of EPA or State Agency Contact:	Telephone:
Dorothy Rayfield	(404) 347-5065

Street Address:	City:	State:
345 Courtland Street, N.E.	Atlanta	Ga

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation: No	CERCLIS Recommendation: Higher Priority SI	Signature:
Date:	Date:	Name:
		Position:

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State: Fl

CERCLIS Number: D984170860

CERCLIS Discovery Date: 9/22/89

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site:
Commercial
Residential

Site Setting:
Urban

Years of Operation:
Beginning Year: 1949
Ending Year: 1970

Type of Site Operations:
Manufacturing
Lumber and Wood Products
Other:

Waste Generated:
Onsite

Waste Deposition Authorized By: Unauthorized

Waste Accessible to the Public
Yes

Distance to Nearest Dwelling, School, or Workplace:
200 Feet

6. Waste Characteristics Information

Source Type	Quantity	Tier
Non-drum containers	1.00e+00 gals	V

General Types of Waste:
Organics
Solvents

Physical State of Waste as Deposi
Liquid

Tier Legend
C = Constituent W = Wastestream
V = Volume A = Area

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: Fl	CERCLIS Number: D984170860
	CERCLIS Discovery Date: 9/22/89	

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles: No	Is There a Suspected Release to Ground Water: Yes	List Secondary Target Population Served by Ground Water Withdrawn From:
Type of Ground Water Wells Within 4 Miles: Municipal	Have Primary Target Drinking Water Wells Been Identified: No	0 - 1/4 Mile 0 >1/4 - 1/2 Mile 0 >1/2 - 1 Mile 0 >1 - 2 Miles 0 >2 - 3 Miles 0 >3 - 4 Miles 35262 Total 35262
Depth to Shallowest Aquifer: 0 Feet		
Karst Terrain/Aquifer Present: No	Nearest Designated Wellhead Protection Area: None within 4 Miles	

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION
	State: Fl / CERCLIS Number: D984170860
	CERCLIS Discovery Date: 9/22/89

8. Surface Water Pathway — Part 1 of 4

Type of Surface Water Draining Site and 15 Miles Downstream:	Shortest Overland Distance From Any Source to Surface Water:
River Ocean Other:	800 Feet 0.2 Miles
Is there a Suspected Release to Surface Water: No	Site is Located in: >10 yr - 100 yr floodplai

8. Surface Water Pathway — Part 2 of 4

Drinking Water Intakes Along the Surface Water Migration Path: No

Have Primary Target Drinking Water Intakes Been Identified: No

Secondary Target Drinking Water Intakes:
None

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION
	State: Fl | CERCLIS Number: D984170860
	CERCLIS Discovery Date: 9/22/89

8. Surface Water Pathway — Part 3 of 4

Fisheries Located Along the Surface Water Migration Path: Yes

Have Primary Target Fisheries Been Identified: No

Secondary Target Fisheries:

Fishery Name	Water Body Type/Flow(cfs)
New River	moderate-large stream/ >100-1000
Intracoastal Waterwa	Coastal,ocean,Gr.Lakes

8. Surface Water Pathway — Part 4 of 4

Wetlands Located Along the Surface Water Migration Path? (y/n) Yes

Have Primary Target Wetlands Been Identified? (y/n) No

Secondary Target Wetlands:
None

Other Sensitive Environments Along the Surface Water Migration Path: Yes

Have Primary Target Sensitive Environments Been Identified: No

Secondary Target Sensitive Environments:

Water Body/Flow(cfs)	Sensitive Environment Type
moderate-large stream/ >100-1000	Habitat used by Fed. des.species
Coastal,ocean,Gr.Lakes	Habitat for Federally designated endanger

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT FORM

IDENTIFICATION

State:	CERCLIS Number:
Fl	D984170860

CERCLIS Discovery Date: 9/22/89

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination: No

Number of Workers Onsite: None

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination: No

10. Air Pathway

Total Population on or Within:	
Onsite	0
0 - 1/4 Mile	3333
>1/4 - 1/2 Mile	3333
>1/2 - 1 Mile	3333
>1 - 2 Miles	0
>2 - 3 Miles	0
>3 - 4 Miles	0
Total	9999

Is There a Suspected Release to Air: No

Wetlands Located Within 4 Miles of the Site: No

Other Sensitive Environments Located Within 4 Miles of the Site: Yes

Sensitive Environments Within 1/2 Mile of the Site:

Distance	Sensitive Environment Type/Wetlands Area(acres)
0 - 1/4	Habitat for Federally designated endangered/threatened species

PA-Score 1.0 Scoresheets
Gate City Door and Sash/Sun Bank Pr - 08/26/92

WASTE CHARACTERISTICS

Waste Characteristics (WC) Calculations:

1 UST area — Non-drum containers — Ref: 3,6 — WQ value 2.00E-03 — maximum 2.00E-03

Volume 1.00E+00 gals

On 2/27/89, four 2,000 gallon USTs were discovered. During the excavation, a heavy rainfall caused the excavation to fill with water and float one of the tanks. This shifting of the tank caused between 6-89 gallons of liquid to spill out of the tank and into the excavation. Analysis of two of the tanks indicated the presence of a mineralspirits/pentachlorophenol solution, most likely used in the GCDS wood preserving operation. Upon removal of the tanks, two of the tanks (Tanks 2 & 4) were observed to be corroded and have small holes. Remedial measures taken in 1989 and 1990 included: removal of
Ref: 2,3,5,6,11,39-41, Figures 3-7.

Waste Characteristics Score: WC = 1

Ground Water Pathway Criteria List
Suspected Release

Are sources poorly contained? (y/n/u)	U
Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)? (y/n/u)	U
Is waste quantity particularly large? (y/n/u)	U
Is precipitation heavy? (y/n/u)	Y
Is the infiltration rate high? (y/n/u)	Y
Is the site located in an area of karst terrain? (y/n)	N
Is the subsurface highly permeable or conductive? (y/n/u)	Y
Is drinking water drawn from a shallow aquifer? (y/n/u)	Y
Are suspected contaminants highly mobile in ground water? (y/n/u)	N
Does analytical or circumstantial evidence suggest ground water contamination? (y/n/u)	Y

Other criteria? (y/n) N

SUSPECTED RELEASE? (y/n) Y

Summarize the rationale for Suspected Release:

Spillage from four 2,000 gallon USTs filled with mineral spirits and pentachlorophenol has resulted in VOC, BNA, and PAH groundwater contamination. Remedial action, including removal of the tanks, tank contents and spilled product/rainwater, took place in 1989 and 1990. Benzene has been detected above state PDWS. Several organic compounds including naphthalene, ethylbenzene, pentachlorophenol and xylene have been found to exceed FGWGC during past sampling events.

Ref: 2,3,5,6, Figures 3-7, Tables 1,2

Ground Water Pathway Criteria List
Primary Targets

Is any drinking water well nearby? (y/n/u)

Has any nearby drinking water well been closed? (y/n/u)

Has any nearby drinking water well user reported foul-testing or foul-smelling water? (y/n/u)

Does any nearby well have a large drawdown/high production rate? (y/n/u)

Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance? (y/n/u)

Does analytical or circumstantial evidence suggest contamination at a drinking water well? (y/n/u)

Does any drinking water well warrant sampling? (y/n/u)

Other criteria? (y/n)

PRIMARY TARGET(S) IDENTIFIED? (y/n)

Summarize the rationale for Primary Targets:

GROUND WATER PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	Yes	
Is the site located in karst terrain? (y/n)	No	
Depth to aquifer (feet):	0	
Distance to the nearest drinking water well (feet):	0	

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	550		
2. NO SUSPECTED RELEASE		0	
LR =	550	0	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION Are any wells part of a blended system? (y/n) Y	417	0	
5. NEAREST WELL	2	0	
6. WELLHEAD PROTECTION AREA None within 4 Miles	0	0	
7. RESOURCES	5	0	
T =	424	0	

WASTE CHARACTERISTICS		
WC =	18	0

GROUND WATER PATHWAY SCORE:	51

Ground Water Target Populations

Primary Target Population Drinking Water Well ID	Dist. (miles)	Population Served	Reference	Value
None				
			Total	

Secondary Target Population Distance Categories	Population Served	Reference	Value
0 to 1/4 mile	0		0
Greater than 1/4 to 1/2 mile	0		0
Greater than 1/2 to 1 mile	0		0
Greater than 1 to 2 miles	0		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	35262	12,26	417
		Total	417

Apportionment Documentation for a Blended System

The nearest wellfield system to the site is the Peele/Dixie well field located between 3.5 (well#11) and 4.5 miles west-southwest of the site. There are currently 17 active wells in this wellfield. Seven of these wells are located between 3 and 4 miles of the site. The Peele-Dixie wellfield normally supplies 30% of the City of Fort Lauderdale water demand. The Fiveash-Prospect wellfield, located approximately 4.5 miles north-northwest of the site, normally provides 70% of the water demand. The Ft. Lauderdale water system currently serves a population of 284,398 (49,350 service connections). A review of the FDER PWS database indicates that there is only one other public well located within 4 miles of the site.

Ref: 12,24,26,27-30

Surface Water Pathway Criteria List Suspected Release	
Is surface water nearby? (y/n/u)	Y
Is waste quantity particularly large? (y/n/u)	U
Is the drainage area large? (y/n/u)	N
Is rainfall heavy? (y/n/u)	Y
Is the infiltration rate low? (y/n/u)	N
Are sources poorly contained or prone to runoff or flooding? (y/n/u)	U
Is a runoff route well defined(e.g.ditch/channel to surf.water)? (y/n/u)	Y
Is vegetation stressed along the probable runoff path? (y/n/u)	U
Are sediments or water unnaturally discolored? (y/n/u)	U
Is wildlife unnaturally absent? (y/n/u)	U
Has deposition of waste into surface water been observed? (y/n/u)	N
Is ground water discharge to surface water likely? (y/n/u)	Y
Does analytical/circumstantial evidence suggest S.W. contam? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Stormwater runoff not collected by the on-site French drains, is collected by the Ft. Lauderdale municipal storm sewer system and directed to the New River located approximately 800 feet south of the site. This site is only partially paved with asphalt. In addition, it is documented that groundwater discharges to the New River. It is possibile that contaminants (DNAPLs) from this site could migrate to the New River via these surface water migration pathway components. The New River is used for recreational boating and fishing and is designated a Manatee Protection Zone for the federally designated endangered West Indian manatee by the state of Florida.

Ref: 3,6,12,15,20,21,31-34,36, Figures 3-7.

Surface Water Pathway Criteria List
Primary Targets

Is any target nearby? (y/n/u) If yes: Y
N Drinking water intake
Y Fishery
Y Sensitive environment

Has any intake, fishery, or recreational area been closed? (y/n/u) N

Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target? (y/n/u) N

Does any target warrant sampling? (y/n/u) If yes: Y
N Drinking water intake
Y Fishery
Y Sensitive environment

Other criteria? (y/n) N

PRIMARY INTAKE(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Intakes:

No surface water intakes are present within the 15-mile target distance limit.

Ref: 12,27
continued -------

continued -------

Other criteria? (y/n) N

PRIMARY FISHERY(IES) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Fisheries:

The New River is used for recreational fishing. Numerous homes are located along the surface water migration pathway.

Ref: 6,12,31,32,34, Figures 3-7.

Other criteria? (y/n) N

PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Sensitive Environments:

The New River is a habitat for the federally designated endangered West Indian manatee (trichechus manatus latirostris). The river has also been designated a Manatee Protection Zone by the state of Florida. A manatee aggregation is present in the Port Everglades section of the Intracoastal Waterway.

Ref: 12,31,33,34, Figure 1

SURFACE WATER PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	No	
Distance to surface water (feet):	800	12,21
Flood frequency (years):	100	12,37
What is the downstream distance (miles) to:		
a. the nearest drinking water intake?	N.A.	12,27
b. the nearest fishery?	0.2	31,32
c. the nearest sensitive environment?	0.2	31,34

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Drinking Water Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
3. Determine the water body type, flow (if applicable), and number of people served by each drinking water intake.			
4. PRIMARY TARGET POPULATION 0 person(s)	0		
5. SECONDARY TARGET POPULATION Are any intakes part of a blended system? (y/n): N	0	0	
6. NEAREST INTAKE	0	0	
7. RESOURCES	0	5	
T =	0	5	

Drinking Water Threat Target Populations

Intake Name	Primary (y/n)	Water Body Type/Flow	Population Served	Ref.	Value
None					

Total Primary Target Population Value	0
Total Secondary Target Population Value	0

Apportionment Documentation for a Blended System

No surface water intakes are located within a 15 mile target distance limit for this site.

Ref: 12,27.

Human Food Chain Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
8. Determine the water body type and flow for each fishery within the target limit.			
9. PRIMARY FISHERIES	0		
10. SECONDARY FISHERIES	0	12	
T =	0	12	

Human Food Chain Threat Targets

Fishery Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
1 New River	N	>100-1000 cfs	31,43	12
2 Intracoastal Waterway	N	Coastal,ocean,Gr.Lake	12,32	12
None				
		Total Primary Fisheries Value		0
		Total Secondary Fisheries Value		24

Environmental Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
11. Determine the water body type and flow (if applicable) for each sensitive environment.			
12. PRIMARY SENSITIVE ENVIRONMENTS	0		
13. SECONDARY SENSITIVE ENVIRONS.	0	10	
T =	0	10	

Environmental Threat Targets

Sensitive Environment Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
1 West Indian manatee Hab.	N	>100-1000 cfs	12,43	12
2 Intracoastal Waterway	N	Coastal,ocean,Gr.Lake	12,33	12
Total Primary Sensitive Environments Value				0
Total Secondary Sensitive Environments Value				0

Surface Water Pathway Threat Scores

Threat	Likelihood of Release(LR) Score	Targets(T) Score	Pathway Waste Characteristics (WC) Score	Threat Score LR x T x WC / 82,500
Drinking Water	500	5	18	1
Human Food Chain	500	12	18	1
Environmental	500	10	18	1

SURFACE WATER PATHWAY SCORE:	3

Soil Exposure Pathway Criteria List
Resident Population

Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? (y/n/u)	U
Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? (y/n/u)	N
Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? (y/n/u)	U
Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? (y/n/u)	N
Does any neighboring property warrant sampling? (y/n/u)	N

Other criteria? (y/n) N

RESIDENT POPULATION IDENTIFIED? (y/n) N

Summarize the rationale for Resident Population:

An offsite reconnaissance needs to be conducted to fully document any resident and nearby populations. Available information indicates no schools, daycare centers or residents are present within 200 feet ofthe GCDS site. The northern portion of the site is paved and used as a parking lot for Sun Bank employees and clients.

Ref: 3,5,6,12, Figures 1-7.

SOIL EXPOSURE PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do any people live on or within 200 ft of areas of suspected contamination? (y/n)	No	3,6
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination? (y/n)	No	12
Is the facility active? (y/n):	No	3,6

LIKELIHOOD OF EXPOSURE	Suspected Contamination	References
1. SUSPECTED CONTAMINATION LE =	550	

Targets

2. RESIDENT POPULATION 0 resident(s) 0 school/daycare student(s)	0	
3. RESIDENT INDIVIDUAL	0	
4. WORKERS None	0	
5. TERRES. SENSITIVE ENVIRONMENTS	0	
6. RESOURCES	5	
T =	5	

WASTE CHARACTERISTICS

WC = 18

RESIDENT POPULATION THREAT SCORE: 1

NEARBY POPULATION THREAT SCORE: 2

Population Within 1 Mile: 10,001 - 50,000

SOIL EXPOSURE PATHWAY SCORE: 3

Soil Exposure Pathway Terrestrial Sensitive Environments

Terrestrial Sensitive Environment Name	Reference	Value
None		
Total Terrestrial Sensitive Environments Value		

Air Pathway Criteria List
Suspected Release

Are odors currently reported? (y/n/u)	N
Has release of a hazardous substance to the air been directly observed? (y/n/u)	N
Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air? (y/n/u)	N
Does analytical/circumstantial evidence suggest release to air? (y/n/u)	N
Other criteria? (y/n)	N
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

There is a potential for contaminants at this site to be released via gas migration or wind born particulate transport. However, if this site is paved in the near future, as is planned by Sun Bank, the soil exposure and air migration pathways may not be a concern at his site.The 1990 Census population for Ft. Lauderdale is 144,355

Ref: 3,5,6,7,8,12,38-41.

AIR PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	No	
Distance to the nearest individual (feet):	0	

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION	0	166	
5. NEAREST INDIVIDUAL	0	20	
6. PRIMARY SENSITIVE ENVIRONS.	0		
7. SECONDARY SENSITIVE ENVIRONS.	0	2	
8. RESOURCES	0	5	
T =	0	194	

WASTE CHARACTERISTICS		
WC =	0	18

AIR PATHWAY SCORE:	21

Air Pathway Secondary Target Populations

Distance Categories	Population	References	Value
Onsite	0	12,38	0
Greater than 0 to 1/4 mile	3333	12,38	130
Greater than 1/4 to 1/2 mile	3333	12,38	28
Greater than 1/2 to 1 mile	3333	12,38	8
Greater than 1 to 2 miles	0		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	0		0
	Total Secondary Population Value		166

Air Pathway Primary Sensitive Environments

Sensitive Environment Name	Reference	Value
None		
Total Primary Sensitive Environments Value		

Air Pathway Secondary Sensitive Environments

Sensitive Environment Name	Distance	Reference	Value
1 West Indian manatee Hab.	0 - 1/4	12,31	2.5
None			
Total Secondary Sensitive Environments Value			2

SITE SCORE CALCULATION	SCORE
GROUND WATER PATHWAY SCORE:	51
SURFACE WATER PATHWAY SCORE:	3
SOIL EXPOSURE PATHWAY SCORE:	3
AIR PATHWAY SCORE:	21
SITE SCORE:	28

SUMMARY

1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water? No

   If yes, identify the well(s).

   If yes, how many people are served by the threatened well(s)? 0

2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water?
   A. Drinking water intake No
   B. Fishery No
   C. Sensitive environment (wetland, critical habitat, others) No

   If yes, identity the target(s).

3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility? No

   If yes, identify the properties and estimate the associated population(s)

4. Are there public health concerns at this site that are not addressed by PA scoring considerations? No

   If yes, explain:

REFERENCE LIST

U.S. EPA SUPERFUND PROGRAM

SELECTION: ** SPECIAL **
SEQUENCE: STATE, CNTY CODE, SITE NAME
EVENTS: SITE EVAL

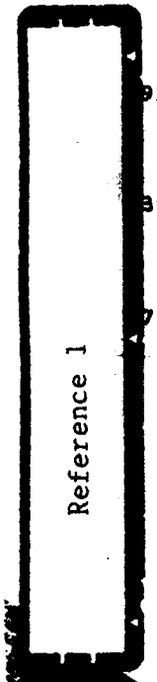
** C E R C L I S **

LIST-8: SITE/EVENT LISTING

RUN DATE: [illegible]
RUN TIME: 16:03:10

VERSION: 1

EPA ID NO.	SITE NAME STREET CITY COUNTY CODE AND NAME	STATE ZIP CONG DIST.	NFA FLAG	OPRBLE UNIT	EVENT TYPE	ACTUAL START DATE	ACTUAL COMPL DATE	CURRENT EVENT LEAD
FLD984169268	FT. LAUDERDALE GASIFICATION PLANT INTERSECTION OF NW 7TH AVE. &N FT LAUDERDALE 011 BROWARD	FL 33311		00	DS1 PA1	03/19/90	02/24/89 03/23/90	STATE(FUND) STATE(FUND)
FLD981029853	G B C WEBTRON 2030 W MCNAB RD FT LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1		06/01/85 12/03/85	EPA (FUND) STATE(FUND)
FLD075322198	GARRETT HYDRAULICS 5841 NW 9TH AVE FORT LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1		07/01/79 09/25/85	EPA (FUND) STATE(FUND)
FLD984170860	GATE CITY 300 W. BROWARD BLVD FT. LAUDERDALE 011 BROWARD	FL		00	DS1		09/22/89	OTHER
FLD032890691	GEMINI AIRCRAFT 3469 NW 55 ST FT LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1		06/01/85 03/17/86	EPA (FUND) STATE(FUND)
[illegible]9213	GIL AIRCRAFT 560 NW 15TH AVENUE FT. LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1 SI1		09/05/85 12/03/85 06/23/86	EPA (FUND) STATE(FUND) STATE(FUND)
[illegible]8047	GLOBAL ALLIANCE LABS INC 3447 NW 55 STREET FT LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1 SI1		06/01/85 02/26/86 12/04/90	EPA (FUND) STATE(FUND) EPA (FUND)
[illegible]7319	GRAINGER, W W ELECTRONICS 6781 NW 17 AVENUE FT LAUDERDALE 011 BROWARD	FL 33309		00	DS1 PA1		06/01/85 02/07/86	EPA (FUND) STATE(FUND)



Reference 2

U.S. Environmental Protection Agency
Region IV

Waste Management Division
Waste Programs Branch
Site Assessment Section
345 Courtland St., NE
Atlanta, GA 30365
Fax (404) 347-4862
Phone (404) 347-3065

No. of Pages to Follow: 5

Please Deliver To: BRIAN MOORE
Company: FOER
Phone:
Fax:
Date: 5/12/92

Message: HERE IT IS, BRIAN. NOT MUCH TO GO ON, IS THERE.
THERE ISN'T A SPILL NUMBER ASSIGNED TO THIS SITE, SO EMERGENCY ISN'T INVOLVED.
THIS IS WHAT PA's ARE FOR! GO GET 'EM!

From: BRIAN FARRIER

ISCOVERY FORM

Part 1: Information necessary to add a site to CERCLIS

ACTION: A

EPA ID: FLD 984170860

SITE NAME: Gate City SOURCE: R (R=EPA, T=STAT

STREET: 300 W. Broward Blvd. CONG DIST: __ (optional)

CITY: Ft. Lauderdale ZIP: ____ - ____

CNTY NAME: Broward CNTY CODE: ___ (optional)

LATITUDE: __ / __ / ____ LONGITUDE: ___ / __ / ____ (optional)

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

RPM NAME: Undine Johnson RPM PHONE: 404 - 347 - 5065 (EPA Project Offic

SITE DESCRIPTION: (optional)

- The site was occupied by Gate City Sash & Window until they went OOB in 1972. The property is now owned by Sun Bank.
- Recently 4 underground storage tanks were noted on the property. Two were empty. The other 2 had pentachlorophenol and mineral spirits. (It was not cont'd below)

Part 2: Other site information

DATE SITE FIRST REPORTED: 06 / 16 / 89 REPORTED BY: Ms. Toula of local newspaper 305-761-4264

~~REASON FOR LISTING~~: clear if there was a mixture or separate tanks of each chemical.) There reportedly was more pentachlorophenol.

- Sun Bank told FDER and hired someone to do a cleanup. FDER saw the cleanup.
- The chemicals were removed from the 2 tanks and it totaled about 189/55 gal. drums.
- This information was given to Shane Hutchcock of EPA, Region IV Emergency on or about 6/16/89.

Joe McG

Needs Discovery

Sun Bank - owns now
300 W. Broward Blvd.
Ft Lauderdale, Fla.
~~Gade C~~
Gate City Sash + Window

Went OOB 1972

Prelim. Tests - some
leaked into g.w.

4 underground
2 tanks (2 were empty)
189/55 gal drums
removed from other 2 tanks
Some mineral spirits
most have pentachlorophenol

Hazardous

FDER knows + has seen
cleanup

Sun Bank
~~had~~ told
FDER

Sun Bank hired someone to
do cleanup
I told Shane Hitchcock

MEMORANDUM OF CALL

301-469-8852

Previous editions usable

TO: John

☒ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

Robert Gulley

OF (Organization)

Building Diagnostic Corp.

☒ PLEASE PHONE ▶ ☐ FTS ☐ AUTOVON

301 469 9595

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

RE Phone call on 19 Sep on FOIA request received ltr. stating he has already rec'd the info He says he hasn't.

Site Name GATE City
Ft. Lauderdale, FL
FLD 049 448 764 →

RECEIVED BY	DATE	TIME
Sharon	10/12	400

63-110 NSN 7540-00-634-4018 STANDARD FORM 63 (Rev. 8-81) Prescribed by GSA FPMR (41 CFR) 101—11.6

☆ GPO : 1986 O - 157-353

MEMORANDUM OF CALL Previous editions usable

TO: John

☒ YOU WERE CALLED BY– ☐ YOU WERE VISITED BY–

Robert Goley

OF (Organization)

☒ PLEASE PHONE ▶ ☐ FTS ☐ AUTOVON

(301) 469 9595

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

Would appreciate a call this Afternoon.

RECEIVED BY	DATE	TIME
Sharon	9/19	326

63-110 NSN 7540-00-634-4018 STANDARD FORM 63 (Rev. 8-81) Prescribed by GSA FPMR (41 CFR) 101-11.6

GPO : 1986 O - 157-353

RANDOM CALL Previous editions usable

TO: Joe Young

☒ YOU WERE CALLED BY– ☐ YOU WERE VISITED BY–

Ms. Toula.

OF (Organization)

☒ PLEASE PHONE ▶ ☐ FTS ☐ AUTOVON

305-761-4264

☐ WILL CALL AGAIN ☐ IS WAITING TO SEE YOU

☐ RETURNED YOUR CALL ☐ WISHES AN APPOINTMENT

MESSAGE

Ref: Pentachlorophenol

Ret'd her call

RECEIVED BY	DATE	TIME
Florence	6/16/89	12:01

63-110 NSN 7540-00-634-4018 STANDARD FORM 63 (Rev. 8-81) Prescribed by GSA FPMR (41 CFR) 101-11.6

• U.S. GPO 1986 — 201-759

VIEW SITE SUMMARY SCREEN 2 OF 2

REF NO.: 05301 EPA ID: FLD984170860

RPM/OSC NAME: PHONE NO.: ( ) -
OTHER REGIONAL CONTACT: PHONE NO.: ( ) -
SECTION CODE:

C0491 :	C0492 :	C0493 :
C0494 :	C0495 :	C0496 :
C0497 :	C0498 :	

SITE DESCRIPTION

ENTER: WAS OCCUPIED BY GATE CITY SASH AND WINDOW UNTIL WENT OOB IN

WAS OCCUPIED BY GATE CITY SASH AND WINDOW UNTIL WENT OOB IN 1972, 4 UNDERGROUND STORAGE TANKS TWO HAD PENTACHLOROPHENOL AND MINERAL SPIRITS. FDRR SAW THE CLEAN UP OF 2 TANKS TOTALLING 189 - 55 GAL DRUMS

Menu options Back Leave [M]

Reference 3

ENVIROPACT, INC.
4790 Northwest 157th Street
Miami, Florida 33014-6421
(305) 620-1700 Fax No. (305) 625-2964

CONTAMINATION ASSESSMENT PLAN

FOR

300 WEST BROWARD BOULEVARD
FT. LAUDERDALE, FLORIDA

PROJECT NUMBER 5954-0002

MAY 1989

SUBMITTED TO:

BROWARD COUNTY ENVIRONMENTAL
QUALITY CONTROL BOARD
500 S.W. 14th COURT
FT. LAUDERDALE, FLORIDA 33315

AND

SUN BANK/SOUTH FLORIDA, N.A.
GENERAL SERVICES ADMINISTRATION
1431 NORTHWEST 26th STREET
WILTON MANORS, FLORIDA 33305

SUBMITTED BY:

ENVIROPACT, INC.
4790 N.W. 157th STREET
MIAMI, FLORIDA 33014

RECEIVED
JUN 26 1989
BUREAU OF WASTE CLEA
Twin Towers

5954-0002

PT/mcl

ENVIROPACT

Thi
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APPENDIX III	LAB RESULTS
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APPENDIX V	SUMMARY OF SOIL GAS SURVEY RESULTS
APPENDIX VI	PROPOSED MONITORING WELL LOCATION
APPENDIX VII	SITE SPECIFIC HEALTH AND SAFETY PLAN

relevant aerial photographs are attached in Appendix 1. A review of these aerial photographs does not show any indication of any other underground storage tanks on the subject property. This was confirmed during our initial field reconnaissance by conducting a magnetometer survey of the subject property on May 18, 1989.

During our magnetometer survey a Model MAC-51B magnetic and cable locator was used to determine if any buried iron or steel objects the size of tanks existed on the subject property. The entire lot was surveyed by Kent Reetz of Enviropact, Inc. A sweeping side to side motion with the locator was used during the survey and when a higher frequency tone was heard this meant that the locator was in range of an iron or steel object. Although the locator tone frequency increased many times during the survey these signals were all false alarms. If the locator was raised several inches higher then the potential target the signal would disappear and this meant a rusty bolt or rebar was detected and not actually a larger target (i.e. tank).

The subject property was purchased in 1972 by Sun Bank and until recently was never utilized by the Bank. In December, 1988 a large warehouse building was demolished which encompassed 90 percent of the site and on January 30 construction commenced on a parking lot for the bank's use. Prior to the incident with the underground storage tanks, Sun Bank was unaware of the existence of any tanks on this site.

During construction of the parking lot the four (4) 2000 gallon underground storage tanks were discovered on February 27, 1989. During the removal of the tanks on February 28, 1989 an intense and unexpected rainstorm caused one of the four tanks to float and turn over, discharging some of its contents into the excavated pit. Initial emergency response consisted of pumping the spilled product and rainwater into two vacuum trucks. Interim remedial measures conducted over the next three weeks consisted of containerizing all the contents of the tanks into 55 gallon drums. The depth of the excavated pit after the removal of the tanks was approximately six feet deep. Approximately 500 gallons of floating product was pumped from the excavation and placed into drums. Once all the contents were removed from the tanks they were decontaminated and placed on visqueen for visual inspection.

The condition and integrity of tanks #1 and #3 did not show any visual evidence of corrosion or leakage. Tank #2 had six small holes on the side of the tank while tank #4 had a 3" x 6" hole in the side. The exact age of the tanks has not been determined but the assumption can be made that they were installed as part of the lumber operations, and therefore the date of installation was at least prior to 1972. This would make the tanks at least seventeen (17) years old. There are no records of registration for these tanks nor are there records to show if the tanks and tank lines were ever tested for tightness.

3.0 PRELIMINARY CONTAMINATION ASSESSMENT

A preliminary contamination assessment was conducted on March 21, 1989 to determine if soil and groundwater contamination existed as a result of the presence of the underground storage tanks. One soil boring and one monitoring well was installed by Enviropact Drilling Services, a State of Florida certified drilling company. Dough Lowell, Field Geologist supervised the installation of the monitoring well to insure that proper methodology was used in the construction and installation. Please see Appendix II for well construction details.

The borehole for the monitoring well was advanced with a six-inch outside diameter hollow stem auger. The borehole annuli were backfilled with clean 6/20 filter pack silica sand and capped with wetted bentonite to 1-2 feet above the top of the well screens. The casing for the shallow monitoring well was constructed of two (2) inch ASTM Schedule 40 PVC casing with a 10 foot 0.01 inch slotted screen interval and a five foot solid riser. The monitoring wells were developed with a centrifugal pump until the water was free of sediment.

The monitoring well was sampled on March 27, 1989 by Ruth Pangallo, of Enviropact, Inc. Approximately five volumes of water were purged from the well with a centrifugal pump. A representative groundwater sample was obtained once pH, conductivity and temperature readings had stabilized.

A decontaminated teflon bailer was used for sample retrieval. Decontamination procedures as listed in Enviropact, Inc. monitoring well sampling techniques manual were observed throughout. The groundwater samples were placed in a cooler and transported to the laboratory for analysis. The groundwater sample from MW-1 was analyzed for mineral spirits, EPA method 601, 602, 608 and 625 parameters. Reports of analyses (log numbers #29881 and #29934) from Enviropact, Inc. laboratory are attached as Appendix III.

Groundwater and soil analyses are summarized in the attached tables which list parameters analyzed for and found to be above detectable limits. The soil samples collected from the 0-2 ft. interval and the soil/water interface (6 to 8 feet below grade) both exhibited low levels of mineral spirits. The groundwater sample obtained from monitoring well #1 (MW-1) exhibited elevated concentrations of benzene (2.1 ug/l), bis (2-Ethylhexyl) phthalate (24.6 ug/l), ethyl benzene (13.3 ug/l), mineral spirits (1,670 ug/l), pentachlorophenol (6,120 ug/l), toluene (23.3 ug/l), xylene (195 ug/l), 2-chloronaphthalene (2.6 ug/l), and 2,4-dimethyl phenol (3.6 ug/l).

The level of benzene measured in the groundwater sample is above the maximum contaminant level (MCL) allowed by the county under the Broward County Code Chapter 27-5.073. There are no maximum contaminant levels (MCL) established by the county for the specific parameters pentachlorophenol and 2,4-dimethyl phenol, but these

17.3 FAC

parameters would fall under the category of phenolic compounds which is regulated by the county. The maximum contaminant level (MCL) for total phenols is 0.001 mg/l and therefore the concentration of both pentachlorophenol and 2,4- dimethyl phenol exceed this standard.

3.1 SOIL-GAS SURVEY

A soil-gas survey was conducted on May 18, 1989 to define the extent of excessively contaminated soils in the vicinity of the underground tank excavation. The soil-gas survey was initiated near the tank backfill and soil gas sampling points were placed in a grid pattern extending out from the tank excavation. A total of fourteen (14) locations (two samples per location - 24 samples) were surveyed with the organic vapor analyzer (OVA) instrument equipped with a flame ionization detector (FID).

The ground probe technique method was used during this survey which involved the placement of a steel tube into the ground to a depth of two feet six inches and then four feet eight inches. The monitoring well depth to water was measured prior to commencement of the soil-gas survey and the water table elevation was five feet. Experience has shown that the best results are obtained from a soil-gas survey when the probe is placed a few inches above the water table elevation (four feet eight inches).

The results of the soil-gas survey indicates that the extent of soil contamination appears to be limited to immediately around the existing monitoring well (MW-1). The highest soil gas concentrations detected during the survey were at sample points #6 and #10. Please see Appendix IV for the approximate locations of these survey points. Also please see Appendix V for a summary of the (OVA) analytical results.

Based on the soil gas survey the soil in the vicinity of the tank excavation does not appear to be excessively contaminated.

4.0 SITE HYDROGEOLOGY

The depth to groundwater at this location was 8.72 feet during our sampling of the monitoring well on March 27, 1989. During our initial response it was noted that groundwater at this site may be influenced by tidal fluctuations. The site is located above the eastern portion of the Biscayne Aquifer which is the principal source of fresh water in the southeastern portion of Florida. This portion of the aquifer is assumed to be classified as G-2 groundwater. During our assessment we will verify this classification based on analysis of total dissolved solids.

The property is not located within the boundaries of any presently enforced Broward County wellfield protection areas and is therefore not presently subject to any wellfield protection ordinance regulations. Located to the south of the property is the New River

which may influence groundwater flow and the hydraulic gradient of the subject property. A review of the DER drinking water quick look report indicates that there are no public potable wells located within one mile of the site and that all drinking water sources are connected to a public water system. From a public health perspective, the one main environmental pathway or exposure route would be consumption of water containing the contaminants detected. Based on the results of our water supply well survey, the potential risk to public health from exposure to contamination at this site is expected to be low. Therefore, further interim remedial measures to abate imminent hazards to human health and the environment are not recommended at this time.

BASED UPON CONJECTURE

5.0 PROPOSED ASSESSMENT

Enviropact proposes to install five (5) monitoring wells in an effort to determine the horizontal and vertical extent of contamination. These monitoring wells will be installed at the locations as diagramed on the site map in Appendix VI.

The monitoring wells will be installed by a State of Florida certified driller using a 6-inch diameter hollow stem auger. The four (4) additional shallow monitoring wells will be drilled to a depth of fifteen feet and the one (1) deep monitoring well will be drilled to a depth of thirty feet. The shallow wells will be constructed by 15 feet of 2-inch diameter schedule 40 PVC casing with 10 feet of well screen (slot size 0.01 inch) and a five foot

riser. The deep monitoring will be constructed of 30 feet of 2-inch diameter schedule 40 PVC casing with 10 feet of well screen (slot size of 0.01 inch) and a twenty foot riser. The annular space will be filled with 6/20 silica filter sand to one foot above the top of the screen. The filter pack will be sealed with a six-inch thick layer of bentonite, and the remainder of the annular space filled with cement grout, into which a steel riser will be set. See Appendix II for well construction details.

The wells will be developed using a gas powered centrifugal pump until all sediments are removed. These monitoring well rims will be surveyed by a State of Florida registered land surveyor so a potentiometric surface map of the site area can be prepared.

Groundwater samples collected from the newly installed monitoring wells will be analyzed for mineral spirits, and for EPA method 602 and 625 parameters.

6.0 TIMETABLE

A Contamination Assessment Report will be prepared and submitted to BCEQCB within sixty (60) days of written approval of this plan. An extension may be requested if additional wells become necessary to fully delineate the extent of groundwater contamination.

TABLE 1

SOIL ANALYSES ABOVE DETECTABLE LIMITS

PARAMETERS	SB-1 (0-2') (mg/kg)	SB-1 (water table) (mg/kg)
Mineral Spirits	46.7	76.4
Xylene	BDL	0.39

BDL = Below Detectable Limits

TABLE 2

GROUNDWATER ANALYSES ABOVE DETECTABLE LIMITS

Well No.	Depth (feet)	Parameters	Concentration (ug/l)	Guidance Concentrations
MW-1	15	Benzene	2.1	1.0 ug/l see below (A,C,D)
		Ethyl Benzene	13.3	See below (C)
		Toluene	23.3	See below (C)
		Xylene, Total	195.0	See below (C)
		Bis (2-Ethylhexyl) Phthalate	24.6	---
		Mineral Spirits	1,670	---
		Pentachlorophenol	6,120	< 220 ug/l (B)
		2-Chloronaphthalene	2.6	0.9 ug/l (B)
		2,4-Dimethyl Phenol	3.6	400 ug/l (B)

(A) Broward County Groundwater Standards Chapter 27-5.

(B) DER Groundwater Minimum Criteria, Guidance Concentrations.

(C) FAC 17-70.011(5)(a); Total VOA (the sum of concentrations of benzene, toluene, total xylenes, and ethylbenzenes) not to exceed 50 ug/l.

(D) FAC 17.22.210 State of Florida Maximum Contaminant Level (MCL) for Primary Drinking Water Standards.

APPENDIX I

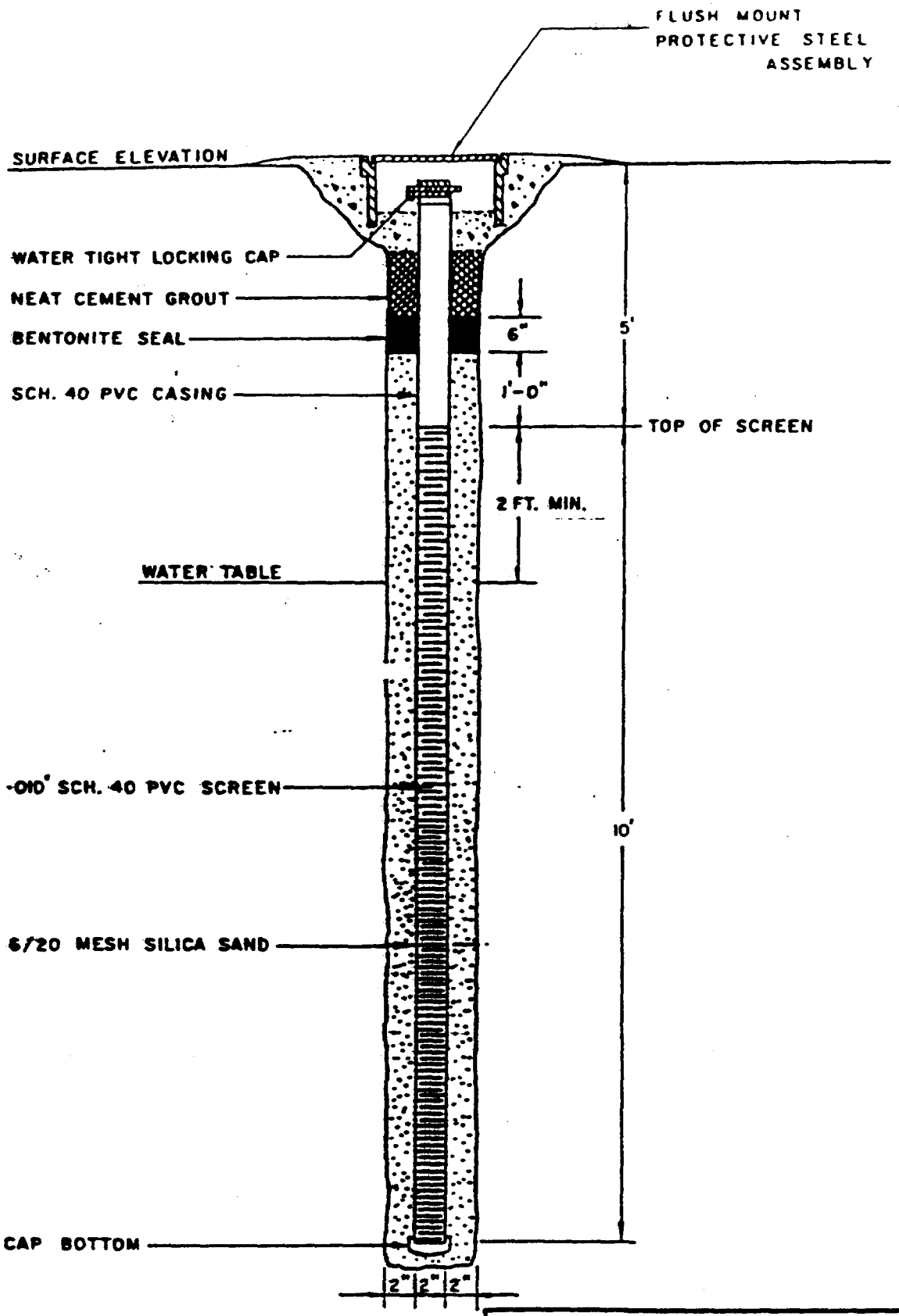
AERIAL PHOTOGRAPHS

POOR LEGIBILITY

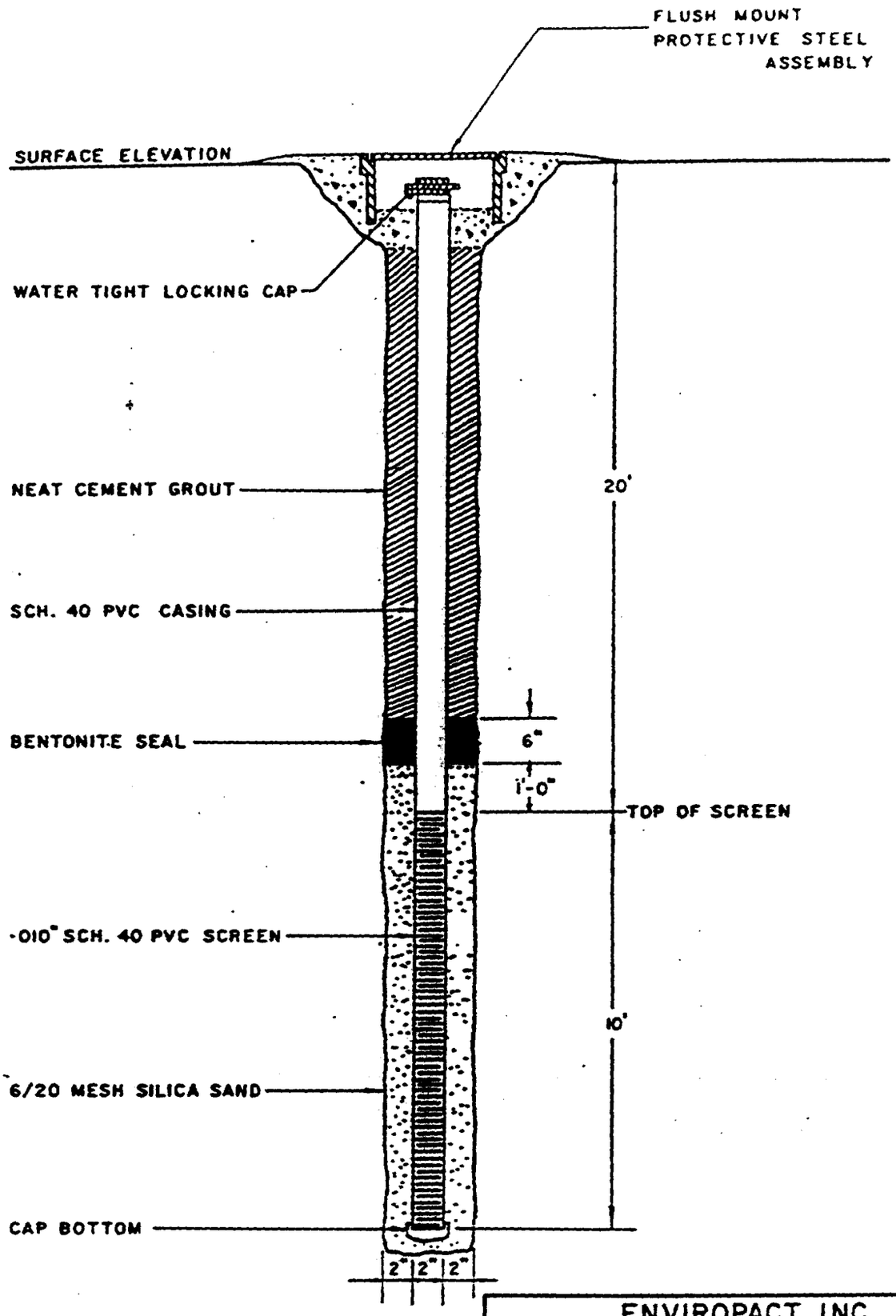
PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

APPENDIX II

WELL CONSTRUCTION DIAGRAMS



ENVIROPACT INC.		
ENVIRONMENTAL CONSULTING AND ANALYSIS		
SCALE: N.T.S.	APPROVED BY: J. M. PETERSON, P.G.	DRAWN BY
DATE:		REVISED
MONITORING WELL CONSTRUCTION		
SUN BANK		DRAWING NUMBER



ENVIROPACT INC.

ENVIRONMENTAL CONSULTING AND ANALYSIS

SCALE: N.T.S.	APPROVED BY: P. THORNBURY	DRAWN BY
DATE:		REVISED

MONITORING WELL CONSTRUCTION

SUN BANK

DRAWING NUMBER

APPENDIX III

LAB RESULTS

ENVIROPACT

15954

Page 1 of 20

SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR

April 7, 1989
Report 29934

LAB I.D. 86119

Sample Collected: 3/27/89
Sample Received: 3/27/89
Collected By: RUTH A. PANGALLO
Sample Description: 300 W. BROWARD BLVD. CENTER OF TANK EXCAVATION AREA

REPORT OF ANALYSIS : MW 1		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 6	µg/l	4/06/89
2-NITROPHENOL	< 4	µg/l	4/06/89
ACENAPHTHENE	< 2	µg/l	4/06/89
ACENAPHTHYLENE	< 4	µg/l	4/06/89
ALDRIN	< 2	µg/l	4/06/89
ANTHRACENE	< 2	µg/l	4/06/89
BENZENE	2.1	µg/l	3/29/89
BENZIDINE	< 44	µg/l	4/06/89
BENZO (A) ANTHRACENE	< 8	µg/l	4/06/89
BENZO (A) PYRENE	< 3	µg/l	4/06/89
BENZO (B) FLUORANTHENE	< 5	µg/l	4/06/89
BENZO (G,H,I) PERYLENE	< 4	µg/l	4/06/89
BENZO (K) FLUORANTHENE	< 5	µg/l	4/06/89
BETA BHC	< 5	µg/l	4/06/89
BIS (CHLOROISOPROPHYL) ETHER	< 6	µg/l	4/06/89
BIS (2-CHLOROETHOXY) METHANE	< 6	µg/l	4/06/89
BIS (2-ETHYLHEXYL) PHTHALATE	24.6	µg/l	4/06/89
BROMODICHLOROMETHANE	< 0.5	µg/l	3/29/89
BROMOFORM	< 0.5	µg/l	3/29/89
BROMOMETHANE	< 0.5	µg/l	3/29/89
BUTYL BENZYL PHTHALATE	< 3	µg/l	4/06/89
CARBON TETRACHLORIDE	< 0.5	µg/l	3/29/89
CHLORDANE	< 40	µg/l	4/06/89
CHLOROBENZENE	< 0.5	µg/l	3/29/89

SITE HEALTH AND SAFETY PLAN FORM	EMERGENCY CONTACTS
PROJECT/SITE MANAGER: Janet Peterson ON-SITE COORDINATOR: Paul Thornbury ENVIRONMENTAL AGENCY: BCEQCB - ( ) 765-4900 FIRE DEPARTMENT: FT. Lauderdale (911) 761-5320 POLICE DEPARTMENT: FT. Lauderdale (911) 761-5700 STATE POLICE: HEALTH DEPARTMENT: 357-6385 POISON CONTROL CENTER: 1 (800) 282-3171	MEDICAL EMERGENCY PHONE: 764-8900 HOSPITAL NAME: Las Olas Community Hospital HOSPITAL ADDRESS: 1516 East Las Olas Boulevard NAME OF CONTACT AT HOSPITAL: PHONE: 24-HOUR AMBULANCE: American Ambulance 925-200 Medics Ambulance Service 463-8400 ROUTE TO HOSPITAL: East on Broward Boulevard to Andrews Avenue; south to Las Olas Boulevard (2 blocks); east 1 mile to hospital (southside of Las Olas Boulevard). DISTANCE TO HOSPITAL: 1.25 Miles ATTACH MAP WITH ROUTE TO HOSPITAL
CONTINGENCY PLANS - SUMMARIZE BELOW	
SITE HEALTH AND SAFETY PLAN APPROVALS _____ DATE: __/__/__ _____ DATE: __/__/__	

SITE HEALTH AND SAFETY PLAN FORM		CAMP DRESSER & McKEE INC.
SITE PERSONNEL AND RESPONSIBILITIES (INCLUDE SUBCONTRACTORS)		
NAME	**FIRM/REGION**	**RESPONSIBILITIES**
Paul Thornbury	Enviropact, Inc. Miami Division	On-site Manager/Coordinator A-B-C-D-E F-G-H
Paul Thornbury	Enviropact, Inc. Miami Division	SHCH A-B-C-D-E F-G-H
Charlie Magistro	Enviropact, Inc. Miami Division	Drilling Coordinator

SITE HEALTH AND SAFETY PLAN FORM		DECONTAMINATION PROCEDURES
ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES		
PERSONAL DECONTAMINATION	**SAMPLING EQUIPMENT DECONTAMINATION**	**HEAVY EQUIPMENT DECONTAMINATION**
SUMMARIZE BELOW AND/OR ATTACH DIAGRAM See attached diagrams, page 9 and 10. [ ] Not needed	**SUMMARIZE BELOW AND/OR ATTACH DIAGRAM** Rinse off soil and other gross contamination with clean water. Steam clean after rinse. Wipe with isopropyl alcohol after steam clean. [ ] Not needed	**SUMMARIZE BELOW AND/OR ATTACH DIAGRAM** Rinse off soil and other gross contamination with clean water. Steam clean after rinse. [ ] Not needed
CONTAMINATION AND DISPOSAL METHOD Protective clothing: drummed and stored on site. Water: run off into trench on site.	**CONTAMINATION AND DISPOSAL METHOD** Cuttings and soil: drummed and stored on site. Water: run off into trench on site.	**CONTAMINATION AND DISPOSAL METHOD** Water: run off into trench on site.

SITE HEALTH AND SAFETY PLAN FORM			
MONITORING EQUIPMENT: SPECIFY BY TASK. INDICATE TYPE AS NECESSARY. ATTACH ADDITIONAL SHEETS AS NEEDED			
INSTRUMENT	**TASKS**	**ACTION GUIDELINES**	**COMMENTS**
Combustible Gas Indicator N/A	A-B-C-D E-F-G-H	0-10% LEL No explosion hazard. 10-25% LEL Potential explosion hazard; Notify SHSC. > 25% LEL Explosion hazard;interrupt task/evacuate. 21.0% O_2 Oxygen normal. < 21.0% O_2 Oxygen deficient; Notify SHSC. < 19.5% O_2 Interrupt task/evacuate.	
Radiation Survey Meter N/A	A-B-C-D E-F-G-H	3 X Background Notify SHSC. > 2 mA/hr: Interrupt task/evacuate.	**NOTE:** Annual exposure not to exceed 100 mrem/yr or 50 urem/hr average.
Photoionization Detector	A-B-C-D E-F-G-H	Specify: N/A [ ] 11.7 ev [ ] 10.2 ev [ ] 09.8 ev [ ] ___ ev Type:___	
Flame Ionization Detector	A-B-C-D E-F-G-H	Specify: Foxboro Century 128 organic vapor analyzer Type: with FID.	
Delector Tubes/ Monilox	A-B-C-D E-F-G-H	Specify: N/A Type:	
Respirable Dust Monitor	A-B-C-D E-F-G-H	Specify: N/A Type:	
Other	A-B-C-D E-F-G-H	Specify: Air sampling pump with XAD charcoal tube.	

SITE HEALTH AND SAFETY PLAN FORM

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary.*

BLOCK A

TASKS: LEVEL: A—B—C—D—E—F—G—H A—B—C—D—Modified

Respiratory: ( ) Not needed

( ) SCBA, Airline: _____
( ) APR: _____
(X) Cartridge: Organic Vapor
( ) Escape Mask: _____
(X) Other: Dust filter

Head and Eye: ( ) Not needed

( ) Safety Glasses: _____
(X) Face Shield: _____
( ) Goggles: _____
( ) Hard Hat: _____
( ) Other: _____

Boots: ( ) Not needed

Boots: Rubber
Overboots: _____

Prot. Clothing ( ) Not needed

( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Coverall: _____
( ) Other: _____

Gloves: ( ) Not needed

( ) Undergloves: _____
( ) Gloves: Nitrile
( ) Overgloves: _____

Other: *Specify below*

BLOCK B

TASKS: LEVEL: A—B—C—D—E—F—G—H A—B—C—D—Modified

Respiratory: ( ) Not needed

( ) SCBA, Airline: _____
( ) APR: _____
(X) Cartridge: Organic Vapor
( ) Escape Mask: _____
(X) Other: Dust Filter

Head and Eye: ( ) Not needed

( ) Safety Glasses: _____
(X) Face Shield: _____
( ) Goggles: _____
(X) Hard Hat: _____
( ) Other: _____

Boots: ( ) Not needed

Boots: Rubber
Overboots: _____

Prot. Clothing ( ) Not needed

( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
(X) Coverall: Chemrell
( ) Other: Safety Equipment

Gloves: ( ) Not needed

( ) Undergloves: _____
(X) Gloves: Nitrile
( ) Overgloves: _____

Other: *Specify below*

BLOCK C

TASKS: LEVEL: A—B—C—D—E—F—G—H A—B—C—D—Modified

Respiratory: ( ) Not needed

( ) SCBA, Airline: _____
( ) APR: _____
(X) Cartridge: Organic Vapor
( ) Escape Mask: _____
(X) Other: Dust Filter

Head and Eye: ( ) Not needed

( ) Safety Glasses: _____
(X) Face Shield: _____
( ) Goggles: _____
(X) Hard Hat: _____
( ) Other: _____

Boots: ( ) Not needed

Boots: Rubber
Overboots: _____

Prot. Clothing ( ) Not needed

( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
(X) Coverall: Chemrell
( ) Other: Safety Equipment

Gloves: ( ) Not needed

( ) Undergloves: _____
(X) Gloves: Nitrile
( ) Overgloves: _____

Other: *Specify below*

BLOCK D

TASKS: LEVEL: A—B—C—D—E—F—G—H A—B—C—D—Modified

Respiratory: ( ) Not needed

( ) SCBA, Airline: _____
( ) APR: _____
(X) Cartridge: Organic Vapor
( ) Escape Mask: _____
(X) Other: Dust Filter

Head and Eye: ( ) Not needed

( ) Safety Glasses: _____
(X) Face Shield: _____
( ) Goggles: _____
( ) Hard Hat: _____
( ) Other: _____

Boots: ( ) Not needed

Boots: Rubber
Overboots: _____

Prot. Clothing ( ) Not needed

( ) Encapsulating Suit: _____
( ) Splash Suit: _____
( ) Apron: _____
( ) Tyvek Coverall
( ) Saranex Coverall
(X) Coverall: Chemrell
( ) Other: Safety Equipment

Gloves: ( ) Not needed

( ) Undergloves: _____
(X) Gloves: Nitrile
( ) Overgloves: _____

Other: *Specify below*

SITE HEALTH AND SAFETY PLAN FORM				
FIELD INVESTIGATION ACTIVITIES COVERED UNDER THIS PLAN ATTACH ADDITIONAL SHEETS AS NECESSARY		LEVEL OF PROTECTION		
TASK DESCRIPTION/SPECIFIC TECHNIQUE /SITE LOCATION	TYPE	PRIMARY	CONTINGENCY	SCHEDULE
A Soil gas survey	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
B Soil boring installation	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
C Monitoring well installation	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
D Groundwater sample acquisition	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
E	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
F	INTRUSIVE NON-INTRUSIVE	A B C D MODIFIED	A B C D MODIFIED	
ACTIVITIES/TASKS OF GREATEST CONCERN: SUMMARIZE BELOW				

SITE HEALTH AND SAFETY PLAN FORM — CAMP DRESSER & McKEE INC.

CONTAMINANT	HIGHEST OBSERVED CONCENTRATION (SPECIFY UNITS AND MEDIA)	PEL/TLV ppm or mg/m3 (SPECIFY)	IDLH ppm or mg/m3 (SPECIFY)	WARNING CONCENTRATION ppm or mg/m3 (SPECIFY)	SYMPTOMS/EFFECTS OF ACUTE EXPOSURE
Mineral spirits	76.4 mg/kg (S) 1670 ug/l (GW)	N/A	N/A	N/A	N/A
Pentachlorophenol	6120 ug/l (GW)	0.5 mg/m^3	150 mg/m^3	N/A	Irritation of eyes, nose, throat, weakness, anorexia, sweating, headache, dizziness, nausea, chest pain, dermatitis.

NA = Not Available NE = None Established U = Unknown

S = Soil SW = Surface Water GW = Groundwater A = Air T = Tailings

SITE HEALTH AND SAFETY PLAN FORM

SITE HISTORY: SUMMARIZE BELOW

Site formerly part of Gate City Lumber Company which at one time (1949-1972) took up three city blocks. Last building on-site from lumber yard was demolished in December, 1988. Underground tanks were recently discovered which contained wood-treating material.

KNOWN OR SUSPECTED WASTES DISPOSED: SUMMARIZE BELOW

Mineral spirits based wood-treating compound with pentachlorophenol (PCP) as active ingredient.

HAZARDS OF CONCERN:

[ ] Heat Stress allach guidelines

[ ] Cold Stress allach guidelines

[ ] Explosion/Flammable

[ ] Oxygen Deficient

[ ] Radiological

[ ] Biological

[ ] Noise

[ ] Inorganic Chemicals

[ ] Organic Chemicals

[ ] Other Specify

PRINCIPAL DISPOSAL METHODS AND PRACTICES: SUMMARIZE BELOW

Abandoned underground tanks.

SITE HEALTH AND SAFETY PLAN FORM
REM II HEALTH AND SAFETY PROGRAM

THIS PAGE RESERVE FOR SITE MAP

SITE HEALTH AND SAFETY PLAN FORM

SITE NAME Former Gate City Lumber Company

LOCATION 300 West Broward Boulevard
Fort Lauderdale, Florida

PREPARED BY Ms. Janet M. Peterson

FIRM Enviropact, Inc., 4790 N.W. 157th Street
Miami, Florida 33014

DATE ___/___/___

DESCRIPTION OF ACTIVITIES			SITE TYPE: CHECK AS MANY AS APPLICABLE					
Preliminary Assessment	[ ]	Clean-Up	[ ]	Active	[ ]	Landfill	[ ]	Unknown
Initial Investigation	[ ]	Oversight	[ ]	Inactive	[X]	Uncontrolled	[ ]	Other Specify
Initial Investigation "Sampling"	[X]	Other Specify	[ ]	Secure	[ ]	Industrial	[ ]	
	[ ]			Unsecure	[X]	Recovery	[ ]	
	[ ]			Enclosed Space	[ ]	Well Field	[ ]	
	[ ]							

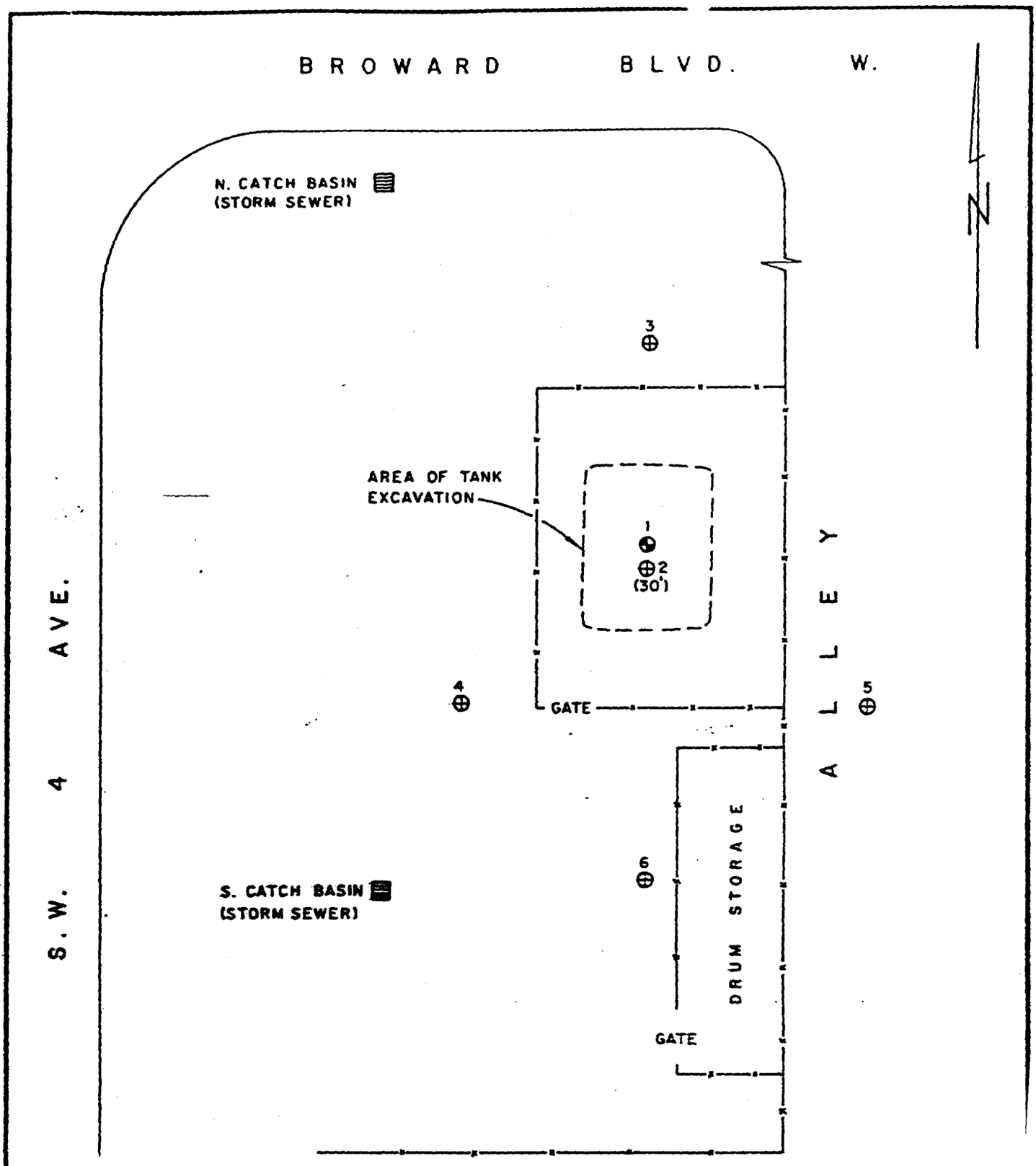
SITE DESCRIPTION AND FEATURES: SUMMARIZE BELOW

Half a city block in downtown Fort Lauderdale. Site currently a parking lot for an adjacent bank. Underground tanks were discovered on-site in February, 1989.

SURROUNDING POPULATION: [ ] Residential [ ] Industrial [ ] Rural [X] Urban [ ] Other

APPENDIX VII

SITE SPECIFIC HEALTH AND SAFETY PLAN



LEGEND

- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL

ENVIROPACT INC.
ENVIRONMENTAL CONSULTING AND ANALYSIS

SCALE: 1" = 30'	APPROVED BY: J. M. PETERSON, P.G.	DRAWN BY
DATE:		REVISED

BROWARD BLVD. SITE

SUN BANK

DRAWING NUMBER

APPENDIX VI

PROPOSED MONITORING WELL LOCATION

ENVIROPACT, INC. 4790 NW 157th St., Miami, FL 33014-6421

SOIL VAPOR SURVEY	Page: 1 of 1
Client: Sun Bank	Project #: 5954 - 002
Location: 300 West Broward Blvd.	
Date: 5 / 18 / 89	Time Start: 10:00	Time Finish: 5:00
Temperature: 95	Humidity: 98%	Rain Within Past 24 Hrs.: Yes ☒ No ☐
Vapor Analysis By: FID ☒ PID ☐ GC ☐	Groundwater Depth: 5'

POINT	ANALYSIS (ppm)	PROBE DEPTH	COMMENTS
1	20,30	2'6", 4'8"	
2	ND,ND	2'6", 4'8"	
3	1.5, 1.5	2'6", 4'8"	
4	1.0, ND	2'6",4'8"	
5	ND,ND	2'6",4'8"	
6	300, ND	2'6",4'8"	
7	ND,ND	2'6",4'8"	
8	ND,ND	2'6",4'8"	
9	ND,ND	2'6",4'8"	
10	90, >500	2'6",4'8"	
11	5, ND	2'6",4'8"	
12	8, 80	2'6",4'8"	
13	ND,ND	2'6",4'8"	
14	ND,ND	2'6",4'8"	
15			
16			
17			
18			
19			

ADDITIONAL COMMENTS:

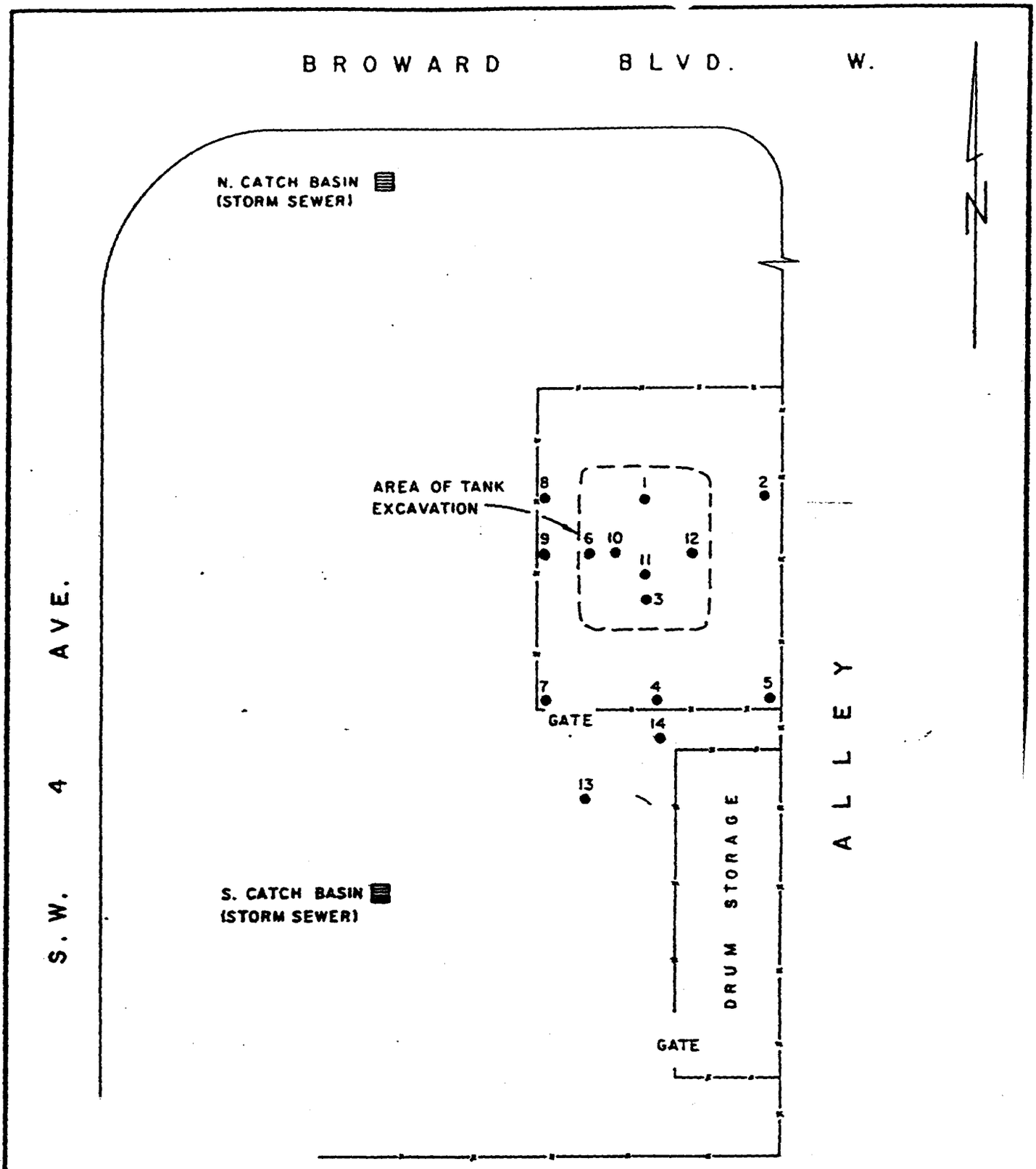
ND - Non Detected

MW #1 head space (10 ppm)

Survey By: Doug Lowell, Kent Reetz | Project Consultant: Paul Thornbury

APPENDIX V

SUMMARY OF SOIL GAS SURVEY RESULTS



LEGEND

● , SOIL GAS MONITORING POINT

ENVIROPACT INC.		
ENVIRONMENTAL CONSULTING AND ANALYSIS		
SCALE: 1" = 30'	APPROVED BY: J. M. PETERSON, P.G.	DRAWN BY
DATE:		REVISED
BROWARD BLVD. SITE		
SUN BANK		DRAWING NUMBER

APPENDIX IV

SOIL GAS SURVEY POINTS

15096
MONTGOMERY ENTERPRISES (331)
891 SPRUCE LANE
NARANJA, FL 33032

April 20, 1989
Report 29134
LAB ID. 86119

Sample Collected: 1/16/89
Sample Received: 1/16/89
Sample Description: 625 ANALYSIS

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : HOSE BLANK		UNITS	DATE
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l	1/23/89
4-NITROPHENOL	< 3	µg/l	1/23/89
4,4'-DDE	< 6	µg/l	1/23/89
4,4'-DDD	< 3	µg/l	1/23/89
4,4'-DDT	< 5	µg/l	1/23/89
EPA METHOD 625			
EPA METHOD 608			

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, Inc

15096
MONTGOMERY ENTERPRISES (331)
891 SPRUCE LANE
NARANJA, FL 33032

April 20, 1989
Report 29134
LAB ID. 86119

Sample Collected: 1/16/89
Sample Received: 1/16/89
Sample Description:625 ANALYSIS

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : HOSE BLANK		UNITS	DATE
PCB 1248	< 40	µg/l	1/23/89
PCB 1242	< 40	µg/l	1/23/89
PCB 1254	< 40	µg/l	1/23/89
PCB 1260	< 40	µg/l	1/23/89
PENTACHLOROPHENOL	< 4	µg/l	1/23/89
PHENANTHRENE	< 6	µg/l	1/23/89
PHENOL	< 2	µg/l	1/23/89
PYRENE	< 2	µg/l	1/23/89
TOXAPHENE	< 40	µg/l	1/23/89
1,2-DICHLOROBENZENE	< 2	µg/l	1/23/89
1,2,4-TRICHLOROBENZENE	< 2	µg/l	1/23/89
1,3-DICHLOROBENZENE	< 2	µg/l	1/23/89
1,4-DICHLOROBENZENE	< 5	µg/l	1/23/89
2-CHLORONAPHTHALENE	< 2	µg/l	1/23/89
2-CHLOROPHENOL	< 4	µg/l	1/23/89
2-METHYL-4,6-DINITROPHENOL	<-24	µg/l	1/23/89
2,4-DICHLOROPHENOL	< 3	µg/l	1/23/89
2,4-DIMETHYL PHENOL	< 3	µg/l	1/23/89
2,4-DINITROTOLUENE	< 6	µg/l	1/23/89
2,4-DINITROPHENOL	< 42	µg/l	1/23/89
2,4,6-TRICHLOROPHENOL	< 3	µg/l	1/23/89
2,6-DINITROTOLUENE	< 2	µg/l	1/23/89
3,3 DICHLOROBENZIDINE	< 17	µg/l	1/23/89
4-BROMOPHENYL PHENYL ETHER	< 2	µg/l	1/23/89
4-CHLORO-3 METHYLPHENOL	< 3	µg/l	1/23/89

15096
MONTGOMERY ENTERPRISES (331)
891 SPRUCE LANE
NARANJA, FL 33032

April 20, 1989
Report 29134
LAB ID. 86119

Sample Collected: 1/16/89
Sample Received: 1/16/89
Sample Description: 625 ANALYSIS

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : HOSE BLANK		UNITS	DATE
DIMETHYL PHTHALATE	< 2	µg/l	1/23/89
ENDOSULFAN SULFATE	< 6	µg/l	1/23/89
ENDOSULFAN-II	< 5	µg/l	1/23/89
ENDOSULFAN-I	< 5	µg/l	1/23/89
ENDRIN	< 5	µg/l	1/23/89
ENDRIN ALDEHYDE	< 10	µg/l	1/23/89
FLUORANTHENE	< 2	µg/l	1/23/89
FLUORENE	< 2	µg/l	1/23/89
GAMMA BHC	< 5	µg/l	1/23/89
HEPTACHLOR	< 2	µg/l	1/23/89
HEPTACHLOR-EPOXIDE	< 2	µg/l	1/23/89
HEXACHLOROBENZENE	< 2	µg/l	1/23/89
HEXACHLOROBUTADIENE	< 1	µg/l	1/23/89
HEXACHLOROETHANE	< 2	µg/l	1/23/89
HEXACHLOROCYCLOPENTADIENE	< 10	µg/l	1/23/89
INDENO-(1,2,3-CD) PYRENE	< 4	µg/l	1/23/89
ISOPHORONE	< 2	µg/l	1/23/89
N-NITROSODIMETHYLAMINE	< 10	µg/l	1/23/89
N-NITROSODIPHENYLAMINE	< 2	µg/l	1/23/89
N-NITROSODI-N-PROPYLAMINE	< 10	µg/l	1/23/89
NAPHTHALENE	< 2	µg/l	1/23/89
NITROBENZENE	< 2	µg/l	1/23/89
PCB 1016	< 40	µg/l	1/23/89
PCB 1221	< 40	µg/l	1/23/89
PCB 1232	< 40	µg/l	1/23/89

15096
MONTGOMERY ENTERPRISES (331)
891 SPRUCE LANE
NARANJA, FL 33032

April 20, 1989
Report 29134
LAB I.D. 86119

Sample Collected: 1/16/89
Sample Received: 1/16/89
Sample Description: 625 ANALYSIS

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : HOSE BLANK		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 6	µg/l	1/23/89
2-NITROPHENOL	< 4	µg/l	1/23/89
ACENAPHTHENE	< 2	µg/l	1/23/89
ACENAPHTHYLENE	< 4	µg/l	1/23/89
ALDRIN	< 2	µg/l	1/23/89
ANTHRACENE	< 2	µg/l	1/23/89
BENZIDINE	< 44	µg/l	1/23/89
BENZO (A) ANTHRACENE	< 8	µg/l	1/23/89
BENZO (B) FLUORANTHENE	< 5	µg/l	1/23/89
BENZO (K) FLUORANTHENE	< 5	µg/l	1/23/89
BENZO (A) PYRENE	< 3	µg/l	1/23/89
BENZO (G,H,I) PERYLENE	< 4	µg/l	1/23/89
BETA BHC	< 5	µg/l	1/23/89
BIS (CHLOROISOPROPHYL) ETHER	< 6	µg/l	1/23/89
BIS (2-CHLOROETHOXY) METHANE	< 6	µg/l	1/23/89
BIS (2-ETHYLHEXYL) PHTHALATE	-173.1	µg/l	1/23/89
BUTYL BENZYL PHTHALATE	< 3	µg/l	1/23/89
CHLORDANE	< 40	µg/l	1/23/89
CHRYSENE	< 3	µg/l	1/23/89
DI-N-BUTYL PHTHALATE	< 3	µg/l	1/23/89
DI-N-OCTYL PHTHALATE	< 3	µg/l	1/23/89
DIBENZO (A,H) ANTHRACENE	< 3	µg/l	1/23/89
DIELDRIN	< 3	µg/l	1/23/89
DIETHYL PHTHALATE	< 22	µg/l	1/23/89

March 30, 1989
Report 29881

LAB ID. 86119

15954
SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Collected By: DOUG LOWELL
Sample Description:SUN BANK, 300 BROWARD BLVD.

REPORT OF ANALYSIS : WT INTERFACE		UNITS	DATE
2,4-DINITROPHENOL	< 16	mg/kg	3/28/89
2,4-DINITROTOLUENE	< 3.3	mg/kg	3/28/89
2,4,6-TRICHLOROPHENOL	< 3.3	mg/kg	3/28/89
2,6-DINITROTOLUENE	< 3.3	mg/kg	3/28/89
3,3 DICHLOROBENZIDINE	< 16	mg/kg	3/28/89
4-BROMOPHENYL PHENYL ETHER	< 3.3	mg/kg	3/28/89
4-CHLORO-3 METHYLPHENOL	< 3.3	mg/kg	3/28/89
4-CHLOROPHENYL PHENYL ETHER	< 3.3	mg/kg	3/28/89
4-NITROPHENOL	< 16	mg/kg	3/28/89
4,4'-DDD	< 3.3	mg/kg	3/28/89
4,4'-DDE	< 3.3	mg/kg	3/28/89
4,4'-DDT	< 3.3	mg/kg	3/28/89

EPA METHOD 3540/8270
EPA METHOD 5030/8010 & 8020

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, In

15954

SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Sample Description:SUN BANK, 300 BROWARD BLVD.

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

REPORT OF ANALYSIS : WT INTERFACE		UNITS	DATE
TOLUENE	< 0.125	mg/kg	3/22/89
TOXAPHENE	< 16	mg/kg	3/28/89
TRANS-1,2-DICHLOROETHENE	< 0.125	mg/kg	3/22/89
TRANS-1,3-DICHLOROPROPENE	< 0.125	mg/kg	3/22/89
TRICHLOROETHENE	< 0.125	mg/kg	3/22/89
TRICHLOROFLUOROMETHANE	< 0.125	mg/kg	3/22/89
VINYL CHLORIDE	< 0.125	mg/kg	3/22/89
XYLENE, TOTAL	0.39	mg/kg	3/22/89
1,1-DICHLOROETHENE	< 0.125	mg/kg	3/22/89
1,1-DICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,1-TRICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,2-TRICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,2,2-TETRACHLOROETHANE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROPROPANE	< 0.125	mg/kg	3/22/89
1,2,4-TRICHLOROBENZENE	< 3.3	mg/kg	3/28/89
1,3-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
1,4-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
2-CHLOROETHYLVINYL ETHER	< 0.125	mg/kg	3/22/89
2-CHLORONAPHTHALENE	< 3.3	mg/kg	3/28/89
2-CHLOROPHENOL	< 3.3	mg/kg	3/28/89
2-METHYL-4,6-DINITROPHENOL	< 16	mg/kg	3/28/89
2,4-DICHLOROPHENOL	< 3.3	mg/kg	3/28/89
2,4-DIMETHYL PHENOL	< 3.3	mg/kg	3/28/89

SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Sample Description:SUN BANK, 300 BROWARD BLVD.

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

REPORT OF ANALYSIS : WT INTERFACE		UNITS	DATE
HEXACHLOROBUTADIENE	< 3.3	mg/kg	3/28/89
HEXACHLOROCYCLOPENTADIENE	< 3.3	mg/kg	3/28/89
HEXACHLOROETHANE	< 3.3	mg/kg	3/28/89
INDENO-(1,2,3-CD) PYRENE	< 3.3	mg/kg	3/28/89
ISOPHORONE	< 3.3	mg/kg	3/28/89
METHYL TERT BUTYL ETHER	< 0.125	mg/kg	3/22/89
METHYLENE CHLORIDE	< 0.125	mg/kg	3/22/89
MINERAL SPIRITS	76.4	mg/kg	3/27/89
N-NITROSODI-N-PROPYLAMINE	< 3.3	mg/kg	3/28/89
N-NITROSODIMETHYLAMINE	< 3.3	mg/kg	3/28/89
N-NITROSODIPHENYLAMINE	< 3.3	mg/kg	3/28/89
NAPHTHALENE	< 3.3	mg/kg	3/28/89
NITROBENZENE	< 3.3	mg/kg	3/28/89
PCB 1016	< 16	mg/kg	3/28/89
PCB 1221	< 16	mg/kg	3/28/89
PCB 1232	< 16	mg/kg	3/28/89
PCB 1242	< 16	mg/kg	3/28/89
PCB 1248	< 16	mg/kg	3/28/89
PCB 1254	< 16	mg/kg	3/28/89
PCB 1260	< 16	mg/kg	3/28/89
PENTACHLOROPHENOL	< 16	mg/kg	3/28/89
PHENANTHRENE	< 3.3	mg/kg	3/28/89
PHENOL	< 3.3	mg/kg	3/28/89
PYRENE	< 3.3	mg/kg	3/28/89
TETRACHLOROETHENE	< 0.125	mg/kg	3/22/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

Sample Description:SUN BANK, 300 BROWARD BLVD.

REPORT OF ANALYSIS : 0-2 FT.		UNITS	DATE
TOLUENE	< 0.125	mg/kg	3/22/89
TOXAPHENE	< 160	mg/kg	3/28/89
TRANS-1,2-DICHLOROETHENE	< 0.125	mg/kg	3/22/89
TRANS-1,3-DICHLOROPROPENE	< 0.125	mg/kg	3/22/89
TRICHLOROETHENE	< 0.125	mg/kg	3/22/89
TRICHLOROFLUOROMETHANE	< 0.125	mg/kg	3/22/89
VINYL CHLORIDE	< 0.125	mg/kg	3/22/89
XYLENE, TOTAL	< 0.125	mg/kg	3/22/89
1,1-DICHLOROETHENE	< 0.125	mg/kg	3/22/89
1,1-DICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,1-TRICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,2-TRICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,1,2,2-TETRACHLOROETHANE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROETHANE	< 0.125	mg/kg	3/22/89
1,2-DICHLOROPROPANE	< 0.125	mg/kg	3/22/89
1,2,4-TRICHLOROBENZENE	< 33	mg/kg	3/28/89
1,3-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
1,4-DICHLOROBENZENE	< 0.125	mg/kg	3/22/89
2-CHLOROETHYLVINYL ETHER	< 0.125	mg/kg	3/22/89
2-CHLORONAPHTHALENE	< 33	mg/kg	3/28/89
2-CHLOROPHENOL	< 33	mg/kg	3/28/89
2-METHYL-4,6-DINITROPHENOL	< 160	mg/kg	3/28/89
2,4-DICHLOROPHENOL	< 33	mg/kg	3/28/89
2,4-DIMETHYL PHENOL	< 33	mg/kg	3/28/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR

March 30, 1989
Report 29881

LAB ID. 86119

Sample Collected: 3/21/89
Sample Received: 3/21/89
Collected By: DOUG LOWELL
Sample Description:SUN BANK, 300 BROWARD BLVD.

REPORT OF ANALYSIS : 0-2 FT.		UNITS	DATE
2,4-DINITROPHENOL	< 160	mg/kg	3/28/89
2,4-DINITROTOLUENE	< 33	mg/kg	3/28/89
2,4,6-TRICHLOROPHENOL	< 33	mg/kg	3/28/89
2,6-DINITROTOLUENE	< 33	mg/kg	3/28/89
3,3 DICHLOROBENZIDINE	< 160	mg/kg	3/28/89
4-BROMOPHENYL PHENYL ETHER	< 33	mg/kg	3/28/89
4-CHLORO-3 METHYLPHENOL	< 33	mg/kg	3/28/89
4-CHLOROPHENYL PHENYL ETHER	< 33	mg/kg	3/28/89
4-NITROPHENOL	< 160	mg/kg	3/28/89
4,4'-DDD	< 33	mg/kg	3/28/89
4,4'-DDE	< 33	mg/kg	3/28/89
4,4'-DDT	< 33	mg/kg	3/28/89

EPA METHOD 3540/8270
EPA METHOD 5030/8010 & 8020

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, Inc

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Sample Description:SUN BANK, 300 BROWARD BLVD.

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

REPORT OF ANALYSIS : WT INTERFACE		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 3.3	mg/kg	3/28/89
2-NITROPHENOL	< 3.3	mg/kg	3/28/89
ACENAPHTHENE	< 3.3	mg/kg	3/28/89
ACENAPHTHYLENE	< 3.3	mg/kg	3/28/89
ALDRIN	< 3.3	mg/kg	3/28/89
ANTHRACENE	< 3.3	mg/kg	3/28/89
BENZENE	< 0.125	mg/kg	3/22/89
BENZIDINE	< 16	mg/kg	3/28/89
BENZO (A) ANTHRACENE	< 3.3	mg/kg	3/28/89
BENZO (A) PYRENE	< 3.3	mg/kg	3/28/89
BENZO (B) FLUORANTHENE	< 3.3	mg/kg	3/28/89
BENZO (G,H,I) PERYLENE	< 3.3	mg/kg	3/28/89
BENZO (K) FLUORANTHENE	< 3.3	mg/kg	3/28/89
BETA BHC	< 3.3	mg/kg	3/28/89
BIS (CHLOROISOPROPHYL) ETHER	< 3.3	mg/kg	3/28/89
BIS (2-CHLOROETHOXY) METHANE	< 3.3	mg/kg	3/28/89
BIS (2-ETHYLHEXYL) PHTHALATE	< 3.3	mg/kg	3/28/89
BROMODICHLOROMETHANE	< 0.125	mg/kg	3/22/89
BROMOFORM	< 0.125	mg/kg	3/22/89
BROMOMETHANE	< 0.125	mg/kg	3/22/89
BUTYL BENZYL PHTHALATE	< 3.3	mg/kg	3/28/89
CARBON TETRACHLORIDE	< 0.125	mg/kg	3/22/89
CHLORDANE	< 16	mg/kg	3/28/89
CHLOROBENZENE	< 0.125	mg/kg	3/22/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
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WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Sample Description:SUN BANK, 300 BROWARD BLVD.

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

REPORT OF ANALYSIS : WT INTERFACE		UNITS	DATE
CHLOROETHANE	< 0.125	mg/kg	3/22/89
CHLOROFORM	< 0.125	mg/kg	3/22/89
CHLOROMETHANE	< 0.125	mg/kg	3/22/89
CHRYSENE	< 3.3	mg/kg	3/28/89
CIS-1,3-DICHLOROPROPENE	< 0.125	mg/kg	3/22/89
DI-N-BUTYL PHTHALATE	< 3.3	mg/kg	3/28/89
DI-N-OCTYL PHTHALATE	< 3.3	mg/kg	3/28/89
DIBENZO (A,H) ANTHRACENE	< 3.3	mg/kg	3/28/89
DIBROMOCHLOROMETHANE	< 0.125	mg/kg	3/22/89
DICHLORODIFLUOROMETHANE	< 0.125	mg/kg	3/22/89
DIELDRIN	< 3.3	mg/kg	3/28/89
DIETHYL PHTHALATE	< 3.3	mg/kg	3/28/89
DIMETHYL PHTHALATE	< 3.3	mg/kg	3/28/89
ENDOSULFAN SULFATE	< 3.3	mg/kg	3/28/89
ENDOSULFAN-I	< 3.3	mg/kg	3/28/89
ENDOSULFAN-II	< 3.3	mg/kg	3/28/89
ENDRIN	< 3.3	mg/kg	3/28/89
ENDRIN ALDEHYDE	< 3.3	mg/kg	3/28/89
ETHYL BENZENE	< 0.125	mg/kg	3/22/89
FLUORANTHENE	< 3.3	mg/kg	3/28/89
FLUORENE	< 3.3	mg/kg	3/28/89
GAMMA BHC	< 3.3	mg/kg	3/28/89
HEPTACHLOR	< 3.3	mg/kg	3/28/8
HEPTACHLOR-EPOXIDE	< 3.3	mg/kg	3/28/8
HEXACHLOROBENZENE	< 3.3	mg/kg	3/28/8

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SUN BANK/SOUTH FLORIDA N.A.
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1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR

March 30, 1989
Report 29881

LAB ID. 86119

Sample Collected: 3/21/89
Sample Received: 3/21/89 -Collected By: DOUG LOWELL
Sample Description:SUN BANK, 300 BROWARD BLVD.

REPORT OF ANALYSIS : 0-2 FT.		UNITS	DATE
HEXACHLOROBUTADIENE	< 33	mg/kg	3/28/89
HEXACHLOROCYCLOPENTADIENE	< 33	mg/kg	3/28/89
HEXACHLOROETHANE	< 33	mg/kg	3/28/89
INDENO-(1,2,3-CD) PYRENE	< 33	mg/kg	3/28/89
ISOPHORONE	< 33	mg/kg	3/28/89
METHYL TERT BUTYL ETHER	< 0.125	mg/kg	3/22/89
METHYLENE CHLORIDE	< 0.125	mg/kg	3/22/89
MINERAL SPIRITS	46.7	mg/kg	3/27/89
N-NITROSODI-N-PROPYLAMINE	< 33	mg/kg	3/28/89
N-NITROSODIMETHYLAMINE	< 33	mg/kg	3/28/89
N-NITROSODIPHENYLAMINE	< 33	mg/kg	3/28/89
NAPHTHALENE	< 33	mg/kg	3/28/89
NITROBENZENE	< 33	mg/kg	3/28/89
PCB 1016	< 160	mg/kg	3/28/89
PCB 1221	< 160	mg/kg	3/28/89
PCB 1232	< 160	mg/kg	3/28/89
PCB 1242	< 160	mg/kg	3/28/89
PCB 1248	< 160	mg/kg	3/28/89
PCB 1254	< 160	mg/kg	3/28/89
PCB 1260	< 160	mg/kg	3/28/89
PENTACHLOROPHENOL	< 160	mg/kg	3/28/89
PHENANTHRENE	< 33	mg/kg	3/28/89
PHENOL	< 33	mg/kg	3/28/89
PYRENE	< 33	mg/kg	3/28/89
TETRACHLOROETHENE	< 0.125	mg/kg	3/22/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/21/89
Sample Received: 3/21/89
Sample Description:SUN BANK, 300 BROWARD BLVD.

March 30, 1989
Report 29881

LAB ID. 86119

Collected By: DOUG LOWELL

REPORT OF ANALYSIS : 0-2 FT.		UNITS	DATE
CHLOROETHANE	< 0.125	mg/kg	3/22/89
CHLOROFORM	< 0.125	mg/kg	3/22/89
CHLOROMETHANE	< 0.125	mg/kg	3/22/89
CHRYSENE	< 33	mg/kg	3/28/89
CIS-1,3-DICHLOROPROPENE	< 0.125	mg/kg	3/22/89
DI-N-BUTYL PHTHALATE	< 33	mg/kg	3/28/89
DI-N-OCTYL PHTHALATE	< 33	mg/kg	3/28/89
DIBENZO (A,H) ANTHRACENE	< 33	mg/kg	3/28/89
DIBROMOCHLOROMETHANE	< 0.125	mg/kg	3/22/89
DICHLORODIFLUOROMETHANE	< 0.125	mg/kg	3/22/89
DIELDRIN	< 33	mg/kg	3/28/89
DIETHYL PHTHALATE	< 33	mg/kg	3/28/89
DIMETHYL PHTHALATE	< 33	mg/kg	3/28/89
ENDOSULFAN SULFATE	< 33	mg/kg	3/28/89
ENDOSULFAN-I	< 33	mg/kg	3/28/89
ENDOSULFAN-II	< 33	mg/kg	3/28/89
ENDRIN	< 33	mg/kg	3/28/8
ENDRIN ALDEHYDE	< 33	mg/kg	3/28/8
ETHYL BENZENE	< 0.125	mg/kg	3/22/8
FLUORANTHENE	< 33	mg/kg	3/28/8
FLUORENE	< 33	mg/kg	3/28/8
GAMMA BHC	< 33	mg/kg	3/28/8
HEPTACHLOR	< 33	mg/kg	3/28/8
HEPTACHLOR-EPOXIDE	< 33	mg/kg	3/28/8
HEXACHLOROBENZENE	< 33	mg/kg	3/28/8

ENVIROPACT

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Page 1 of 10

SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR

March 30, 1989
Report 29881

LAB I.D. 86119

Sample Collected: 3/21/89
Sample Received: 3/21/89
Collected By: DOUG LOWELL
Sample Description:SUN BANK, 300 BROWARD BLVD.

REPORT OF ANALYSIS : 0-2 FT.		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 33	mg/kg	3/28/89
2-NITROPHENOL	< 33	mg/kg	3/28/89
ACENAPHTHENE	< 33	mg/kg	3/28/89
ACENAPHTHYLENE	< 33	mg/kg	3/28/89
ALDRIN	< 33	mg/kg	3/28/89
ANTHRACENE	< 33	mg/kg	3/28/89
BENZENE	< 0.125	mg/kg	3/22/89
BENZIDINE	< 160	mg/kg	3/28/89
BENZO (A) ANTHRACENE	< 33	mg/kg	3/28/89
BENZO (A) PYRENE	< 33	mg/kg	3/28/89
BENZO (B) FLUORANTHENE	< 33	mg/kg	3/28/89
BENZO (G,H,I) PERYLENE	< 33	mg/kg	3/28/89
BENZO (K) FLUORANTHENE	< 33	mg/kg	3/28/89
BETA BHC	< 33	mg/kg	3/28/89
BIS (CHLOROISOPROPHYL) ETHER	< 33	mg/kg	3/28/89
BIS (2-CHLOROETHOXY) METHANE	< 33	mg/kg	3/28/89
BIS (2-ETHYLHEXYL) PHTHALATE	< 33	mg/kg	3/28/89
BROMODICHLOROMETHANE	< 0.125	mg/kg	3/22/89
BROMOFORM	< 0.125	mg/kg	3/22/89
BROMOMETHANE	< 0.125	mg/kg	3/22/89
BUTYL BENZYL PHTHALATE	< 33	mg/kg	3/28/89
CARBON TETRACHLORIDE	< 0.125	mg/kg	3/22/89
CHLORDANE	< 160	mg/kg	3/28/89
CHLOROBENZENE	< 0.125	mg/kg	3/22/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : EQUIPMENT BLANK		UNITS	DATE
2,4-DINITROPHENOL	< 42	µg/l	4/06/89
2,4-DINITROTOLUENE	< 6	µg/l	4/06/89
2,4,6-TRICHLOROPHENOL	< 3	µg/l	4/06/89
2,6-DINITROTOLUENE	< 2	µg/l	4/06/89
3,3 DICHLOROBENZIDINE	< 17	µg/l	4/06/89
4-BROMOPHENYL PHENYL ETHER	< 2	µg/l	4/06/89
4-CHLORO-3 METHYLPHENOL	< 3	µg/l	4/06/89
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l	4/06/89
4-NITROPHENOL	< 3	µg/l	4/06/89
4,4'-DDD	< 3	µg/l	4/06/89
4,4'-DDE	< 6	µg/l	4/06/89
4,4'-DDT	< 5	µg/l	4/06/89

EPA METHOD 601 & 602
EPA METHOD 608
EPA METHOD 625

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, Inc

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : EQUIPMENT BLANK		UNITS	DATE
TOLUENE	0.8	µg/l	3/29/89
TOXAPHENE	< 40	µg/l	4/06/89
TRANS-1,2-DICHLOROETHENE	< 0.5	µg/l	3/29/89
TRANS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
TRICHLOROETHENE	< 0.5	µg/l	3/29/89
TRICHLOROFLUOROMETHANE	< 0.5	µg/l	3/29/89
VINYL CHLORIDE	< 0.5	µg/l	3/29/89
XYLENE, TOTAL	0.7	µg/l	3/29/89
1,1-DICHLOROETHANE	3.7	µg/l	3/29/89
1,1-DICHLOROETHENE	< 0.5	µg/l	3/29/89
1,1,1-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2,2-TETRACHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,2-DICHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROPROPANE	< 0.5	µg/l	3/29/89
1,2,4-TRICHLOROBENZENE	< 2	µg/l	4/06/89
1,3-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,4-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
2-CHLOROETHYLVINYL ETHER	< 0.5	µg/l	3/29/89
2-CHLORONAPHTHALENE	< 2	µg/l	4/06/89
2-CHLOROPHENOL	< 4	µg/l	4/06/89
2-METHYL-4,6-DINITROPHENOL	< 24	µg/l	4/06/89
2,4-DICHLOROPHENOL	< 3	µg/l	4/06/89
2,4-DIMETHYL PHENOL	< 3	µg/l	4/06/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : EQUIPMENT BLANK		UNITS	DATE
HEXACHLOROBUTADIENE	< 1	µg/l	4/06/89
HEXACHLOROCYCLOPENTADIENE	< 10	µg/l	4/06/89
HEXACHLOROETHANE	< 2	µg/l	4/06/89
INDENO-(1,2,3-CD) PYRENE	< 4	µg/l	4/06/89
ISOPHORONE	< 2	µg/l	4/06/89
METHYL TERT BUTYL ETHER	1.1	µg/l	3/29/89
METHYLENE CHLORIDE	< 0.5	µg/l	3/29/89
MINERAL SPIRITS	< 20	µg/l	3/30/89
N-NITROSODI-N-PROPYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIMETHYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIPHENYLAMINE	< 2	µg/l	4/06/89
NAPHTHALENE	< 2	µg/l	4/06/89
NITROBENZENE	< 2	µg/l	4/06/89
PCB 1016	< 40	µg/l	4/06/89
PCB 1221	< 40	µg/l	4/06/89
PCB 1232	< 40	µg/l	4/06/89
PCB 1242	< 40	µg/l	4/06/89
PCB 1248	< 40	µg/l	4/06/89
PCB 1254	< 40	µg/l	4/06/89
PCB 1260	< 40	µg/l	4/06/89
PENTACHLOROPHENOL	< 4	µg/l	4/06/89
PHENANTHRENE	< 6	µg/l	4/06/89
PHENOL	< 2	µg/l	4/06/89
PYRENE	< 2	µg/l	4/06/89
TETRACHLOROETHENE	< 0.5	µg/l	3/29/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : EQUIPMENT BLANK		UNITS	DATE
CHLOROETHANE	< 0.5	µg/l	3/29/89
CHLOROFORM	< 0.5	µg/l	3/29/89
CHLOROMETHANE	< 0.5	µg/l	3/29/89
CHRYSENE	< 3	µg/l	4/06/89
CIS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
DI-N-BUTYL PHTHALATE	< 3	µg/l	4/06/89
DI-N-OCTYL PHTHALATE	< 3	µg/l	4/06/89
DIBENZO (A,H) ANTHRACENE	< 3	µg/l	4/06/89
DIBROMOCHLOROMETHANE	< 0.5	µg/l	3/29/89
DICHLORODIFLUOROMETHANE	< 0.5	µg/l	3/29/89
DIELDRIN	< 3	µg/l	4/06/89
DIETHYL PHTHALATE	< 22	µg/l	4/06/89
DIMETHYL PHTHALATE	< 2	µg/l	4/06/89
ENDOSULFAN SULFATE	< 6	µg/l	4/06/89
ENDOSULFAN-I	< 5	µg/l	4/06/89
ENDOSULFAN-II	< 5	µg/l	4/06/89
ENDRIN	< 5	µg/l	4/06/89
ENDRIN ALDEHYDE	< 10	µg/l	4/06/89
ETHYL BENZENE	< 0.5	µg/l	3/29/89
FLUORANTHENE	< 2	µg/l	4/06/89
FLUORENE	< 2	µg/l	4/06/89
GAMMA BHC	< 5	µg/l	4/06/89
HEPTACHLOR	< 2	µg/l	4/06/89
HEPTACHLOR-EPOXIDE	< 2	µg/l	4/06/89
HEXACHLOROBENZENE	< 2	µg/l	4/06/89

15954
SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : EQUIPMENT BLANK		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 6	µg/l	4/06/89
2-NITROPHENOL	< 4	µg/l	4/06/89
ACENAPHTHENE	< 2	µg/l	4/06/89
ACENAPHTHYLENE	< 4	µg/l	4/06/89
ALDRIN	< 2	µg/l	4/06/89
ANTHRACENE	< 2	µg/l	4/06/89
BENZENE	< 0.5	µg/l	3/29/89
BENZIDINE	< 44	µg/l	4/06/89
BENZO (A) ANTHRACENE	< 8	µg/l	4/06/89
BENZO (A) PYRENE	< 3	µg/l	4/06/89
BENZO (B) FLUORANTHENE	< 5	µg/l	4/06/89
BENZO (G,H,I) PERYLENE	< 4	µg/l	4/06/89
BENZO (K) FLUORANTHENE	< 5	µg/l	4/06/89
BETA BHC	< 5	µg/l	4/06/89
BIS (CHLOROISOPROPHYL) ETHER	< 6	µg/l	4/06/89
BIS (2-CHLOROETHOXY) METHANE	< 6	µg/l	4/06/89
BIS (2-ETHYLHEXYL) PHTHALATE	< 3	µg/l	4/06/89
BROMODICHLOROMETHANE	< 0.5	µg/l	3/29/89
BROMOFORM	< 0.5	µg/l	3/29/89
BROMOMETHANE	< 0.5	µg/l	3/29/89
BUTYL BENZYL PHTHALATE	< 3	µg/l	4/06/89
CARBON TETRACHLORIDE	< 0.5	µg/l	3/29/89
CHLORDANE	< 40	µg/l	4/06/89
CHLOROBENZENE	< 0.5	µg/l	3/29/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : FIELD BLANK		UNITS	DATE
2,4-DINITROPHENOL	< 42	µg/l	4/06/89
2,4-DINITROTOLUENE	< 6	µg/l	4/06/89
2,4,6-TRICHLOROPHENOL	< 3	µg/l	4/06/89
2,6-DINITROTOLUENE	< 2	µg/l	4/06/89
3,3 DICHLOROBENZIDINE	< 17	µg/l	4/06/89
4-BROMOPHENYL PHENYL ETHER	< 2	µg/l	4/06/89
4-CHLORO-3 METHYLPHENOL	< 3	µg/l	4/06/89
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l	4/06/89
4-NITROPHENOL	< 3	µg/l	4/06/89
4,4'-DDD	< 3	µg/l	4/06/89
4,4'-DDE	< 6	µg/l	4/06/89
4,4'-DDT	< 5	µg/l	4/06/89

EPA METHOD 608
EPA METHOD 601 & 602
EPA METHOD 625

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, Inc.

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GENERAL SERVICES ADMNSTR.
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WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : FIELD BLANK		UNITS	DATE
TOLUENE	< 0.5	µg/l	3/29/89
TOXAPHENE	< 40	µg/l	4/06/89
TRANS-1,2-DICHLOROETHENE	< 0.5	µg/l	3/29/89
TRANS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
TRICHLOROETHENE	< 0.5	µg/l	3/29/89
TRICHLOROFLUOROMETHANE	< 0.5	µg/l	3/29/89
VINYL CHLORIDE	< 0.5	µg/l	3/29/89
XYLENE, TOTAL	< 0.5	µg/l	3/29/89
1,1-DICHLOROETHENE	< 0.5	µg/l	3/29/89
1,1-DICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,1-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2,2-TETRACHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,2-DICHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROPROPANE	< 0.5	µg/l	3/29/89
1,2,4-TRICHLOROBENZENE	< 2	µg/l	4/06/89
1,3-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,4-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
2-CHLOROETHYLVINYL ETHER	< 0.5	µg/l	3/29/89
2-CHLORONAPHTHALENE	< 2	µg/l	4/06/89
2-CHLOROPHENOL	< 4	µg/l	4/06/89
2-METHYL-4,6-DINITROPHENOL	< 24	µg/l	4/06/89
2,4-DICHLOROPHENOL	< 3	µg/l	4/06/89
2,4-DIMETHYL PHENOL	< 3	µg/l	4/06/89

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WILTON MANORS, FL 33305
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Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : FIELD BLANK		UNITS	DATE
HEXACHLOROBUTADIENE	< 1	µg/l	4/06/89
HEXACHLOROCYCLOPENTADIENE	< 10	µg/l	4/06/89
HEXACHLOROETHANE	< 2	µg/l	4/06/89
INDENO-(1,2,3-CD) PYRENE	< 4	µg/l	4/06/89
ISOPHORONE	< 2	µg/l	4/06/89
METHYL TERT BUTYL ETHER	< 1	µg/l	3/29/89
METHYLENE CHLORIDE	< 0.5	µg/l	3/29/89
MINERAL SPIRITS	< 20	µg/l	3/30/89
N-NITROSODI-N-PROPYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIMETHYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIPHENYLAMINE	< 2	µg/l	4/06/89
NAPHTHALENE	< 2	µg/l	4/06/89
NITROBENZENE	< 2	µg/l	4/06/89
PCB 1016	< 40	µg/l	4/06/89
PCB 1221	< 40	µg/l	4/06/89
PCB 1232	< 40	µg/l	4/06/89
PCB 1242	< 40	µg/l	4/06/89
PCB 1248	< 40	µg/l	4/06/89
PCB 1254	< 40	µg/l	4/06/89
PCB 1260	< 40	µg/l	4/06/89
PENTACHLOROPHENOL	< 4	µg/l	4/06/89
PHENANTHRENE	< 6	µg/l	4/06/89
PHENOL	< 2	µg/l	4/06/89
PYRENE	< 2	µg/l	4/06/89
TETRACHLOROETHENE	< 0.5	µg/l	3/29/89

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SUN BANK/SOUTH FLORIDA N.A.
GENERAL SERVICES ADMNSTR.
1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description: QUALITY CONTROL

April 7, 1989
Report - 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : FIELD BLANK		UNITS	DATE
CHLOROETHANE	< 0.5	µg/l	3/29/89
CHLOROFORM	< 0.5	µg/l	3/29/89
CHLOROMETHANE	< 0.5	µg/l	3/29/89
CHRYSENE	< 3	µg/l	4/06/89
CIS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
DI-N-BUTYL PHTHALATE	< 3	µg/l	4/06/89
DI-N-OCTYL PHTHALATE	< 3	µg/l	4/06/89
DIBENZO (A,H) ANTHRACENE	< 3	µg/l	4/06/89
DIBROMOCHLOROMETHANE	< 0.5	µg/l	3/29/89
DICHLORODIFLUOROMETHANE	< 0.5	µg/l	3/29/89
DIELDRIN	< 3	µg/l	4/06/89
DIETHYL PHTHALATE	< 22	µg/l	4/06/89
DIMETHYL PHTHALATE	< 2	µg/l	4/06/89
ENDOSULFAN SULFATE	< 6	µg/l	4/06/89
ENDOSULFAN-I	< 5	µg/l	4/06/89
ENDOSULFAN-II	< 5	µg/l	4/06/89
ENDRIN	< 5	µg/l	4/06/89
ENDRIN ALDEHYDE	< 10	µg/l	4/06/89
ETHYL BENZENE	< 0.5	µg/l	3/29/89
FLUORANTHENE	< 2	µg/l	4/06/89
FLUORENE	< 2	µg/l	4/06/89
GAMMA BHC	< 5	µg/l	4/06/89
HEPTACHLOR	< 2	µg/l	4/06/89
HEPTACHLOR-EPOXIDE	< 2	µg/l	4/06/89
HEXACHLOROBENZENE	< 2	µg/l	4/06/89

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SUN BANK/SOUTH FLORIDA N.A.
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Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : FIELD BLANK		UNITS	DATE
BIS (2-CHLOROETHYL) ETHER	< 6	µg/l	4/06/89
2-NITROPHENOL	< 4	µg/l	4/06/89
ACENAPHTHENE	< 2	µg/l	4/06/89
ACENAPHTHYLENE	< 4	µg/l	4/06/89
ALDRIN	< 2	µg/l	4/06/89
ANTHRACENE	< 2	µg/l	4/06/89
BENZENE	< 0.5	µg/l	3/29/89
BENZIDINE	< 44	µg/l	4/06/89
BENZO (A) ANTHRACENE	< 8	µg/l	4/06/89
BENZO (A) PYRENE	< 3	µg/l	4/06/89
BENZO (B) FLUORANTHENE	< 5	µg/l	4/06/89
BENZO (G,H,I) PERYLENE	< 4	µg/l	4/06/89
BENZO (K) FLUORANTHENE	< 5	µg/l	4/06/89
BETA BHC	< 5	µg/l	4/06/89
BIS (CHLOROISOPROPHYL) ETHER	< 6	µg/l	4/06/89
BIS (2-CHLOROETHOXY) METHANE	< 6	µg/l	4/06/89
BIS (2-ETHYLHEXYL) PHTHALATE	< 3	µg/l	4/06/89
BROMODICHLOROMETHANE	< 0.5	µg/l	3/29/89
BROMOFORM	< 0.5	µg/l	3/29/89
BROMOMETHANE	< 0.5	µg/l	3/29/89
BUTYL BENZYL PHTHALATE	< 3	µg/l	4/06/89
CARBON TETRACHLORIDE	< 0.5	µg/l	3/29/89
CHLORDANE	< 40	µg/l	4/06/89
CHLOROBENZENE	< 0.5	µg/l	3/29/89

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SUN BANK/SOUTH FLORIDA N.A.
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1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : TRIP BLANK		UNITS	DATE
2,4-DINITROPHENOL	< 42	µg/l	4/06/89
2,4-DINITROTOLUENE	< 6	µg/l	4/06/89
2,4,6-TRICHLOROPHENOL	< 3	µg/l	4/06/89
2,6-DINITROTOLUENE	< 2	µg/l	4/06/89
3,3 DICHLOROBENZIDINE	< 17	µg/l	4/06/89
4-BROMOPHENYL PHENYL ETHER	< 2	µg/l	4/06/89
4-CHLORO-3 METHYLPHENOL	< 3	µg/l	4/06/89
4-CHLOROPHENYL PHENYL ETHER	< 5	µg/l	4/06/89
4-NITROPHENOL	< 3	µg/l	4/06/89
4,4'-DDD	< 3	µg/l	4/06/89
4,4'-DDE	< 6	µg/l	4/06/89
4,4'-DDT	< 5	µg/l	4/06/89

EPA METHOD 608
EPA METHOD 601 & 602
EPA METHOD 625

Analyses performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully Submitted,

Jeffrey S. Glass
Laboratory Manager
Enviropact Services, Inc.

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Sample Description:QUALITY CONTROL

April 7, 1989
Report. 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : TRIP BLANK		UNITS	DATE
TOLUENE	< 0.5	µg/l	3/29/89
TOXAPHENE	< 40	µg/l	4/06/89
TRANS-1,2-DICHLOROETHENE	< 0.5	µg/l	3/29/89
TRANS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
TRICHLOROETHENE	< 0.5	µg/l	3/29/89
TRICHLOROFLUOROMETHANE	< 0.5	µg/l	3/29/89
VINYL CHLORIDE	< 0.5	µg/l	3/29/89
XYLENE, TOTAL	< 0.5	µg/l	3/29/89
1,1-DICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1-DICHLOROETHENE	< 0.5	µg/l	3/29/89
1,1,1-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2-TRICHLOROETHANE	< 0.5	µg/l	3/29/89
1,1,2,2-TETRACHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,2-DICHLOROETHANE	< 0.5	µg/l	3/29/89
1,2-DICHLOROPROPANE	< 0.5	µg/l	3/29/89
1,2,4-TRICHLOROBENZENE	< 2	µg/l	4/06/89
1,3-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
1,4-DICHLOROBENZENE	< 0.5	µg/l	3/29/89
2-CHLOROETHYLVINYL ETHER	< 0.5	µg/l	3/29/89
2-CHLORONAPHTHALENE	< 2	µg/l	4/06/89
2-CHLOROPHENOL	< 4	µg/l	4/06/89
2-METHYL-4,6-DINITROPHENOL	< 24	µg/l	4/06/89
2,4-DICHLOROPHENOL	< 3	µg/l	4/06/89
2,4-DIMETHYL PHENOL	< 3	µg/l	4/06/89

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Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : TRIP BLANK		UNITS	DATE
HEXACHLOROBUTADIENE	< 1	µg/l	4/06/89
HEXACHLOROCYCLOPENTADIENE	< 10	µg/l	4/06/89
HEXACHLOROETHANE	< 2	µg/l	4/06/89
INDENO-(1,2,3-CD) PYRENE	< 4	µg/l	4/06/89
ISOPHORONE	< 2	µg/l	4/06/89
METHYL TERT BUTYL ETHER	< 0.5	µg/l	3/29/89
METHYLENE CHLORIDE	< 0.5	µg/l	3/29/89
MINERAL SPIRITS	< 20	µg/l	3/30/89
N-NITROSODI-N-PROPYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIMETHYLAMINE	< 10	µg/l	4/06/89
N-NITROSODIPHENYLAMINE	< 2	µg/l	4/06/89
NAPHTHALENE	< 2	µg/l	4/06/89
NITROBENZENE	< 2	µg/l	4/06/89
PCB 1016	< 40	µg/l	4/06/89
PCB 1221	< 40	µg/l	4/06/89
PCB 1232	< 40	µg/l	4/06/89
PCB 1242	< 40	µg/l	4/06/89
PCB 1248	< 40	µg/l	4/06/89
PCB 1254	< 40	µg/l	4/06/89
PCB 1260	< 40	µg/l	4/06/89
PENTACHLOROPHENOL	< 4	µg/l	4/06/89
PHENANTHRENE	< 6	µg/l	4/06/89
PHENOL	< 2	µg/l	4/06/89
PYRENE	< 2	µg/l	4/06/89
TETRACHLOROETHENE	< 0.5	µg/l	3/29/89

15954

SUN BANK/SOUTH FLORIDA N.A.
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1431 NORTHEAST 26TH ST.
WILTON MANORS, FL 33305
ATT : MR. DOUGLAS K. SINCLAIR
Sample Collected: 3/27/89
Sample Received: 3/27/89
Sample Description:QUALITY CONTROL

April 7, 1989
Report 29934

LAB ID. 86119

Collected By: RUTH A. PANGALLO

REPORT OF ANALYSIS : TRIP BLANK		UNITS	DATE
CHLOROETHANE	< 0.5	µg/l	3/29/89
CHLOROFORM	< 0.5	µg/l	3/29/89
CHLOROMETHANE	< 0.5	µg/l	3/29/89
CHRYSENE	< 3	µg/l	4/06/89
CIS-1,3-DICHLOROPROPENE	< 0.5	µg/l	3/29/89
DI-N-BUTYL PHTHALATE	< 3	µg/l	4/06/89
DI-N-OCTYL PHTHALATE	< 3	µg/l	4/06/89
DIBENZO (A,H) ANTHRACENE	< 3	µg/l	4/06/89
DIBROMOCHLOROMETHANE	< 0.5	µg/l	3/29/89
DICHLORODIFLUOROMETHANE	< 0.5	µg/l	3/29/89
DIELDRIN	< 3	µg/l	4/06/89
DIETHYL PHTHALATE	< 22	µg/l	4/06/89
DIMETHYL PHTHALATE	< 2	µg/l	4/06/89
ENDOSULFAN SULFATE	< 6	µg/l	4/06/89
ENDOSULFAN-I	< 5	µg/l	4/06/89
ENDOSULFAN-II	< 5	µg/l	4/06/89
ENDRIN	< 5	µg/l	4/06/89
ENDRIN ALDEHYDE	< 10	µg/l	4/06/89
ETHYL BENZENE	< 0.5	µg/l	3/29/89
FLUORANTHENE	< 2	µg/l	4/06/89
FLUORENE	< 2	µg/l	4/06/89
GAMMA BHC	< 5	µg/l	4/06/89
HEPTACHLOR	< 2	µg/l	4/06/89
HEPTACHLOR-EPOXIDE	< 2	µg/l	4/06/89
HEXACHLOROBENZENE	< 2	µg/l	4/06/89

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee
To. _____ Location. _____
To. _____ Location _____
To: _____ Location: _____
From: _____ Date: _____

Interoffice Memorandum

TO: Mike Sisler, South Florida District

THROUGH: James J. Crane, Bureau of Waste Cleanup JJC

FROM: A. M. Stodghill, Bureau of Waste Cleanup AMS

DATE: October 10, 1989

SUBJECT: Contamination Assessment Plan for Sun Bank at 300 West Broward Boulevard, Ft. Lauderdale, Broward County

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The contamination assessment plan (CAP) lists the following objectives:

(a) define areal and vertical extent of groundwater contamination,
(b) define mechanisms of contamination transport,
(c) determine the rate of contaminant movement through soils and groundwater,
(d) characterize the contaminant plume(s),
(e) determine if interim remedial measures are warranted.

In its present form the CAP cannot meet objectives b, c and d. Conclusions regarding objective e are based upon deductive reasoning, but are not supported with data.

Specific issues which must be addressed are:

(1) Complete characterization of the plume(s), including delineation in soils and ground water.

(2) Define methods for determining the rates and mechanisms for contaminant transport.

(3) Accurate determination of the volume of lost fluid from the overturned tank.

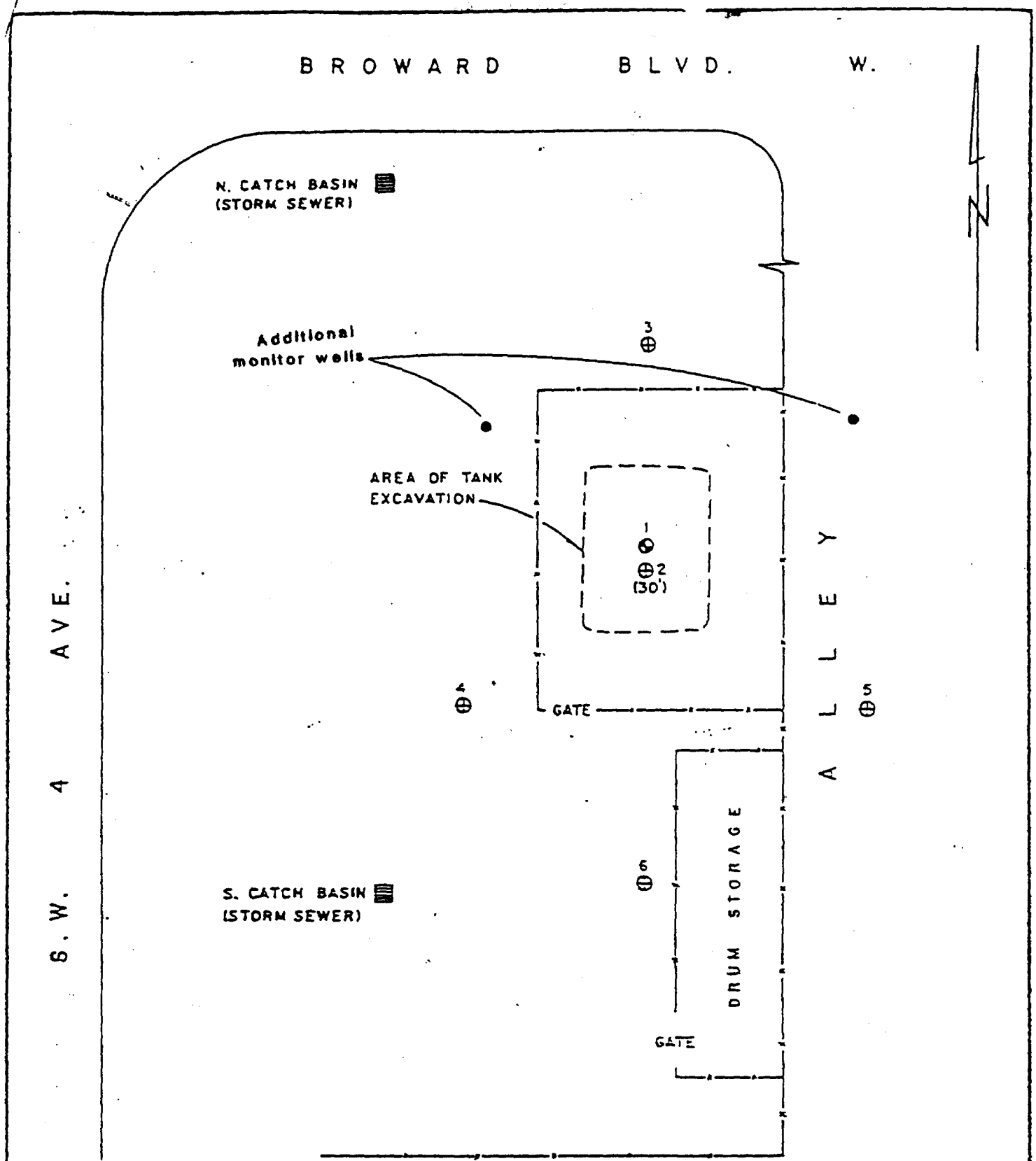
(4) Site hydrology and site geology.

(5) An accurate timetable for the tasks necessary for this investigation.

Specific issues and questions pertaining to the submitted CAP are:

(6) Where in the pit did the spillage occur?

(7) Where in the excavation pit was the soil sample taken?



LEGEND

- EXISTING MONITORING WELL
- PROPOSED MONITORING WELL

ENVIROPACT INC.
ENVIRONMENTAL CONSULTING AND ANALYSIS

SCALE: 1" = 30'
J. M. PETERSON, P.G.
DATE:

BROWARD BLVD. SITE

SUN BANK

PRINTED ON

MAR 16 199(

Bureau of Waste Cleanup

MAR 28 1990

Technical Review Section

RECEIVED
MAR 19 1990
Dept. of Environmental Reg.
West Palm Beach

CONSTRUCTION REPORT

Sun Bank Site
Fort Lauderdale, Florida

MARCH 1990
REF. NO. 3050(5)

CONESTOGA-ROVERS & ASSOCIATES

LIST O F

FIGURE 1.1 SITE LOCATION

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1.0 INTRODUCTION

In February, 1989, Sun Bank began construction of a parking lot adjacent to its 300 West Broward Boulevard branch, Fort Lauderdale, Florida. Figure 1.1 locates the Site. Sun Bank's contractor discovered a suspected underground storage tank in the course of its excavations on February 27, 1989.

On February 28, 1989, Enviropact, Inc., an environmental consulting firm retained by Sun Bank, directed the unearthing of four 2000-gallon tanks which were discovered to contain liquids. During the excavation, seven inches of rain fell, filling the excavation Site with sufficient water to float one of the tanks. The tank shifted and an estimated volume of between 6 to 89 gallons of its liquid contents were spilled into the water filled excavation.

Enviropact, under the direction of the Broward County Environmental Quality Control Board (BCEQCB), removed the liquids from the excavated area and stored the liquids in drums. The contents of the four tanks, liquids and sludges, were also removed and placed in drums. The drums were placed on wooden pallets on visqueen sheeting in a fenced area situated on Sun Bank's property. A detailed record was kept of the source of the contents of each drum for use in decisions regarding disposition of the contents.

Analysis of the tank's contents indicated that one of the tanks contained a mineral spirit/pentachlorophenol solution, one tank

neral spirits and the remaining two tanks contained water. for the four tank materials are presented on Table 1.1.

In July 1989, Sun Bank completed the installation of a am Storage Area (TDSA). The TDSA was designed to meet the out in 40 CFR part 265 for the storage of drummed material. ared a document entitled, "Procedures to Prevent Hazards Plan ncy Plan - Temporary Drum Storage Facility - Sun Bank, Fort rida." (CRA, July 1989) Copies of the plan were submitted by e local police and fire departments, the BCEQCB, the Florida r Environmental Regulation (FDER) and Sun Bank Inspectors / Coordinators.

On August 25, 1989, Sun Bank submitted a document Plan, Containerized Aqueous Material Processing and Sludge ank, Site, Fort Lauderdale Florida" (CRA, August 1989) to the ddressed the processing and disposition of the drummed d in the TDSA.

Sun Bank continued to discuss with the FDER the the contents of the drums. These discussions carried on to 9 whereupon Sun Bank agreed, in the absence of a finalized r, to proceed on January 2, 1990 with the scope of work described an and as modified by discussions with the FDER. Sun Bank h Conestoga-Rovers & Associates (CRA) (the engineer) and te Management, Inc, ENRAC Division (ENRAC) to complete activities.

TABLE 1.1

TANK CONTENTS - ANALYTICAL DATA
SUN BANK SITE

Parameter	*Tank 1*	*Tank 2*	*Tank 3*	*Tank 4*
H.C., IR	65.3%	118 mg/l	>94.8%	7,230 mg/l
% Water	1.4	89.7	2.4	64.3
barium	1.51 mg/kg	1.9 mg/kg	1.70 mg/kg	0.817 mg/kg
chromium	0.704 mg/kg	0.43 mg/kg	0.88 mg/kg	0.372 mg/kg
naphthalene	4,000 mg/kg	<300 mg/kg	5,000 mg/kg	3,000 mg/kg
pentachlorophenol	14,000 mg/kg	<1600 mg/kg	2,000 mg/kg	<1,600 mg/kg
styrene	21,250 mg/kg	<300 mg/kg	2,250 mg/kg	<1,250 mg/kg
total xylene	1,600 mg/kg	<330 mg/kg	2,250 mg/kg	11,620 mg/kg
1,2-dibromo-3-chloropropane	21,250 mg/kg	<330 mg/kg	2,250 mg/kg	<1250 mg/kg
1,3-dichloropropene	21,250 mg/kg	<330 mg/kg	2,250 mg/kg	<1,250 mg/kg
2-methyl naphthalene	2,000 mg/kg	<330 mg/kg	4,000 mg/kg	400 mg/kg

Source: Enviropact, Inc. "Emergency Response and Initial Remedial Action at Sun Bank Lot, 300 West Broward Boulevard, Ft. Lauderdale, Florida", April 14, 1989.

been prepared to describe the activities
pe of work contained in the Work Plan as
DER pursuant to the Consent Order which
February 2, 1990. This report is
he Order.

cribed in the Work Plan was
part of the negotiation of the
e Order was as follows:

parating the mineral spirits

ated carbon adsorption
r testing prior to discharge to

ater volume was to be
n four washes;

rated mineral spirits as F027 wastes at a properly
mineral spirits could be legitimately sold for
rovided in 40 CFR 261.2(e); and

rom the Site and dispose of them

ociated with the implementation of the
f this report.

related to the con
amended by discu
was signed by the
submitted to satisfy

1.1 SCOPE OF WO

Th
modified by discussion
Consent Order. The scc

- reduce the volume of
  from the water;

- process the drummed w
  system and store the tre
  the sanitary sewer;

- wash the drummed sludg
  three times the volume of

- dispose of the sludges off Si

2.0 REMEDIAL CONSTRUCTION ACTIVITIES

The Work Plan described a scope of work that is summarized by the following process steps: Characterization of the drum contents; Processing of the drum contents; Sampling and Analyses; Disposition of Processed Materials; Disposal and Site Securement.

Site activities related to this scope of work were recorded in a photographic log (Appendix A) and are discussed below.

2.1 DRUM CHARACTERIZATION

Following mobilization to the Site and prior to the initiation of other processing activities, the drummed inventory was characterized. This characterization was comprised of three steps: assigning a new unique marking to each drum; inserting a sampling thief in each drum, and recording the level each phase on a unique drum log sheet. A summary of the drum log sheets is presented in Appendix B.

Following characterization, CRA estimated the inventory of drummed material from the completed drum log sheets. The estimate is provided on Table 2.1.

The original number of drums of Site-related material stored at the Site was 189. Due to the overpacking of some drums, consolidation of wastes and bulk disposal of contaminated clothing, the total

TABLE 2.1

DRUMMED MATERIAL INVENTORY ESTIMATE
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

Matrix	*Estiamted Quantity (Gallons)*
Mineral Spirits	2,600
Water	2,900
Sludge-Water	1,950
Sludge	500
Total	7,950

number of drums removed from the Site was not equal to this original inventory.

2.2 Drum Processing

The drummed material was segregated and processed to permit the isolation of the mineral spirits from the water, the processing of the water through an activated carbon adsorption system and the washing of the sludges with potable water. The processing equipment and the processing steps utilized are discussed in the following sections.

2.2.1 Decanting of Mineral Spirits

The decanting of mineral spirits was accomplished using the data from the drum characterization (Section 2.1) and the following pumping equipment: Wilden Model M1 air operated pump; flexible hosing; an Ingersoll Rand Model 130 diesel compressor and a DOT approved tanker truck.

Each drum containing mineral spirits was so marked and opened. The flexible hosing was lowered under the surface of the mineral spirits and the pump was started. Immediately prior to reaching the interface (if any) between the next phase in the drum, the pumping was stopped.

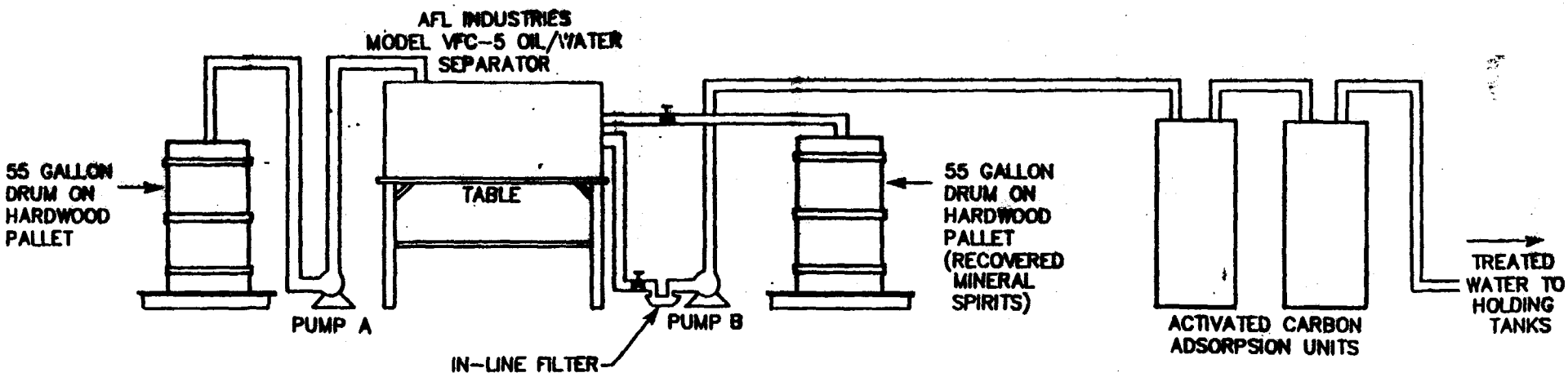
Mineral spirits were segregated in the multiple compartment tanker truck. The segregation was based on the original drum markings. These markings indicated which unearthed storage tank was the source of the contents of each drum.

The mineral spirits were to be sold in bulk to a wood treater as a commercial product prior to February 2, 1990. The mineral spirits were re-drummed and manifested off Site as F027 waste because this sale was unable to be consummated prior to February 2, 1990 and the draft Consent Order required that the mineral spirits be shipped off Site by this date. This waste classification is temporary and will be invalid following the sale of the product, as provided for in the Consent Order.

The mineral spirits were re-drummed on February 2, 1990 and shipped off Site to the Technical Environmental Services Facility in LaPorte, Texas. The bill of lading for this shipment is included in Appendix C. Sixty-two drums of mineral spirits were shipped off Site.

2.2.2 Water Processing

Following the decanting of mineral spirits, the aqueous phase was pumped out of each drum, passed through an oil/water separator and pumped through four 55-gallon carbon adsorption units split into two drum pairs connected in series, then piped to one of two treated water holding tanker trucks. The process equipment layout is indicated on Figure 2.1.



NOTE: 1) PUMP A – WILDEN MODEL M-1, CAPACITY 8gpm

2) PUMP B – WILDEN MODEL M-2, CAPACITY 15gpm

3) TREATED WATER HOLDING TANKS-2-5500 GALLON DOT APPROVED TANK WAGONS

4) WATER FLOW FROM OIL/WATER SEPARATOR IS SPLIT BETWEEN 4 ACTIVATED CARBON UNITS CONNECTED IN A SERIES OF 2 PAIRS

figure 2.1

PROCESS FLOW DIAGRAM

Sun Bank, Ft. Lauderdale, Florida

CRA

The process equipment utilized in this step was:

- Pump A - Wilden Model M1;
- Pump B - Wilden Model M2;
- Oil/Water Separator - AFL Industries Model VTC-5;
- Carbon Adsorption System - 4 x 55-gallon drums distributed by Continental Environmental Services; and
- Distribution Header - 280 psi schedule 40 2 inch piping.

Table 2.1 shows that approximately 1,950 gallons of sludgy water were encountered during the drum characterization phase. Prior to introducing this water into the treatment system, two process equipment changes were made: an in-line filter was installed after the oil/water separator (Keen Plus Filter, 5μm particulate wound fiber elements) and a 150 gallon tub (Rubbermaid) covered with several layers of fabric was used to provide a screen for particulates. The drums of sludgy water were first pumped into the 150 gallon tub through the fabric screen and then processed through the treatment system.

2.2.3 Sludge Processing

The Work Plan provided for the consolidation of Site sludges prior to their transportation off-Site for disposal. Discussions leading to the finalization of the Consent Order, however, produced a sludge washing process step. This washing was comprised of washing the sludge with three

times its volume of potable water divided between four washes. The wash water was then processed through the water treatment system.

The original process planned for the washing of sludge in a 150 gallon tub (Section 2.2.2). The sludge was to be spread over a rack with filter cloth stretched over it, then sprayed with water. Due to the fine grained nature of the sludge, however, this approach proved to be ineffective since the sludge would either pass through the cloth or obstruct the pores in the fabric.

The sludge washing procedure developed during the construction activities was comprised of:

- adding the required wash water to each drum;
- manually agitating the drum contents;
- settling; and
- manually decanting off the wash water into a water drum.

This procedure produced three layers of washed material. These layers were a floating mineral spirits layer, an aqueous layer and a sludge layer. The wash water and mineral spirits were processed through the water treatment system. The sludge was consolidated into a composite sludge drum, then the washing process was repeated until the four washings were complete.

Sixteen drums of sludge (1 part drums included) were consolidated for disposal.

2.3 SAMPLING AND ANALYSIS

Samples were collected from each of the Site matrices for analytical testing prior to sale or disposal. Table 2.2 presents a summary of the samples collected over the scope of the project and the analytical parameters assessed. Sampling and analysis activities are discussed the following sections.

Analytical data was reviewed by CRA's Quality Assurance/Quality Control (QA/QC) staff for their validity. The data validation report is contained in Appendix D.

2.3.1 Mineral Spirits Sampling

Fourteen samples of mineral spirits were collected using drum sampling thieves for drum samples or one quart stainless steel bailers for bulk samples. The sampling equipment was cleaned between each sample collection with virgin mineral spirits. One mineral spirit rinse blank was collected to determine the effectiveness of the sample equipment cleaning.

Five samples of mineral spirits were analyzed for pentachlorophenol. The results of the analyses are reported on Table 2.3.

TABLE 2.2

SAMPLING AND ANALYSIS INDEX
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

CRA Sample Number	*Date Sampled*	*Matrix*	*Sample Location*	*Parameters Analyzed*
MS-011090-SQ-01	1/10/90	MINERAL SPIRITS	TANKER	PCP
MS-011090-SQ-02	1/10/90	MINERAL SPIRITS	TDSA COMPOSITE	PCP
MS-011090-SQ-03	1/10/90	MINERAL SPIRITS	02 DUPLICATE	PCP
MS-011090-SQ-04	1/10/90	MINERAL SPIRITS	RINSE BLANK	PCP
MS-011090-SQ-05	1/10/90	MINERAL SPIRITS	TANKER	J.H. BAXTER APPROVAL
MS-011090-SQ-06	1/10/90	MINERAL SPIRITS	TDSA COMPOSITE	J.H. BAXTER APPROVAL
MS-011090-SQ-07	1/10/90	MINERAL SPIRITS	DRUM COMPOSITE	J.H. BAXTER APPROVAL
MS-011090-SQ-08	1/10/90	MINERAL SPIRITS	DRUM COMPOSITE	PCP
SL-011690-SQ-12	1/16/90	SLUDGE	RINSE BLANK	CCWE EXTRACT FOR LEAD
SL-011690-SQ-13	1/16/90	SLUDGE	DRUM COMPOSITE	CCWE EXTRACT FOR LEAD
SL-011690-SQ-14	1/16/90	SLUDGE	DRUM COMPOSITE	DISPOSAL APPROVAL
SL-011690-SQ-15	1/16/90	CLOTHING	DRUM COMPOSITE	CLOTHING SAMPLE FOR CWM APPROVAL
W-011690-SQ-16-1	1/16/90	WATER	RINSATE	TSS
W-011690-SQ-16-2	1/16/90	WATER	RINSATE	PCP, OIL & GREASE
W-011690-SQ-17-1	1/16/90	WATER	TANK 801	TSS
W-011690-SQ-17-2	1/16/90	WATER	TANK 801	PCP, OIL & GREASE
W-011690-SQ-18-1	1/16/90	WATER	TANK 532	TSS
W-011690-SQ-18-2	1/16/90	WATER	TANK 532	PCP, OIL & GREASE
W-011690-SQ-19-1	1/16/90	WATER	DUP OF 18	TSS
W-011690-SQ-19-2	1/16/90	WATER	DUP OF 18	PCP, OIL & GREASE
W-011690-SQ-20-1	1/16/90	MINERAL SPIRITS	COMPARTMENT 4 (TANK 3)	HOLD - PCP
W-011690-SQ-20-2	1/16/90	MINERAL SPIRITS	COMPARTMENT 4 (TANK 3)	J.H. BAXTER APPROVAL
W-011690-SQ-21-1	1/16/90	MINERAL SPIRITS	COMPARTMENT 3 (DECON)	HOLD - PCP

TABLE 2.2

SAMPLING AND ANALYSIS INDEX
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

CRA Sample Number	*Date Sampled*	*Matrix*	*Sample Location*	*Parameters Analyzed*
W-011690-SQ-21-2	1/16/90	MINERAL SPIRITS	COMPARTMENT 3 (DECON)	J.H. BAXTER APPROVAL
W-011690-SQ-22-1	1/16/90	MINERAL SPIRITS	COMPARTMENT 2 (TANK 1)	HOLD - PCP
W-011690-SQ-22-2	1/16/90	MINERAL SPIRITS	COMPARTMENT 2 (TANK 1)	J.H. BAXTER APPROVAL
BS-3050-WE-01A	2/2/90	WATER	TANK 801	PHENOLS
BS-3050-WE-01B	2/2/90	WATER	TANK 801	TOXICITY - DAPHNEA
BS-3050-WE-02A	2/2/90	WATER	TANK 532	PHENOLS
BS-3050-WE-02B	2/2/90	WATER	TANK 532	TOXICITY - DAPHNEA
BS-3050-WE-03A	2/2/90	WATER	DUP OF 02	PCP
BS-3050-WE-03B	2/2/90	WATER	DUP OF 02	TOXICITY - DAPHNEA
BS-3050-WE-04A	2/2/90	WATER	RINSE BLANK	PCP
BS-3050-WE-04B	2/2/90	WATER	RINSE BLANK	TOXICITY - DAPHNEA
BS-3050-WE-05A	2/2/90	WATER	SEWAGE TREATMENT PLANT	PCP
BS-3050-WE-05B	2/2/90	WATER	SEWAGE TREATMENT PLANT	TOXICITY - DAPHNEA

NOTES:

PCP - pentachlorophenol
TSS - total suspended solids
Toxicity Daphnea - 96 hour LC50 toxicity test
Hold - sample on hold - not analyzed.

Analytical Methods:
pentachlorophenol: USEPA SW-846 Method 8270
oil and grease: USEPA Methods of Chemical Analyses of Water and Wastes, Method 160.2
total suspended solids: USEPA Methods of Chemical Analysis of Water and Wastes, Method 413.2.
phenols: USEPA SW-846 Method 9065
toxicity: Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms (EPA-600/4-85/013)

TABLE 2.3

MINERAL SPIRITS ANALYSES
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

CRA Sample Number	*Sample Location*	*Pentachlorophenol (mg/L)*
MS-011090-SQ-01	Tanker	28,000
MS-011090-SQ-02	TDSA Composite	20,000
MS-011090-SQ-03	02 Duplicate	20,000
MS-011090-SQ-04	Rinse Blank	420
MS-011090-SQ-08	Drum Composite(A)	ND(100)

Notes:

(A) Drum composite derived from drums stored in TDSA labeled "decontamination fluid" or similar.

ND - Not Detected. The detection limit is provided in brackets.

BS-3050-WE-01A	Storage Tank 801			[illegible]	
BS-3050-WE-01B	Storage Tank 801 (a)				0%
BS-3050-WE-02A	Storage Tank 532			0.010	
BS-3050-WE-02B	Storage Tank 532 (a)				0%
BS-3050-WE-03A	Duplicate of WE-02A			0.013	
BS-3050-WE-03B	Duplicate of WE-02B(a)				0%
BS-3050-WE-04A	Rinse Blank			ND(0.005)	
BS-3050-WE-04B	Rinse Blank (a)				0%
BS-3050-WE-05A	Sewage Treatment Plant Influent			0.037	
BS-3050-WE-05B	Sewage Treatment Plant Influent (b)				35%
Discharge Permit Limits		400	100	0.050	(c)

Notes:

a) Diluted 1:1000 as per discharge permit.
b) Undiluted.
c) Wastewater diluted 1000 times must be no more than sewage treatment plant influent by 96 hour LC50.

CRA Sample Number	MS-011090-SQ-01	MS-011090-SQ-02	MS-011090-SQ-03	MS-011090-SQ-04	MS-011090-SQ-08
SUN BANK S[illegible]					

Notes:

(A) Drum composite derive
"decontamination fluid

ND - Not Detected. The dete

The results of the sludge analyses are listed on Table 2.5.

Disposition of Processed Materials

Following the processing steps, three products were olated for disposition: separated mineral spirits; treated water and washed ludge. The spent activated carbon units were also isolated for removal f-Site. Disposition of each of these products is discussed in the following ections.

2.4.1 Mineral Spirits Disposition

Mineral spirits were decanted and stored in an on-Site nk wagon. Samples were submitted to a potential client for purchase aluation, but a contract could not be arranged prior to the February 2, 1990 eadline for removing the mineral spirits from the Site. This deadline was ovided for in the draft Consent Order.

Accordingly, the mineral spirits were re-drummed and nsported off Site as F027 waste to the TES facility in LaPorte, Texas on ebruary 2, 1990. This F027 classification is temporary, as provided in the nsent Order, and will be inapplicable following the finalization of an greement to purchase the mineral spirits.

TABLE 2.5

SLUDGE ANALYSES
N BANK SITE - FORT LAUDERDALE, FLORIDA

ber	*Sample Location*	*Lead (A) (mg/L)*
	Rinse Blank	0.013
	Drum Composite	0.033

analyses according to 40 CFR 268.41, Appendix I.

al Regulations (40 CFR 268.4) provide for a limit of 0.51 mg/L lead
tes.

TABLE 2.5

SLUDGE ANALYSES
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

CRA Sample Number	*Sample Location*	*Lead (A) (mg/L)*
SL-011690-SQ-12	Rinse Blank	0.013
SL-011690-SQ-13	Drum Composite	0.033

Notes:

(A) Lead extract analyses according to 40 CFR 268.41, Appendix I.

- Land Disposal Regulations (40 CFR 268.4) provide for a limit of 0.51 mg/L lead for K001 wastes.

The manifest for this shipment is contained in Appendix C.

2.4.2 Treated Water Disposition

The treated water was pumped to two on-Site tank wagons for interim storage. Following the issuance of a sewer discharge permit by the City of Ft. Lauderdale (Appendix E), and the reporting of analytical results by Sun Bank, the wastewater was approved for discharge.

On February 27, 1990, the wastewater was discharged to the sanitary sewer 350 feet south of West Broward Boulevard on SW 4th Avenue. The discharge was completed under the supervision of a City employee (Mr. J. Derosa) at a controlled flowrate. Table 2.6 provides a chronology of the discharge.

Following the discharge of the treated water, the tankers were rinsed with potable water and drained to the sanitary sewer.

2.4.3 Sludge Disposal

CRA sampled the washed sludge and submitted the samples for disposal approval at incineration contractors. Due to the waste classification (K001) and the physical characteristics of the sludge (a

TABLE 2.6

WASTEWATER DISCHARGE CHRONOLOGY
FEBRUARY 27, 1990
SUN BANK SITE - FORT LAUDERDALE, FLORIDA

Tanker	*Quantity in Tank (gallons)*	*Time*	*Estimated Flow Rate (gpm)*
532	4500	09:40	Start
		12:00	32
			Completed at 12:00
801	2900	12:15	Start
		13:50	31
			Completed at 13:50

solid/liquid mixture), the first two disposal contractors were unable to accept the waste.

A third disposal contractor, Chemical Waste Management, Inc. assessed the sludge for acceptance at one of its disposal facilities and granted disposal approval of the sludge on March 7, 1990. The sludge was removed from the Site on March 14, 1990 as K001 waste. The manifest for this shipment is contained in Appendix C.

This removal date represents Sun Bank's continuing best efforts to dispose of the sludges in a legitimate fashion in accordance with the Consent Order.

2.4.4 Spent Carbon Units Disposition

During the discussions leading to the development of the Consent Order, the FDER indicated that it considered the spent carbon units to be F027 wastes. As a result of this determination, the spent carbon units were scheduled to be transported to the TES facility in LaPorte, Texas for indefinite storage as F027 waste.

The carbon units were transported off Site with the temporarily classified F027 mineral spirits by Environmental Transportation Services, Inc. on February 2, 1990. The manifest for this shipment is contained in Appendix C.

2.5 OTHER SITE ACTIVITIES

The remainder of Site activities was associated with the cleaning of Site materials and demolition of the TDSA in preparation for disposal. These items are discussed in the following sections.

2.5.1 Triple Rinsing of Empty Drums

Empty drums were staged inside the TDSA in preparation for triple rinsing prior to their removal from the TDSA.

A section of High Density Polyethylene (HDPE) liner approximately 8 feet square was cut, placed on top of the existing HDPE liner in the TDSA and then bermed on all sides. Two hardwood pallets were placed inside this lined drum draining station to allow residual mineral spirits to drain from inverted drums.

All drums to be disposed of were rinsed and drained in the following manner:

- each empty drum and drum lid was inverted over a drum that was used to retain mineral spirit rinsate;
- the drums were triple rinsed with virgin mineral spirits using a hand held pesticide sprayer;

- the drums were inverted and let drain in the drum draining station; and

- drained drums were placed outside of the TDSA on a visqueen sheet in preparation for disposal.

The drum draining station and associated pallets were disposed of in a secure landfill as described in Section 2.6.4.

2.5.2 Demolition of TDSA

The TDSA structure was demolished once all drums had been processed, rinsed and drained. The liner and the plywood that was placed on top of the liner were disposed of in a secure landfill as described in Section 2.6.4. The balance of the TDSA was disposed of as construction debris as described in Section 2.6.1.

2.5.3 Decontamination of Process Equipment

All Site equipment that had been in contact with process fluids were first rinsed with potable water then triple rinsed with mineral spirits.

The rinse water was processed through the water treatment system and the mineral spirits were pumped to the mineral spirits holding tank.

2.6 TRANSPORTATION AND DISPOSAL

Construction debris, empty triple rinsed drums, previously decontaminated tanks, the TDSA liner and contaminated clothing were shipped off Site for disposal. These shipments are outlined in the following sections.

2.6.1 Construction Debris Disposal

Construction debris disposed of from the Site included: lumber, visqueen sheeting, uncontaminated pieces of 30 mil HDPE liner (brought on Site for use in secondary containment) and general refuse.

Southern Sanitation Southeast of Ft. Lauderdale was sub-contracted to remove and dispose of this debris. The approval documents for the four shipments of 20 cubic yards each are contained in Appendix C.

2.6.2 Triple Rinsed Drum Disposal

Triple rinsed empty drums and drum lids were temporarily stored outside of the TDSA on visqueen sheeting. Following completion of drum processing, each drum was deheaded by cutting the bottom off with an oxygen-acetylene torch. The deheaded drums were crushed flat with the shovel from a backhoe, then loaded into a 20 cubic yard roll off box.

Southern Sanitation Southeast was sub-contracted for the disposal of the crushed drums and drum lids. The manifest for this shipment is contained in Appendix C.

2.6.3 Decontaminated Tank Disposal

The four previously decontaminated tanks were cut up with an oxygen-acetylene torch and loaded into a 20 cubic yard roll-off box for disposal off-Site.

Southern Sanitation Southeast was sub-contracted to dispose of the segmented tanks. The manifest for this shipment to the disposal facility is contained in Appendix C.

2.6.4 TDSA Liner and Contaminated Clothing Disposal

The liner from the TDSA, potentially contaminated clothing and rinsed process piping were segregated in a 20 cubic yard secure roll off box. The box was equipped with liquid tight seals on both ends and was lined with polyethylene.

C.W. Penn, Inc. was subcontracted to provide the roll off box and transportation to Chemical Waste Management's (CWM) secure landfill in Carlyss, Louisiana. This waste was classified as K001 waste due to its potential contact with the K001 sludges. This classification was consistent with the RCRA "mixture" rule (40 CFR 261.3).

Following receipt and analysis of a representative sample of the waste, CWM approved the waste for disposal. The roll off box was removed from the Site on March 16, 1990. The manifest for this shipment is provided in Appendix C.

3.0 HEALTH AND SAFETY

3.1 GENERAL

In accordance with the Work Plans submitted to the FDER, a health and safety plan specific to the needs of the removal program was developed by CWM and CRA field personnel, and was maintained for the duration of work involving potential contact with hazardous substances at the Site. The health and safety plan provided specific information regarding air monitoring, use of personnel protective clothing and equipment, work area designations, hospital routes, and emergency phone numbers. A copy of the health and safety plan was kept on-Site and was available to all Site personnel and visitors. All off-Site emergency response organizations maintained a copy of the previously submitted "Procedures to Prevent Hazards Plan" (CRA, July, 1989). A copy of the health and safety plan is contained in Appendix F. A brief description of some key points in the plan is provided in the following subsections.

3.2 HEALTH AND SAFETY OFFICER

CWM maintained a Health and Safety Officer at the Site for the duration of the project. The Health and Safety Officer was responsible for the implementation, enforcement, and monitoring of the health and safety plan. The Health and Safety Officer supervised all air monitoring on and around the Site and was responsible to ensure that all on-Site personnel were properly examined and trained for work in hazardous environments

prior to entry on Site. The Health and Safety Officer also was responsible to ensure that all personnel were trained in the proper use of and donning of protective clothing and equipment as instructed in the health and safety plan.

3.3 AIR MONITORING

During Site activities involving potential contact with hazardous substances and air quality within all active work areas was monitored by the Health and Safety Officer or his designated technician. Total organic vapors, explosive gases, hydrogen sulfide and oxygen concentrations were monitored. A complete description of the actual air monitoring performed on-Site is presented in the Health and Safety Plan in Appendix F.

From the data generated through air monitoring, total organic vapor concentrations remained within safe levels for the respiratory protection used by all on-Site personnel. All other air quality parameters monitored were within safe working levels.

3.4 CONTINGENCY PLANS

The off-Site contingency plan was developed prior to the initiation of any processing activities. The contingency plan is contained in the document "Procedures to Prevent Hazards Plan" (CRA, July, 1989).

The on-Site contingency plan is contained in the Health and Safety Plan which is presented in Appendix F.

4.0 SITE SECUREMENT

A daily sign-in log was kept by the engineer for the duration of pressing activities. In addition, Sun Bank's security staff maintain an ongoing sign-in log for the Site.

Following each day's processing or construction activities, the Site gates were locked and the parking lot was secured. Night lighting and an emergency telephone were provided by Sun Bank, consistent with the measures described in the "Procedures to Prevent Hazards Plan" (CRA, July, 1989).

5.0 CONCLUSION

Site activities related to the unearthed underground storage tanks were completed on March 16, 1990 when the rolloff box containing the potentially contaminated clothing was removed from the Site. The remainder of the scope of work identified in Section 1.1 was completed as follows:

- reduce the volume of mineral spirits by separating the mineral spirits from the water
  - Completed January 14, 1990;

- process the drummed water through an activated carbon adsorption system and store the treated water on Site for testing prior to discharge to the sanitary sewer
  - Processing completed January 15, 1990,
  - Discharge to sanitary sewer completed February 27, 1990;

- wash the drummed sludges with water. The water volume was to be three times the volume of sludge divided between four washes
  - Washing completed January 15, 1990;

- dispose of the sludges off Site as K001 wastes
  - Sludges removed off Site by CWM on March 14, 1990;

- temporarily store the separated mineral spirits as F027 wastes at a properly permitted facility until the mineral spirits could be legitimately sold for use in another process as provided in 40 CFR 261.2(e)
    - Mineral spirits transported off-Site as F027 waste on February 2, 1990 to permitted facility; and

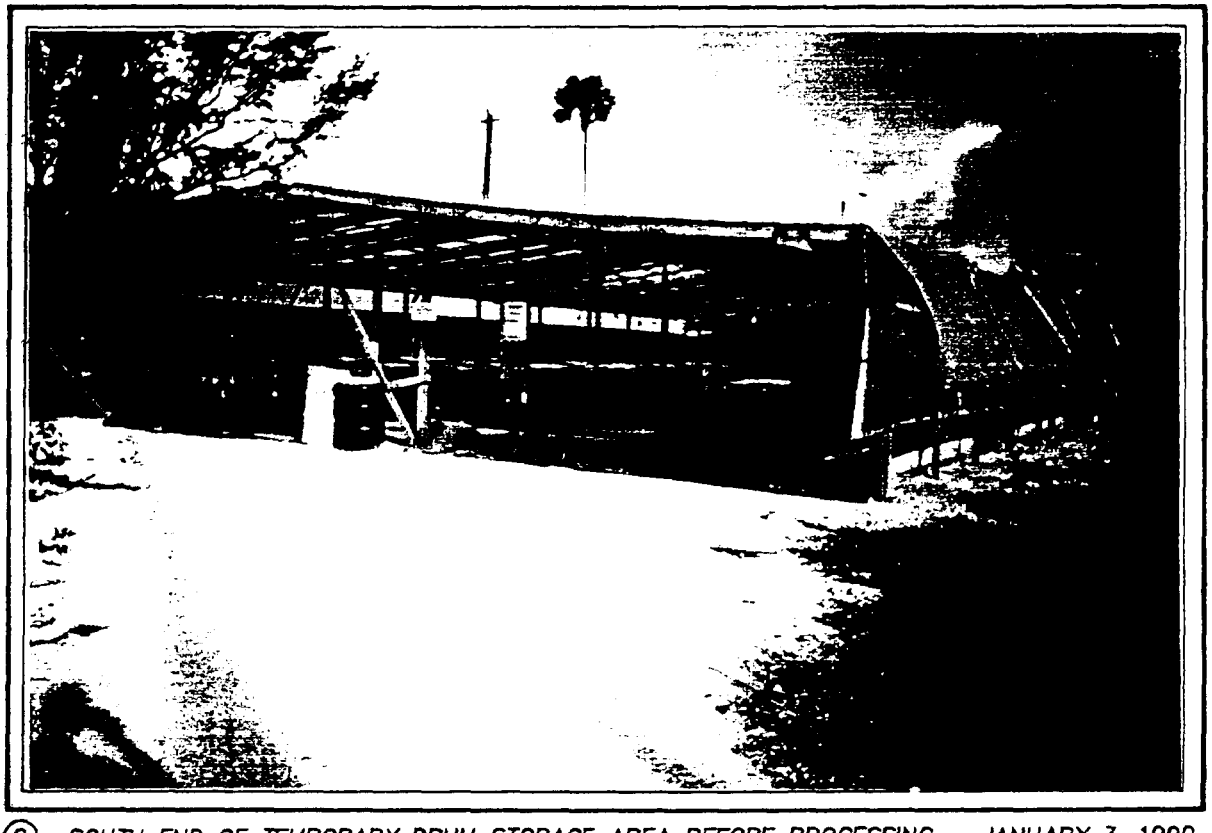
- remove all other materials from the Site and dispose of them appropriately
    - Construction debris disposed at Southern Sanitation Southeast's Facility
    - Potentially contaminated clothing and TDSA liner transported off Site to CWM Facility on March 16, 1990.

The Site surface remains cleared of debris and could be returned to other service at the discretion of Sun Bank with the approval of the FDER.

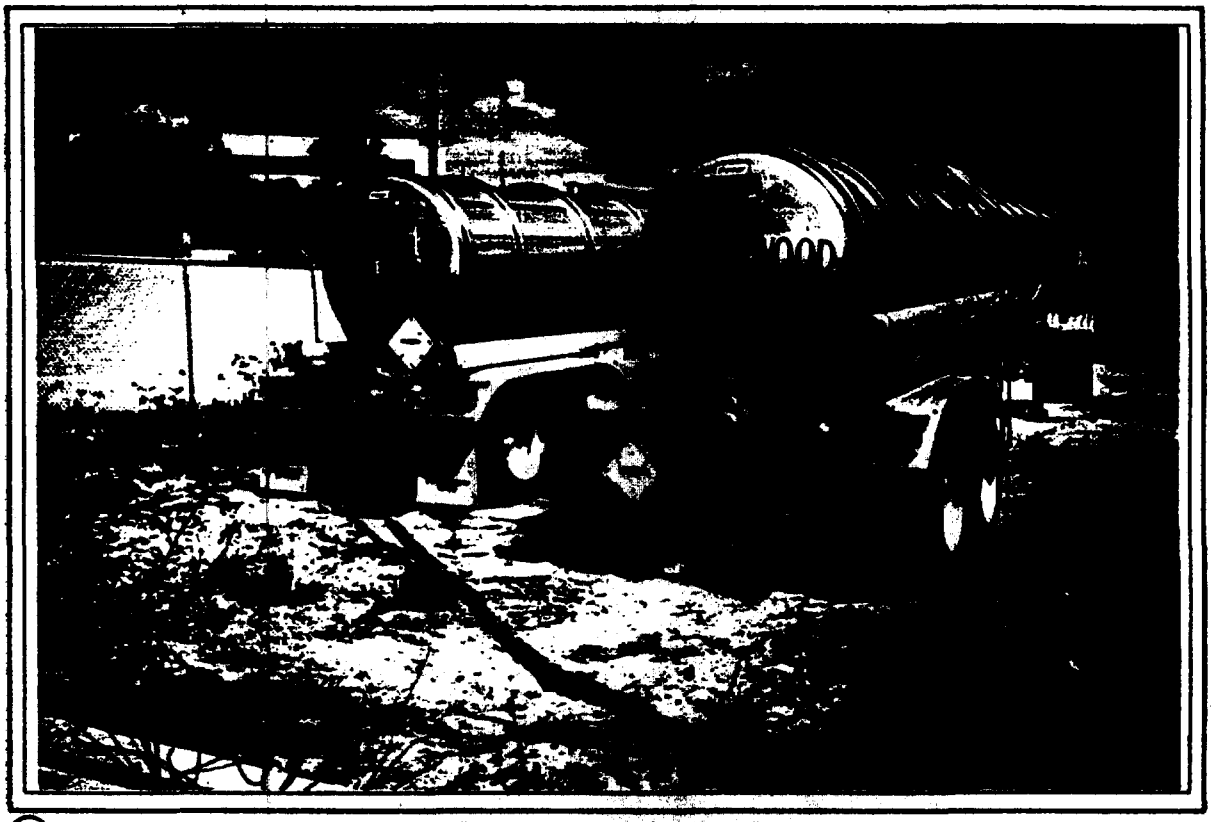
APPENDIX A

PHOTOGRAPHIC LOG

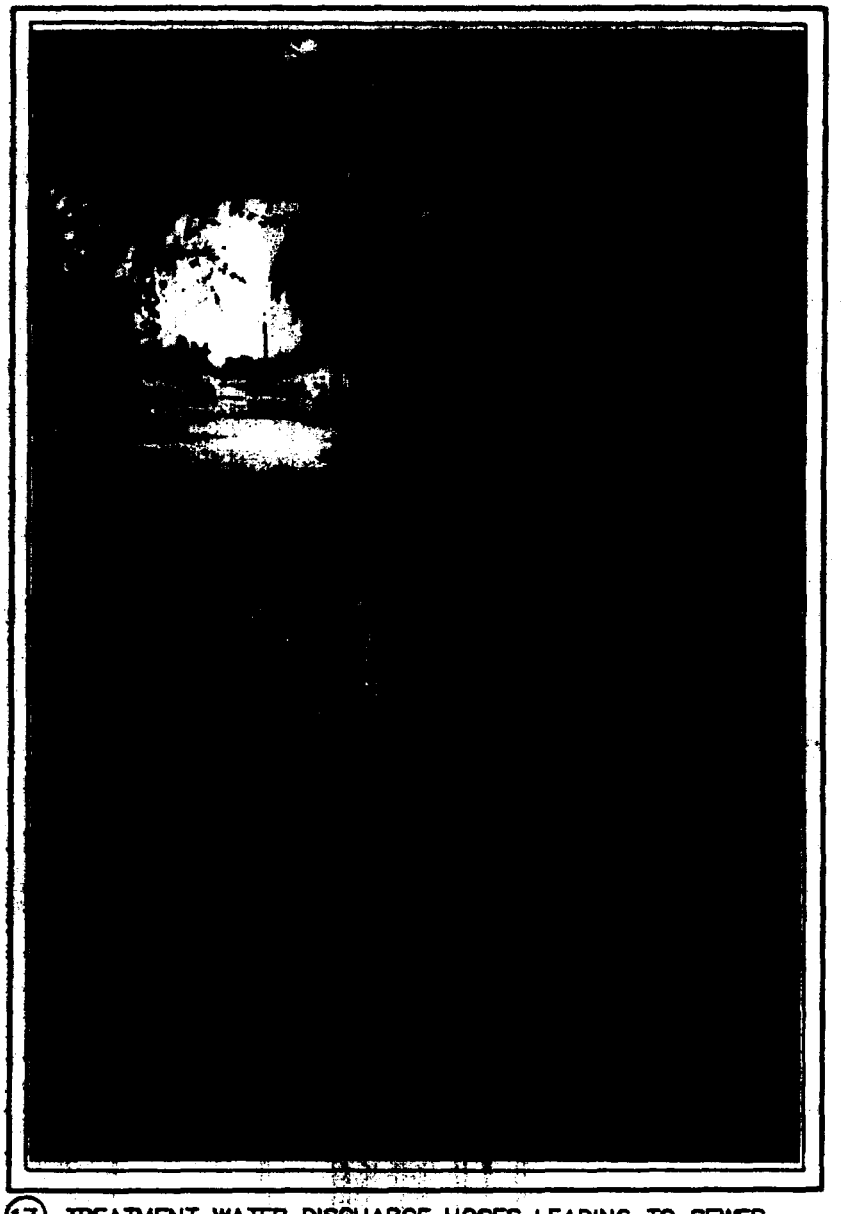
① TEMPORARY DRUM STORAGE AREA BEFORE PROCESSING – JANUARY 3, 1990



② SOUTH END OF TEMPORARY DRUM STORAGE AREA BEFORE PROCESSING – JANUARY 3, 1990



(16) DISCHARGE OF TREATED WATER FROM SITE STORAGE TANK – FEBRUARY 27, 1990



(17) TREATMENT WATER DISCHARGE HOSES LEADING TO SEWER – FEBRUARY 27, 1990

TABLE B.1

DRUM LOG SUMMARY
SUN BANK SITE - FT. LAUDERDALE, FLORIDA

00003

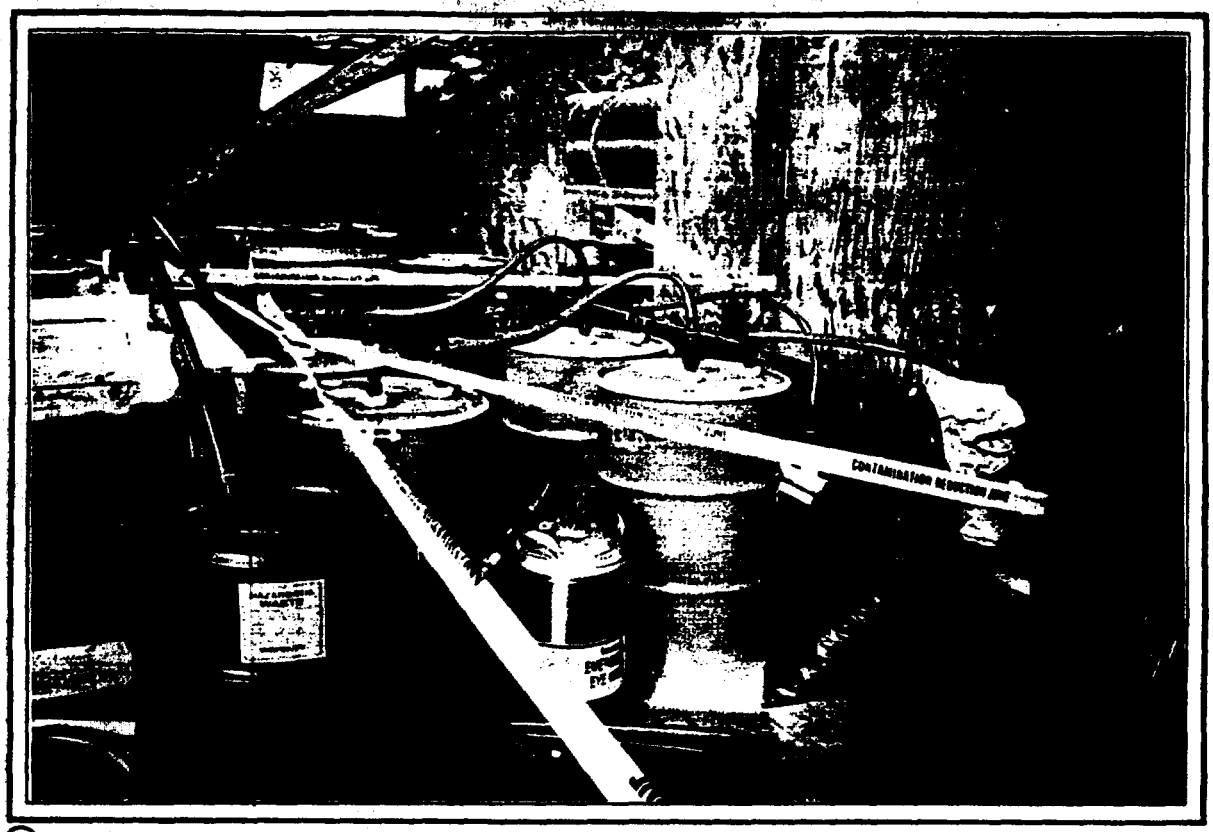
Drum #	Mineral Spirits Layer Height (Inches)	Mineral Spirits Quantity (Gallons)	Water Layer Height (Inches)	Water Quantity (Gallons)	Cloudy Water and Watery Sludge (Inches)	Cloudy Water and Watery Sludge (Gallons)	Sludge Layer Height (Inches)	Sludge Quantity (Gallons)
87A	0		20	33.3	7	11.7	0	
88A	0		21	35	12	20	0	
89A	0		23	38.3	7	11.7	0	
90A	0		18	30	12	20	0	
91A	0		21	35	6	10	0	
92A	0		25	41.7	5	8.3	0	
93A	0		24	40	0		0	
94A	0		0		0		0	
95A	0		0		0		0	
96A	0		0		0		0	
97A	0		0		0		27	45
98A	15	25	0		15	25	0	
99A	3	5	25	41.7	0		0	
100A	-		-		-		-	
101A	0		0		30	50	0	
102A	30	50	0		0		1	1.7
103A	21	35	0		0		9	15
104A	0		0		30	50	0	
105A	0		28	46.7	2	3.3	0	
106A	0		27	45	0		0	
107A	0		0		30	50	0	
108A	0		12	20	3	5	0	
109A	0		23	38.3	7	11.7	0	
110A	0		18	30	12	20	0	
111A	0		18	30	9	15	0	
112A	0		18	30	12	20	0	
113A	0		6	10	18	30	0	
114A	0		18	30	12	20	0	
115A	0		15	25	15	25	0	
116A	0		21	35	6	10	0	
117A	0		20	33.3	10	16.7	0	
118A	0		18	30	12	20	0	
119A	0		18	30	12	20	0	
120A	0		12	20	18	30	0	
121A	0		0		30	50	0	
122A	0		21	35	9	15	0	
123A	0		18	30	12	20	0	
124A	0		15	25	15	25	0	
125A	0		0		0		0	
126A	0		0		0		0	
127A	0		0		0		0	
128A	0		0		30	50	0	
129A	0		0		30	50	0	

TABLE B.1

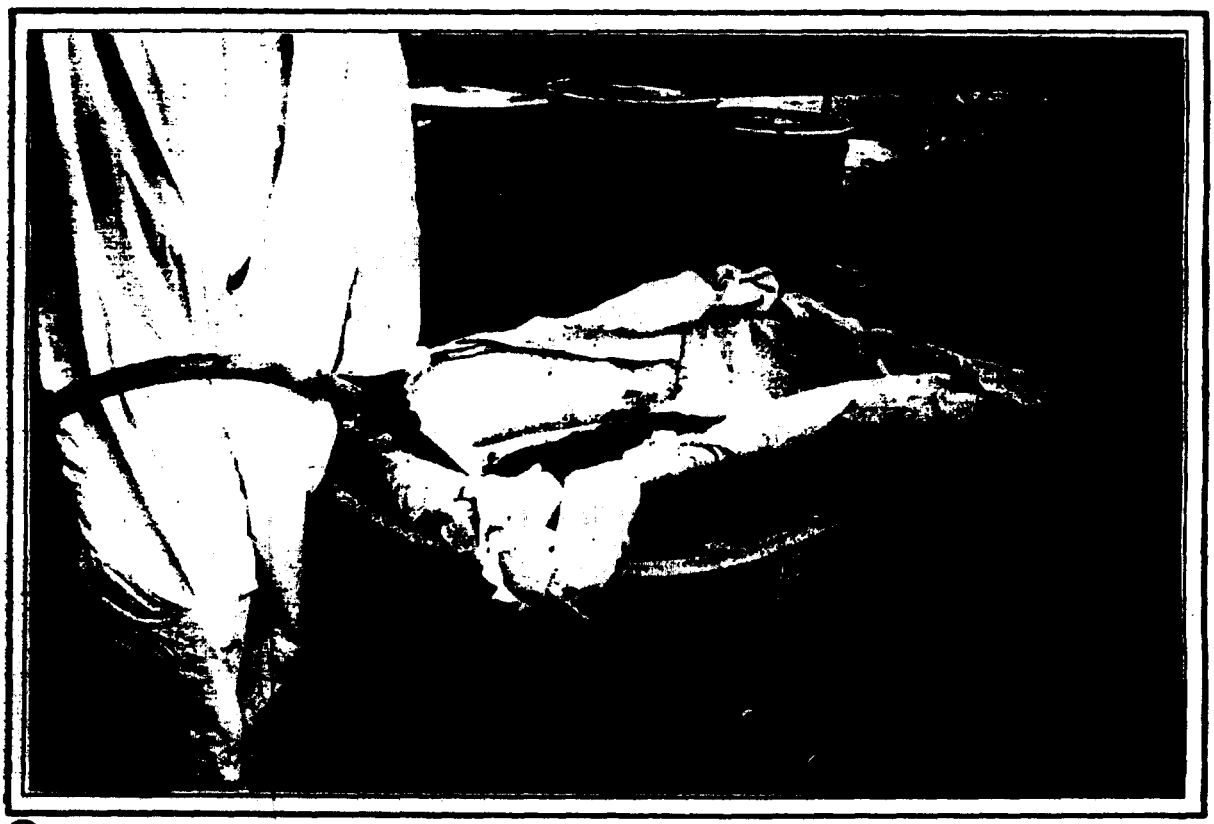
DRUM LOG SUMMARY
SUN BANK SITE - FT. LAUDERDALE, FLORIDA

	Mineral Spirits		*Water*		*Cloudy Water and Watery Sludge*		*Sludge*	
Drum #	*Layer Height (Inches)*	*Quantity (Gallons)*	*Layer Height (Inches)*	*Quantity (Gallons)*	*(Inches)*	*(Gallons)*	*Layer Height (Inches)*	*Quantity (Gallons)*
173A	0		24	40	6	10	0	
174A	0		30	50	0		0	
175A	9	15	0		0		1	1.7
176A	0		24	40	6	10	0	
177A	0		30	50	0		0	
178A	0		30	50	0		0	
179A	0		19	31.7	8	13.3	0	
180A	0		24	40	6	10	0	
190A	0		21	35	9	15	0	
191A	0		27	45	0		0	
192A	0		30	50	0		0	
193A	0		21	35	9	15	0	
194A	0		24	40	6	10	0	
195A	4	6.7	0		26	43.3	0	
196A	0		0		30	50	0	
197A	0		0		30	50	0	
198A	0		0		30	50	0	
199A	0		0		30	50	0	
200A	0		0		0		0	
201A	0		0		0		0	
202A	0		0		0		0	
203A	0		0		0		0	

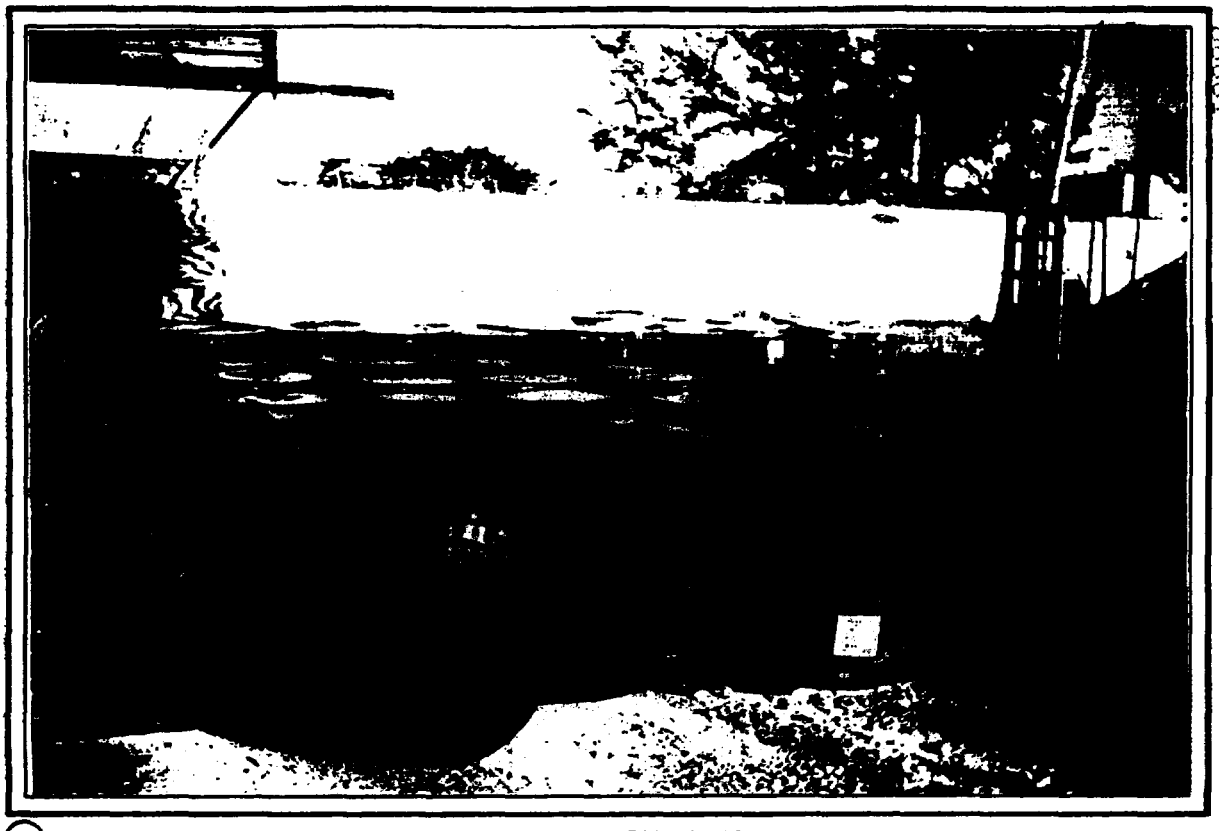
NOTE: Numbers 181A - 189A were not used.



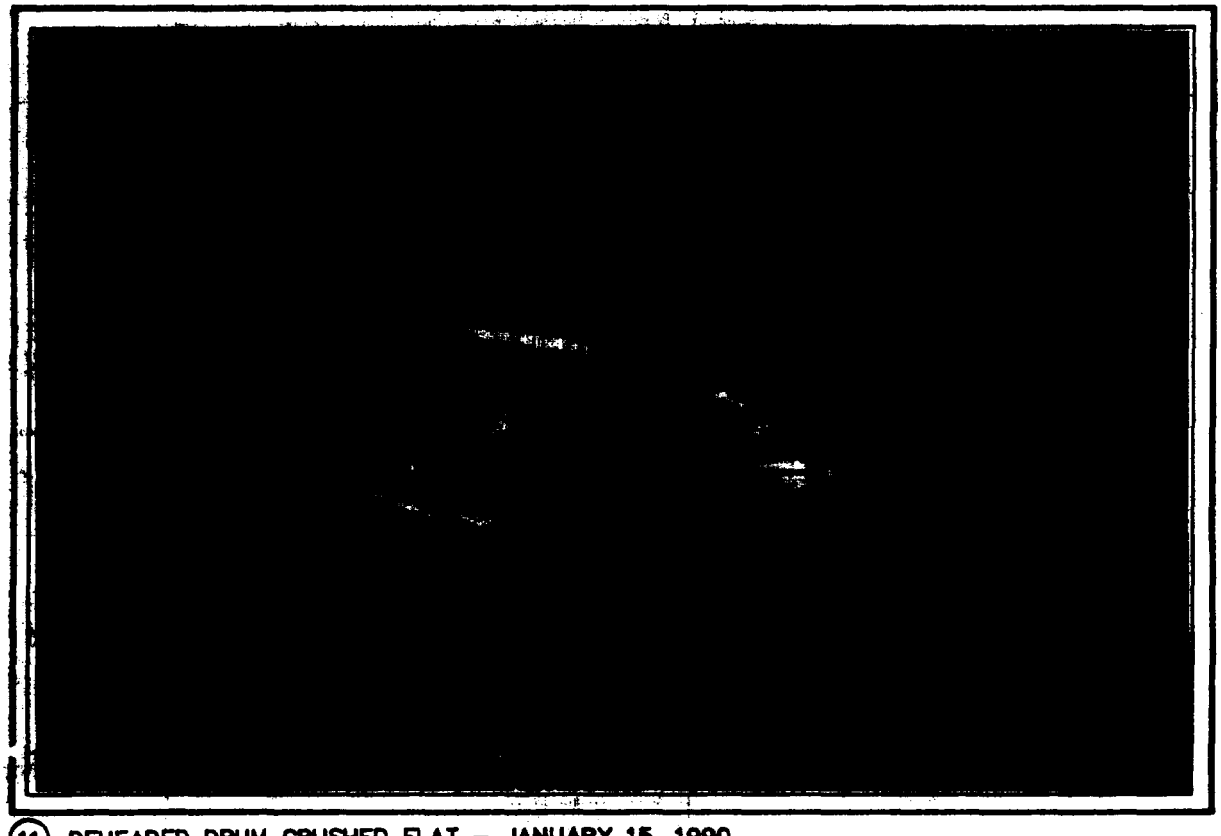
⑧ ACTIVATED CARBON ADSORPTION UNITS SET-UP – JANUARY 11, 1990



⑨ SLUDGE WATER FILTRATION STATION – JANUARY 14, 1990



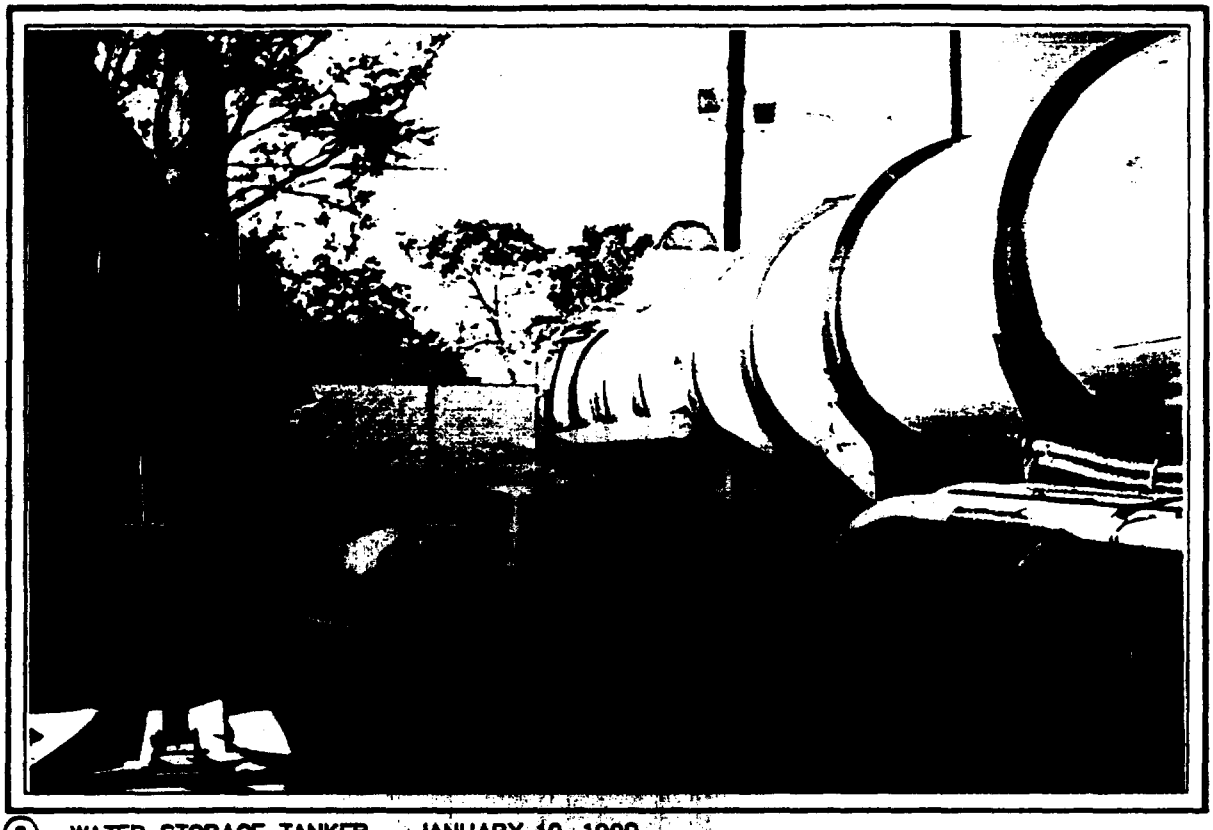
(10) TRIPLE RINSED AND DRAINED DRUMS – JANUARY 14, 1990



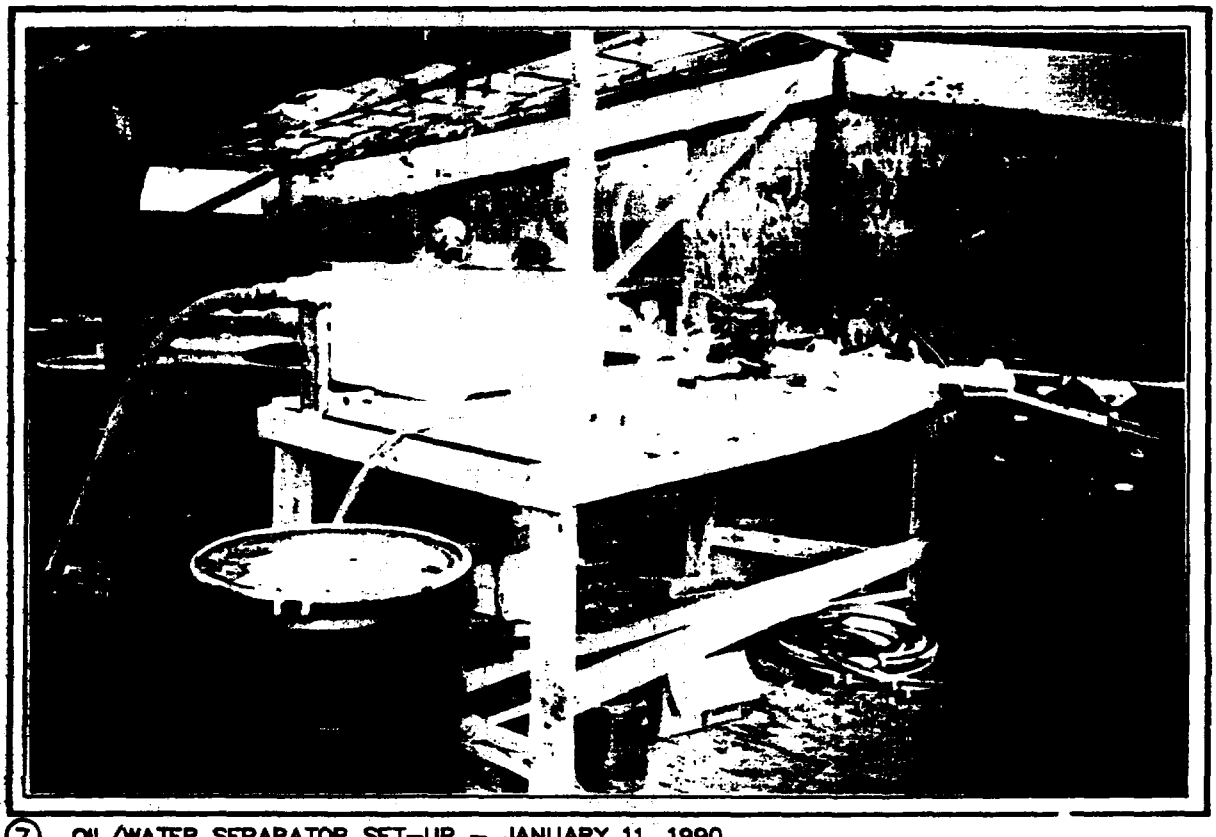
(11) DEHEADED DRUM CRUSHED FLAT – JANUARY 15, 1990

⑤ DECONTAMINATION STATION AND EMERGENCY SHOWER – JANUARY 6, 1990

00000
00001



⑥ WATER STORAGE TANKER – JANUARY 10, 1990



⑦ OIL/WATER SEPARATOR SET-UP – JANUARY 11, 1990

METROPOLITAN [illegible]DE COUNTY ENVIRONMENTAL [illegible]ESOURCES MANAGEMENT

Area where underground

Scraped soil from South

Inspector: [illegible] Section: [illegible] Date: [illegible]

Site Name: [illegible] Address: 11770 SW 214 St

METROPOLITAN [illegible]DE COUNTY ENVIRONMENTAL [illegible]SOURCES MANAGEMENT

Facing North-west [illegible]

Pile of metals & other surface debris to be segregated (minimal soil)

[illegible] - tires to be [illegible] & taken to landfill

[illegible]

Inspector: [illegible] Section: [illegible] Date: [illegible]

Site Name: [illegible] Address: [illegible]

METROPOLITAN [illegible]DE COUNTY ENVIRONMENTAL [illegible]ESOURCES MANAGEMENT

Tree where underground

Scraped soil from South

Inspector: [illegible] Section: [illegible] Date: [illegible]

Site Name: [illegible] Address: 11770 SW 214ST

Facing Northwest

Pile of metals & other surface debris to be segregated (removed from soil)

Another area - tires to be segregated & taken to landfill

Some of the piping

Inspector: [illegible] Section: [illegible] Date: [illegible]

Site Name: [illegible] Address: [illegible]

TABLE B.1

DRUM LOG SUMMARY
BANK SITE - FT. LAUDERDALE, FLORIDA

Drum #	Mineral Spirits Layer Height (Inches)	Mineral Spirits Quantity (Gallons)	Water Layer Height (Inches)	Water Quantity (Gallons)	Cloudy Water and Watery Sludge (Inches)	Cloudy Water and Watery Sludge (Gallons)	Sludge Layer Height (Inches)	Sludge Quantity (Gallons)
1A	30	50	0		0		0	
2A	30	50	0		0		0	
3A	29 1/2	41.2	0		0		1/2	0.8
4A	1	1.7	10	16.7	0		1	1.7
5A	3	5	11 1/2	19.2	0		1/2	0.8
6A	30	50	0		0		0	
7A	30	50	0		0		0	
8A	30	50	0		0		0	
9A	30	50	0		0		0	
10A	24	40	6	10	0		0	
11A	27	45	0		0		0	
12A	33	55	0		0		0	
13A	15	25	11 1/2	19.2	0		1/2	0.8
14A	29	48.3	0		0		1	1.7
15A	29 1/2	49.2	0		0		1/2	0.8
16A	27	45	0		0		0	
17A	26	43.3	0		0		4	6.7
18A	12	20	12	20	0		6	10
19A	27	45	0		0		0	
20A	30	50	0		0		0	
21A	27	45	0		0		0	
22A	21	35	0		0		0	
23A	22	36.7	0		0		5	8.3
24A	15	25	0		0		6	10
25A	33	55	0		0		0	
26A	21	35	0		0		6	10
27A	0		0		0		0	
28A	0		0		0		0	
29A	0		0		0		0	
30A	0		0		0		0	
31A	0		0		0		0	
32A	27	45	0		0		6	10
33A	19	31.7	0		0		14	23.3
34A	26 1/2	44.2	0		0		1/2	0.8
35A	0		0		0		30	50
36A	30	50	0		0		0	
37A	16	26.7	14	23.3	0		0	
38A	30	50	0		0		0	
39A	26	43.3	0		0		1	1.7
40A	30	50	0		0		0	
41A	30	50	0		0		0	
42A	32	53.3	0		0		1	
43A	30	50	0		0		0	

APPENDIX B

DRUM LOG SUMMARY

A C LABORATORIES INC.

6546 PEMBROKE ROAD MIRAMAR, FLORIDA 33023
Broward (305) 989-0928 Dade (305) 620-4440 Fax (305) 985-9748
"Quality Environmental Analysis"

CLIENT: Fosters Auto
C/O BKJ SERVICES
P.O. Box 2206
Naranja, Fl. 33032

DATE: September 30, 1990

DATE SAMPLED: 09/13/90

SAMPLE RECEIVED: 09/13/90

SAMPLED BY: BKJ Services

SAMPLE DESIGNATION: Composite Soil Sample

LABORATORY NO: 90-2435

REPORT OF ANALYSIS

PARAMETERS	RESULT	
Chloromethane	< 10	ug/kg
Bromomethane	< 10	ug/kg
Dichlorodifluoromethane	< 10	ug/kg
Vinyl Chloride	< 10	ug/kg
Chloroethane	< 10	ug/kg
Methylene Chloride	< 10	ug/kg
Trichlorofluoromethane	< 10	ug/kg
1,1-Dichloroethene	< 10	ug/kg
1,1-Dichloroethane	< 10	ug/kg
Trans-1,2-Dichloroethene	< 10	ug/kg
Chloroform	< 10	ug/kg
1,2-Dichloroethane	< 10	ug/kg
1,1,1-Trichloroethane	10.6	ug/kg
Carbon Tetrachloride	< 10	ug/kg
Bromodichloromethane	< 10	ug/kg
1,2-Dichloropropane	< 10	ug/kg
Trans-1,3-Dichloropropene	< 10	ug/kg
Trichloroethene	< 10	ug/kg
Dibromochloromethane	< 10	ug/kg
1,1,2-Trichloroethane	< 10	ug/kg
Cis-1,3-Dichloropropene	< 10	ug/kg
2-Chloroethylvinyl Ether	< 10	ug/kg
Bromoform	< 10	ug/kg
1,1,2,2-Tetrachloroethane	< 10	ug/kg
Tetrachloroethene	< 10	ug/kg
Chlorobenzene	< 10	ug/kg
1,2-Dichlorobenzene	< 10	ug/kg
1,3-Dichlorobenzene	< 10	ug/kg
1,4-Dichlorobenzene	< 10	ug/kg

1,1,1-TC

The above analysis was performed in accordance with E.P.A., Purgeable Halocarbons Method 601. Standard spikes & duplicate samples as per quality control requirements method 601. Laboratory I.D-DHRS #86111, E-86106.

Respectfully submitted,

Kerry Prescott

Kerry Prescott

A C LABORATORIES INC.

6546 PEMBROKE ROAD MIRAMAR, FLORIDA 33023
Broward (305) 989-0928 Dade (305) 620-4440 Fax (305) 985-9748
"Quality Environmental Analysis"

CLIENT: Fosters Auto
C/O BKJ SERVICES
P.O. Box 2206
Naranja, Fl. 33032

DATE: September 30, 1990

DATE SAMPLED: 09/13/90

SAMPLE RECEIVED: 09/13/90

SAMPLED BY: BKJ Services

SAMPLE DESIGNATION: Composite Soil Sample

LABORATORY NO: 90-2435

REPORT OF ANALYSIS

PARAMETERS	RESULT	
Chlorobenzene	< 10	ug/kg
1,2-Dichlorobenzene	< 10	ug/kg
1,3-Dichlorobenzene	< 10	ug/kg
1,4-Dichlorobenzene	< 10	ug/kg
Benzene	< 10	ug/kg
Toluene	< 10	ug/kg
Ethyl Benzene	< 10	ug/kg
Xylene	< 10	ug/kg
MTBE	< 10	ug/kg
Arsenic, Total	< 0.05	mg/kg
Cadmium, Total	1.56	mg/kg
Chromium, Total	7.06	mg/kg
Lead, Total	1.22	mg/kg
Total Halogens	1.4	mg/kg

The above analysis was performed in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.
Laboratory I.D.-DHRS #86111, E-86106.

Respectfully submitted,

Kerry Prescott

KP/ms

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
455 14th Street, Atlanta, Georgia 30318-7900

LABORATORY REPORT

RECEIVED
JUL 11 1996
ENVIRONMENTAL PROTECTION
SOUTHEAST REGION
BRUNSWICK OFFICE

TO: *KNOWLTON REG*

Sample ID :	AB19730
Sample Description:	ELECTRIC TRANSFORMER ELIM-SOIL
Additional Info :	SOIL FROM VICINITY OF ELECTRIC TRANSFORMERS ELIM CH RD.
Comments:	Routine

Date Collected:	06/12/96
Time Collected:	15:45
Sample Collector:	KNOWLTON
Project:	REG
Received By:	BEM
Date Received:	06/14/96
Time Received:	13:30
Reporting Date:	07/05/96

ANALYTE	PARAMETER CODE	EPA METHOD	NOTE	RESULT	UNITS	MDL	ANALYST
ICP METALS FOR HAZARDOUS WASTE / SOLIDS							
Arsenic	01003	200.7/6010	<	3	mg/kg	3	LPM
Barium	01008	200.7/6010		40	mg/kg	1	LPM
Cadmium	01028	200.7/6010		2.7	mg/kg	1	LPM
Chromium	01029	200.7/6010		9.1	mg/kg	2	LPM
Lead	01052	200.7/6010		42	mg/kg	5	LPM
Nickel	01068	200.7/6010		35	mg/kg	2	LPM
Selenium	01148	200.7/6010	<	25	mg/kg	25	LPM
Silver	01078	200.7/6010	<	3	mg/kg	3	LPM
☐ **EXTRACTION FOR PESTICIDE ANALYSIS**							
Extraction For Pesticide Analys.		EPA 8080		28.3g		-0-	LM
☐ **PCB'S IN SEDIMENTS OR SOILS**							
PCB-1016		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1221		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1232		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1242		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB

MDL: Method Detection Limit
ug/l : micrograms/liter
mg/l : milligrams/liter
mg/kg: milligrams/kilogram
ug/kg: micrograms/kilogram
ug/g: micrograms/gram

> : greater than < : less than
TIE: Tentatively identified / estimated value
Trace: Less than quantitation limit
M: not analyzed
LSPC: result less than lower specification
USPC: result greater than upper specification

LABORATORY MANAGERS

PAT SAMMONS	Inorganics Lab	(404) 206-5239
MARK TOLBERT	Metals Lab	(404) 206-5240
DANNY REED	Organics Lab	(404) 206-5252
STEVE BRYAN	GC-Mass Spec. Lab	(404) 206-5280
MARILYN THORNTON	Water Supply Lab	(404) 206-5210

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
455 14th Street, Atlanta, Georgia 30318-7900

LABORATORY REPORT

RECEIVED
JUL 11 1996
ENVIRONMENTAL PROTECTION
SOUTHEAST REGION
BRUNSWICK OFFICE

TO: *KNOWLTON*
REG

Sample ID :	AB19730
Sample Description:	ELECTRIC TRANSFORMER ELIM-SOIL
Additional Info :	SOIL FROM VICINITY OF ELECTRIC TRANSFORMERS ELIM CH RD.
Comments:	Routine

Date Collected:	06/12/96
Time Collected:	15:45
Sample Collector:	KNOWLTON
Project:	REG
Received By:	BEM
Date Received:	06/14/96
Time Received:	13:30
Reporting Date:	07/05/96

ANALYTE	PARAMETER CODE	EPA METHOD	NOTE	RESULT	UNITS	MDL	ANALYST
ICP METALS FOR HAZARDOUS WASTE / SOLIDS							
Arsenic	01003	200.7/6010	<	3	mg/kg	3	LPM
Barium	01008	200.7/6010		40	mg/kg	1	LPM
Cadmium	01028	200.7/6010		2.7	mg/kg	1	LPM
Chromium	01029	200.7/6010		9.1	mg/kg	2	LPM
Lead	01052	200.7/6010		42	mg/kg	5	LPM
Nickel	01068	200.7/6010		35	mg/kg	2	LPM
Selenium	01148	200.7/6010	<	25	mg/kg	25	LPM
Silver	01078	200.7/6010	<	3	mg/kg	3	LPM
☐ **EXTRACTION FOR PESTICIDE ANALYSIS**							
Extraction For Pesticide Analys.		EPA 8080		28.3g		-0-	LM
☐ **PCB'S IN SEDIMENTS OR SOILS**							
PCB-1016		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1221		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1232		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB
PCB-1242		EPA 8080		6 UG/KG	ug/kg	6 UG/KG	ATB

MDL: Method Detection Limit
ug/l : micrograms/liter
mg/l : milligrams/liter
mg/kg: milligrams/kilogram
ug/kg: micrograms/kilogram
ug/g: micrograms/gram

> : greater than < : less than
TIE: Tentatively identified / estimated value
Trace: Less than quantitation limit
M: not analyzed
LSPC: result less than lower specification
USPC: result greater than upper specification

LABORATORY MANAGERS

PAT SAMMONS	Inorganics Lab	(404) 206-5239
MARK TOLBERT	Metals Lab	(404) 206-5240
DANNY REED	Organics Lab	(404) 206-5252
STEVE BRYAN	GC-Mass Spec. Lab	(404) 206-5280
MARILYN THORNTON	Water Supply Lab	(404) 206-5210

APPENDIX C

TRANSPORTATION MANIFESTS

MINERAL SPIRITS

TRANSPORTATION MANIFEST

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: FLD982170 52
Manifest Document No.:
2. Page of 1

3. Generator's Name and Mailing Address
Sun Bank/South Florida, NA
1431 N.E. 24th Street
Ft. Lauderdale, FL 33312
4. Generator's Phone (305) 765-7252

A. State Manifest No
B. State Generator 99912

5. Transporter 1 Company Name: ~~Corsan Trucking, Inc.~~ Environmental Transportation Services
6. US EPA ID Number: ~~TXD 981 [illegible]~~
C. State Transporter's ID
D. Transporter's Phone
7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
~~Technical Environmental Systems, Inc.~~ Environmental
~~500 Battleground Road~~ Transportation Services, Inc.
~~La Porte, Texas 77571~~ P.O. Box 36118
Oklahoma City, OK 73136
10. US EPA ID Number: TXD 981605363
G. State Facility's ID: HW-50225-001
H. Facility's Phone: 713-476-0645

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
	a. RQ, Waste Flammable Liquid, N.O.S. (Mineral Spirits; Water) (Pentachlorophenol) Flammable Liquid UN 1993 (F027)	061 ~~0-0-1~~	DM ~~[illegible]~~	03355	G	F027 915660
	b.					
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above
a) WPR 22174

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
As the generator of the waste listed in this Manifest (the "Waste"), I acknowledge that I have authorized Technical Environmental Systems, Inc. ("TES") to store the Waste and then to transport the Waste to the facility designated in the applicable Exhibit C of that certain Waste Disposal Agreement entered into between TES and myself. By execution of this Manifest, I acknowledge that I have chosen the facility listed in this Exhibit C without relying on the advice of TES, any transporter, or any employees of the foregoing persons.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
Douglas K. Sinclair/Senior Vice President	[signature]	02	02	90

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
John A. Valler	John A. Valler	02	02	90

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space
Item #9 Technical Environmental Services TXD 982290140
500 Battleground rd. Laporte, Texas 77571

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR

TRANSPORTER

FACILITY

This material may be reshipped to a user at a later date in accordance with the order.

TWC-0311 (Rev. 01/01/89)

White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 09-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. FLD982170552 | Manifest Document No.

2. Page 1 of | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Sun Bank/South Florida, NA
1431 N.E. 24th Street
Ft. Lauderdale, FL 33312

A. State Manifest Document Number
No 00217338

4. Generator's Phone (305) 765-7252

B. State Generator's ID
99912

5. Transporter 1 Company Name
Environmental Transportation Services

6. US EPA ID Number
TXD981586605

C. State Transporter's ID 40040

D. Transporter's Phone 512-837-1773

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address
[redacted] Environmental
[redacted] Transportation Services, Inc.
[redacted] P.O. Box 36118
Oklahoma City, OK 73136

10. US EPA ID Number
TXD 981605363

G. State Facility's ID
TX-50225-001

H. Facility's Phone
713-476-0645

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
	a. RQ, Hazardous Waste Solid, N.O.S. (Carbon; Water) (Pentachlorophenol) NA 2020 (F027) *	004	DM	00220	G	F027 915660
	b.					
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above
a)MFR 22173

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

As the generator of the waste listed in this Manifest (the "Waste"), I acknowledge that I have authorized Technical Environmental Systems, Inc. ("TES") to store the Waste and then to transport the Waste to the facility designated in the applicable Exhibit C of that certain Waste Disposal Agreement entered into between TES and myself. By execution of this Manifest, I acknowledge that I have chosen the facility listed in this Manifest without advice or the advice of TES, any transporter, or any employee of the foregoing persons.

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year
Douglas K. Sinclair/Senior Vice President		02/02/90

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year
John A. Valles		02 02 90

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month Day Year

19. Discrepancy Indication Space
Item #9
Technical Environmental Systems Inc. TXD 982290140
See Bill of Lading No. [redacted] Laporte, Texas 77571

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date Month Day Year

TWC-0311 (Rev. 01/01/89) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

*This material is being manifested as F027 for purposes of compliance with FDER Consent Order #89-0752. This material may be re-shipped to a user at a later date in accordance with the order.

GENERATOR TRANSPORTER FACILITY

SLUDGE DISPOSAL

TRANSPORTATION MANIFESTS

SENT BY:DOWNTOWN WEST 4403 . 3-14-90 9:28AM . 3057657287→ 5198640525.4 1

HAZARDOUS WASTE MANIFEST

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2060-0039. Expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: FLD982217052 — Manifest Document No.: 00003
2. Page 1 of 1
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Sun Bank/ South Florida, N.A. Ft. Lauderdale, Florida 33305
300 West Broward Blvd. attn: Douglas K. Sinclair

4. Generator's Phone (305) 766-7001

5. Transporter 1 Company Name: Chemical Waste Management, Inc.
6. US EPA ID Number: FLD099202681

7. Transporter 2 Company Name:
8. US EPA ID Number:

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
Pompano Beach Facility
2700 N W 48th Street
Pompano Beach, Florida 33067
10. US EPA ID Number: FLD000778708

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a. RQ, Waste Flammable Liquid, N.O.S., UN-1993(EPA K001) (Mineral Spirits, Pentachlorophenol, Water and Sand) CWM Profile Number FLA-K06224	0	DM		G
b. CWM Profile Number				
c. CWM Profile Number				
d. CWM Profile Number				

[redacted]

15. Special Handling Instructions and Additional Information
CWM 24hr Emergency # 205-652-9721 (Safety Dept.)

Work Order #: Purchase Order #:

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19
Printed/Typed Name | Signature | Month Day Year

EPA Form 8700-22 (Rev. 9-88) Previous edition is obsolete.

STATE OF FLORIDA (Must Accompany Shipment)

LAND DISPOSAL RESTRICTIONS NOTIFICATION AND CERTIFICATION FORM

Generator Name: SUN BANK Manifest Number: 117644

EPA Hazardous Waste Code(s): K001 CWM Profile Number: K06224

This form is submitted to CWM in accordance with 40 CFR Part 268, which restricts the land disposal of certain hazardous wastes. I have marked the appropriate box below to indicate how my waste must be managed to conform to the land disposal restrictions. For any waste(s) that misses part of the treatment standard and requires additional treatment, you must mark (1) box A (the waste requires treatment) and (2) box B.1. or B.2. or D (the waste satisfies part of the treatment standards).

☒ **A. RESTRICTED WASTE REQUIRES TREATMENT**

Also complete and attach the "Hard-Hammer Addendum" form !

I am the initial generator of a restricted waste (i.e. solvent/dioxin, California List, or scheduled waste) which must be treated to the applicable treatment standard set forth in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d) prior to land disposal. This requirement applies to EPA hazardous waste code(s) K001. A copy of all applicable treatment standards and specified treatment methods is maintained at the treatment, storage and disposal facility named above.

☐ **B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS**

The EPA hazardous waste code(s) _____ has been treated in compliance with the applicable performance standards specified in 40 CFR Part 268 Subpart D. Supporting data is available to be provided as requested by the receiving facility.

"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and that, based upon my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process has been operated and maintained properly so as to comply with the performance levels specified in 40 CFR Part 268 Subpart D and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA Section 3004(d) without dilution of the prohibited waste. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment."

☐ **B.2 RESTRICTED WASTES FOR WHICH THE TREATMENT STANDARD IS EXPRESSEDAS A SPECIFIED TECHNOLOGY**

"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.42. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment." This treatment has been performed for EPA hazardous waste code(s) _____ .

☐ **C. RESTRICTED WASTE SUBJECT TO A VARIANCE**

The waste identified above is subject to a national capacity variance, a treatability variance, or a case-by-case extension which expires on _____. This variance applies to EPA hazardous waste code(s) _____. If disposal occurs in a landfill or surface impoundment, the unit must meet the minimum technological requirements. (Note: Wastes destined for deep well injection are subject to a separate set of variances. See instructions or 40 CFR Part 148.)

☐ **D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT**

I am the initial generator of the following EPA hazardous waste code(s) _____. I have determined that the waste meets all applicable treatment standards set forth in 40 CFR Part 268 Subpart D, and all applicable prohibition levels set forth in Section 268.32 or RCRA Section 3004(d), and therefore can be land disposed without further treatment. A copy of all applicable treatment standards and specified treatment methods is maintained at the treatment, storage and disposal facility named above.

"I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Subpart D and all applicable prohibitions set forth on 40 CFR 268.32 or RCRA section 3004(d). I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of a fine and imprisonment."

I certify that the information submitted in this and all attached documents is complete and accurate to the best of my

INSTRUCTIONS FOR COMPLETING THE HARD HAMMER NOTIFICATION FORM

1. To properly manage your waste under the land disposal restrictions, it is essential that you accurately identify your waste. The first step in assessing whether your waste is subject to the land disposal restrictions is to determine if your waste is hazardous (see 40 CFR 261). Remember, first determine whether the waste that you generate is a listed hazardous waste. Then, if it is not, determine whether it exhibits a hazardous characteristic.

2. All hazardous waste codes currently restricted are listed below. (See Table 1 for treatment standards governing all forms of land disposal except deep well injection. See Table 2 for deep well injection.) If your waste is listed, determine whether it is listed below. Also see 40 CFR § 268.10-11. If it is, your waste is restricted. Write the code(s) in the space provided on this notification form after "EPA Hazardous Waste Code(s)." If additional space is required to reflect multiple waste codes, please attach a continuation sheet to the land ban notification form. If your listed waste code is not listed below, it is not yet restricted (unless imposed by the California list restrictions) and the forms do not apply.

3. If your waste is restricted, determine whether it is subject to a national capacity variance, case-by-case extension, treatability variance or no migration petition. These variances are identified below. If so, check box C and enter the date that the variance expires.

4. If your waste is restricted, determine whether it a) exceeds the treatment standards of 268.41 and 268.43; or b) is subject to a technology-specific treatment standard as defined in 268.42; or c) does not comply with the California list statutory prohibition levels. If so, check box A.

5. If the restricted waste has been treated to satisfy the applicable treatment standards set out at 40 CFR Part 268, check box B.1. If treatment satisfies only part of the treatment standards and additional treatment is necessary, check box A.

6. If the restricted waste naturally meets the treatment standards of 40 CFR, Part 268, upon generation and can be land disposed without any treatment, check box D.

Table 1

RESTRICTED WASTES WITH TREATMENT STANDARDS

F001	F012-*10	K016	K029-*1	K046	K071	K103	P040	P097	U087
F002	F024	K018	K030	K047-*9	K086-*8	K104	P041	P098	U088
F003	K001	K019	K036-*2	K048	K087	K113	P043	P099	U102
F004	K005-*3	K020	K036-*3	K049	K093	K114	P044	P104	U107
F005	K007-*3	K021-*3	K037	K050	K094	K115	P062	P106	U190
F006-*5	K009	K022	K038	K051	K095-*1	K116	P063	P109	U221
F007-*6	K010	K023	K039	K052	K096-*1	P013	P071	P111	U223
F008-*6	K011-*1	K024	K040	K060-*3	K099	P021	P074	P121	U235
F009-*6	K013-*1	K025-*3	K043	K061-*4	K100-*3	P029	P085	U028	
F010	K014-*1	K027	K044-*9	K062	K101-*7	P030	P089	U058	
F011-*10	K015-*2	K028	K045-*9	K069-*11	K102-*7	P039	P094	U069	

Table 2

DEEPWELL INJECTION/RESTRICTED WASTES WITH TREATMENT STANDARDS

F001	F012-*10	K016-*14	K029-*1	K046-*12	K071-*1	K103	P040	P097	U087
F002	F024	K018	K030	K047	K086-*13	K104	P041	P098	U088
F003	K001	K019	K036-*1	K048	K087	K113	P043	P099	U102
F004	K005-*1	K020	K036-*2	K049	K093	K114	P044	P104	U107
F005	K007-*1	K021-*1	K037	K050	K094	K115	P062	P106	U190
F006-*1	K009-*1	K022-*1	K038	K051	K095-*1	K116	P063	P109	U221
F007	K010	K023	K039	K052	K096-*1	P013	P071	P111	U223
F008	K011-*1	K024	K040	K060-*1	K099	P021	P074	P121	U235
F009	K013	K025-*1	K043	K061-*1	K100-*1	P029	P085	U028	
F010	K013-*1	K027	K044	K062	K101-*7	P030	P089	U058	
F011-*10	K015-*2	K028	K045	K069-*11	K102-*7	P039	P094	U069	

*1 - wastewaters
*2 - wastewaters
*3 - wastewaters-no land disposal
*4 - wastewaters-high zinc subcategory (1% or greater) no land disposal 8/8/90
*5 - wastewaters - cyanide effective 7/8/89
*6 - effective 7/8/89
*7 - except high arsenic subcategory, greater than 1%, which is subject to soft hammer
*8 - except solvent recge, arsenic water wash and sludge category
*9 - reactive - no land disposal
*10- effective 7/8/89 - NWW follow standards for F007-F009 until 12/8/89, then follow F011, F012 standards
*11- wastewater non-calcium sulfate subcategory
*12- nonreactive wastewaters
*13- solvent washes
*14- greater than or equal to 1%

Manifest number : 17644

HARD-HAMMER NOTIFICATION ADDENDUM

Profile number: 150624

If you checked box A on the Hard-Hammer Notification form, "Restricted Waste Requires Treatment", then you must also indicate ALL of the restrictions by checking all of the applicable boxes below.

********** SECTION I - CALIFORNIA LIST **********

A. This waste was a liquid hazardous waste, when it was initially generated, and any of the following statements are true (check all that apply):

___ 1. (Metals) - the waste currently fails the paint filter test, and it contains any of the following metals in concentrations greater than or equal to the amount listed here (check each that applies):
___Arsenic : 500 ppm, ___Lead ...: 500 ppm, ___Selenium: 100 ppm,
___Cadmium : 100 ppm, ___Mercury : 20 ppm, ___Thallium: 130 ppm
___Chromium: 500 ppm, ___Nickel : 134 ppm,

___ 2. (Acids) - the waste currently fails the paint filter test, and is an acid (aqueous solution with pH less than or equal to 2.0)

___ 3. (Cyanides) - the waste currently fails the paint filter test, and it contains greater than or equal to 1,000 ppm "free" cyanides.

___ 4. (PCBs) - the waste contains PCBs (Polychlorinated Biphenyls) in concentrations greater than or equal to 50 ppm.

B. This waste was a liquid or nonliquid hazardous waste when it was initially generated, and the following statement is true:

___ 1. (HOCs) - the waste contains HOCs (Halogenated Organic Compounds listed in 40 CFR Part 268, Appendix III) in total concentration greater than or equal to 1,000 ppm.

********** SECTION II - CYANIDES **********

DO NOT LEAVE THIS SECTION BLANK !

If cyanides are present in this waste, list the Total and Amenable levels in this shipment, (otherwise, put "ND" (None detected)), in these spaces:

Total:_____ ppm, Amenable:_____ ppm.

********** SECTION III - SOLVENT AND OTHER HARD-HAMMER WASTES **********

This waste is a (check one): ___ wastewater, X nonwastewater.

This waste may be in any physical form (solid, liquid, sludge, gas, etc.) but it requires treatment for the constituents listed in 40 CFR Part 268 Subpart D that are related to the following codes. Check all codes that apply to this waste and require treatment:

___ F001	___ K011**	___ K039	___ K101	___ P074*	___ U221
___ F002	___ K013**	___ K040	___ K102	___ P085	___ U223**
___ F003	___ K014	___ K043**	___ K103	___ P089	___ U235
___ F004	___ K015**	___ K044**	___ K104	___ P094	
___ F005	___ K016	___ K045**	___ K113**	___ P097	* - CWM-Emelle
___ F006	___ K018	___ K046	___ K114**	___ P098**	does not accept
___ F007	___ K019	___ K047**	___ K115**	___ P099**	these wastes
___ F008	___ K020	___ K060**	___ K116	___ P104**	for disposal.
___ F009	___ K021**	___ K061	___ P013**	___ P106**	
___ F010	___ K022	___ K062	___ P021*	___ P109	** - CWM-Emelle
___ F011	___ K023	___ K069-a	___ P029*	___ P111	does not accept
___ F012**	___ K024	___ K083-b	___ P030*	___ P121**	these wastes
___ F024**	___ K025**	___ K086**	___ P039	___ U028	for storage
X K001	___ K027**	___ K087	___ P040	___ U058	and/or disposal
___ K004**	___ K028	___ K093	___ P041	___ U069	
___ K005**	___ K029	___ K094	___ P043	___ U087	CWM will accept:
___ K007**	___ K030	___ K095	___ P044	___ U088	a - Ca sulfate
___ K008**	___ K036**	___ K096	___ P062	___ U102	category only
___ K009	___ K037	___ K099**	___ P063	___ U107	b - High ash
___ K010	___ K038	___ K100**	___ P071	___ U190	category only

DISPOSAL FACILITY DOCUMENT CONTROL COPY
(Must accompany shipment)

INSTRUCTIONS FOR COMPLETING THE HARD HAMMER NOTIFICATION FORM

1. To properly manage your waste under the land disposal restrictions, it is essential that you accurately identify your waste. The first step in assessing whether your waste is subject to the land disposal restrictions is to determine if your waste is hazardous (see 40 CFR 261). Remember, first determine whether the waste that you generate is a listed hazardous waste. Then, if it is not, determine whether it exhibits a hazardous characteristic.

2. All hazardous waste codes currently restricted are listed below. (See Table 1 for treatment standards governing all forms of land disposal except deep well injection. See Table 2 for deep well injection.) If your waste is listed, determine whether it is listed below. Also see 40 CFR § 268.10-11. If it is, your waste is restricted. Write the code(s) in the space on top of the notification form after "EPA Hazardous Waste Code(s)." If additional space is required to reflect multiple waste codes, please attach a separate sheet to the land ban notification form. If your listed waste code is not listed below, it is not yet restricted (unless approved by the California list exemptions) and the forms do not apply.

3. If your waste is restricted, determine whether it is subject to a national capacity variance, case-by-case extension, treatability variance or no migration petition. These variances are identified below. If so, check box C and enter the date that the variance expires.

4. If your waste is restricted, determine whether it a) exceeds the treatment standards of 268.41 and 268.43; or b) is subject to a technology-specific treatment standard as defined in 268.42; or c) does not comply with the California list mandatory prohibition levels. If so, check box A.

5. If the restricted waste has been treated to satisfy the applicable treatment standards set out at 40 CFR Part 268, check box B.1. If treatment satisfies only part of the treatment standards and additional treatment is necessary, check box A.

6. If the restricted waste naturally meets the treatment standards of 40 CFR, Part 268, upon generation and can be land disposed without any treatment, check box D.

Table 1

RESTRICTED WASTES WITH TREATMENT STANDARDS

F001	F012-*10	K016	K029-*1	K046	K071	K103	P040	P097	U087
F002	F024	K018	K030	K047-*9	K086-*8	K104	P041	P098	U088
F003	K001	K019	K036-*2	K048	K087	K113	P043	P099	U102
F004	K005-*3	K020	K036-*3	K049	K093	K114	P044	P104	U107
F005	K007-*3	K021-*3	K037	K050	K094	K115	P062	P106	U190
F006-*5	K009	K022	K038	K051	K095-*1	K116	P063	P109	U221
F007-*6	K010	K023	K039	K052	K096-*1	P013	P071	P111	U223
F008-*6	K011-*1	K024	K040	K060-*3	K099	P021	P074	P121	U235
F009-*6	K013-*1	K025-*3	K043	K061-*4	K100-*3	P029	P085	U028	
F010	K014-*1	K027	K044-*9	K062	K101-*7	P030	P089	U058	
F011-*10	K015-*2	K028	K045-*9	K069-*11	K102-*7	P039	P094	U069	

Table 2

DEEPWELL INJECTION/RESTRICTED WASTES WITH TREATMENT STANDARDS

F001	F012-*10	K016-*14	K029-*1	K046-*12	K071-*1	K103	P040	P097	U087
F002	F024	K018	K030	K047	K086-*13	K104	P041	P098	U088
F003	K001	K019	K036-*1	K048	K087	K113	P043	P099	U102
F004	K005-*1	K020	K036-*2	K049	K093	K114	P044	P104	U107
F005	K007-*1	K021-*1	K037	K050	K094	K115	P062	P106	U190
F006-*1	K009-*1	K022-*1	K038	K051	K095-*1	K116	P063	P109	U221
F007	K010	K023	K039	K052	K096-*1	P013	P071	P111	U223
F008	K011-*1	K024	K040	K060-*1	K099	P021	P074	P121	U235
F009	K013	K025-*1	K043	K061-*1	K100-*1	P029	P085	U028	
F010	K013-*1	K027	K044	K062	K101-*7	P030	P089	U058	
F011-*10	K015-*2	K028	K045	K069-*11	K102-*7	P039	P094	U069	

*1 - wastewaters
*2 - wastewaters
*3 - wastewaters-no land disposal
*4 - wastewater-high zinc subcategory (15% or greater) no land disposal 8/8/90
*5 - wastewaters - cyanide effective 7/8/90
*6 - effective 7/8/90
*7 - except high arsenic subcategory, greater than 1%, which is subject to soft hammer
*8 - except solvent sludge, caustic water wash and sludge category
*9 - reactive - no land disposal
*10 - effective 7/8/90 - NWW follow standards for F007-F009 until 12/8/90, then follow F011, F012 standards
*11 - wastewater non-calcium sulfide subcategory
*12 - nonexplosive wastewaters
*13 - solvent washes
*14 - greater than or equal to 1%

CONSTRUCTION DEBRIS

AND

CRUSHED TRIPLE RINSED DRUMS

DISPOSAL APPROVALS

Southern Sanitation S.E. Division

A Waste Management, Inc. Company
201 N.W. 12th Avenue
Pompano Beach, Florida 33069
763-7900 Broward & 653-7484 Dade

SERVICE AGREEMENT
NON-HAZARDOUS WASTES

X		$
		$
		$
		$

BILLING

CUSTOMER'S BILLING NAME: CHEMICAL WASTE MGMT

CUSTOMER'S BILLING ADDRESS: 515 W GREENS ROAD SUITE 400-A

CITY, STATE, ZIP CODE: HOUSTON, TX 77067

CUSTOMER CONTACTS: BRUCE DILL & CESAR GARCIA — TELEPHONE NO. 829-1693

SERVICE

SERVICE NAME (IF OTHER THAN BILLING NAME): SUN BANK

SERVICE ADDRESS (IF OTHER THAN BILLING ADDRESS): 300 W BROWARD BLVD — TELEPHONE NO. 343-7626

CITY, STATE, ZIP CODE: FTL

APPROXIMATE # OF PULLS

CONSUMER CERTIFICATE OF EXEMPTION NO.

CUSTOMER PURCHASE ORDER #: 531698

EFFECTIVE DATE

EXPIRATION DATE

[redacted] THE FOLLOWING [redacted] AND

CONTAINER SPECIFICATIONS

	1	30	X					
EL.	1	30	X					
B.I.								

FREQUENCY OF SERVICE

- [X] ON CALL
- [ ] PICK UP(S) PER WEEK

EFFECTIVE SERVICE DATE

EFFECTIVE BILLING DATE

- [ ] CUSTOMER OWNED
- [ ] WMI OWNED

EQUIP. DATE REQUESTED: SAT 1/13/90

DATE DELIVERED

DELIVERED BY:

SCHEDULE OF CHARGES

SERVICE CHARGE PER MONTH $

ADDITIONAL CHARGE PER YARD/CONT. RELOCATE CHG. $

1 DAY OR 30 DAYS CONTAINER MAINTENANCE $ -0-

COMPACTOR USE CHARGE $

SERVICE CHARGE PER

- [ ] YARD $
- [ ] PER PICKUP 15 YD $
- [X] PER PICKUP 30 YD $ 425.00

SIZE $

DISPOSAL $

*INDICATE COMPACTOR LOAD WITH A "C"

PREVIOUS SVC $

SERVICE DATA

CHECK LIST (OFFICE USE ONLY)

MANAGERS APPROVAL _____ Date _____
DISPATCH _____ Date _____
ROUTING _____ Date _____
BILLING _____ Date _____

SPECIAL INSTRUCTIONS

SAT 1-13-90 AFTER 3:00 P.M. IF POSSIBLE

SEE CESAR OR BRUCE IN FENCED IN AREA BEHIND SUN BANK DRIVE THRU

MAXIMUM LOADING LEVEL SHOULD NOT EXCEED HEIGHT OF CONTAINER.

"ROLLOFF"

No Concrete or Fill to be put in 30 yard Containers.

Southern Sanitation will not be responsible for any damages done to driveways, lawns, shrubs water systems etc.

CONTAINER USE CHARGE IS FOR 1 DAY OR 30 DAYS

CUSTOMER

Cesar Garcia — AUTHORIZED SIGNATURE

CESAR GARCIA — PRINT NAME

(PRINT) REPRESENTING

DATE

CONTRACTOR

[signature] — REPRESENTATIVE'S SIGNATURE

TERRITORY NO.

1/12/90 — DATE

White - Office Pink - Processing Gold - Container Order Blue - Sales Canary - Customer

PAP B-520 WMNA-003BP (10/86)

SPECIAL WASTE MANAGEMENT DECISION

046242
Waste Profile Sheet Code

I. Request For Decision: X Initial ___ Renewal

GENERATOR NAME Sun Bank ADDRESS 300 W Broward Blvd.

CITY, STATE/PROVINCE Ft Lauderdale, FL 33312

WASTE NAME(S) Drums and Debris

PROPOSED MANAGEMENT FACILITY CDSL

PROPOSED INTERMEDIATE TRANSFER FACILITY CWM TRANSPORTER CWM

WMNA REQUESTOR Sarah C. Sorano SIGNATURE SARAH SORANO

II. TECHNICAL MANAGER DECISION: (circle one) APPROVED DISAPPROVED ___ Check if additional information is attached.

If Disapproved, Explain:

If Approved, Complete A, B, C and D Below:

A Management Method(s) Standard Operating Procedures

B Precautions, Conditions, or Limitations on Approval None - CWM description attached

C Decision Expiration Date: 1/16/91

D For Type A Wastes, Laboratory Analysis of a Representative Sample Was: (Check only one)

___ Waived ___ Supplied By Generator ___ From a WMI-Approved Lab ___ From Both Generator and WMI-Approved Lab

TECH MGR SIGNATURE Judith Parson NAME (Print) Judith Parson DATE 1/16/90

III. WMI MANAGEMENT FACILITY GENERAL MANAGER DECISION: (circle one) APPROVED DISAPPROVED

If Approved, State any Additional Precautions, Conditions or Limitations:

GENERAL MGR SIGNATURE Sarah C. Sorano for M. Berg NAME (Print) SARAH SORANO DATE 1/19/90

IV. WMI INTERMEDIATE TRANSFER FACILITY GENERAL MANAGER DECISION: (circle one) APPROVED DISAPPROVED

If Approved, State any Additional Precautions, Conditions or Limitations:

GENERAL MGR SIGNATURE ___ NAME (Print) ___ DATE ___

Waste Management of North America
GENERATOR'S SPECIAL WASTE PROFILE SHEET
TYPE B Waste
PLEASE PRINT IN INK OR TYPE

WMA 046242
Waste Profile Sheet Code

INSTRUCTIONS FOR COMPLETING THIS FORM ARE ATTACHED

(Shaded Areas For WMNA Use Only)

Renewal Date of Service Agreement: WMNA Sales Rep#:

A. WHERE IS THE WASTE GENERATED?

1. Generator Name: SUN BANK
2. Facility Address (site of waste generation): 300 W Broward Blvd
3. Generator City, State/Province: Ft. Lauderdale, FL
4. Zip/Postal Code: 33312
5. Generator USEPA/Federal ID: FLD 983170 52
6. Generator State/Province ID:
7. Technical Contact: Steve Quigley CRA (Agent) Tom Allen CWM-ENRAC
8. Phone: (514) 224-0510 (904) 385-3099

B. WHERE ARE WASTE MANAGEMENT, INC. INVOICES SENT?

1. ☐ Generating Facility (A, above), or
2. Company Name: CHEMICAL WASTE Mgmt, Inc. ENRAC Div
3. Phone: (713) 875-1110
4. Address: 515 W. GREENS Rd #400
5. Generator City, State/Province: Houston, Texas 77067
6. Zip/Postal Code: 77067

C. WASTE STREAM INFORMATION:

1. Name of Waste: Triple-Rinsed DOT-Empty Crushed 55-gallon drums &
2. Process Generating Waste: Construction Debris, Linear Material & Rubble ~~Bulking of Drummed Mineral Spirits, Water and Pentachlorophenol~~
3. Method of Shipment: ☐ Bulk Liquid ☐ Bulk Sludge ☐ Bulk Solid ☒ Drum/Box ☐ Other
4. Annual Amount/Units: ~ 2 QTY – 20 cubic yd. Roll off BOXES
5. Supplemental Information (see instructions): Empty and Triple-Rinsed Drums (Rinsed with Mineral Spirits) ~~[illegible]~~ were generated from the bulking of Mineral Spirits, Water and Pentachlorophenol. Other wastes are construction debris, linear materials and construction rubble.
6. Is this a DOT hazardous material? ☒ No ☐ Yes (If so, complete 7, 8 & 9)
7. Hazard Class/ID #:
8. Reportable Quantity/ Units (lb/kg):
9. Shipping Name:

☐ Check this box if additional information is attached.

D. GENERATOR CERTIFICATION

By signing this profile sheet, the generator certifies that unless clearly stated above or in attachments:

1. This waste is not a "Hazardous Waste" as defined by USEPA or Canadian Federal regulation and/or the state/province.
2. This waste does not contain regulated quantities of PCB's (Polychlorinated Biphenyls).
3. This sheet and its attachments contain true and accurate descriptions of the waste material. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed.
4. The Contractor's Definition of Special Waste (Form WMNA 0038 AD) has been read, signed and attached.

5. Signature: [signature]
6. Title: S.V.P.
7. Name (Type or Print): Douglas K. Sinclair
8. Date: 1/15/90

CONTRACTOR'S DEFINITION OF SPECIAL WASTE

1. "Special Waste" means Type A or Type B Special wastes as defined below.

046242
WASTE PROFILE CODE

2. "Type A Special Waste" means any waste, from a commercial or industrial activity meeting any of the following descriptions.
   a. A containerized waste (e.g., a drum, portable tank, lugger box, roll-off box, pail, bulk tanker, etc.) listed in b.-g. below.
   b. A waste containing free liquids.
   c. A sludge waste.
   d. A waste from an industrial process.
   e. A waste from a pollution control process.
   f. Residue and debris from the cleanup of a spill of a chemical substance or commercial product or a waste listed in a.-e. or g.
   g. Contaminated residuals, or articles from the cleanup of a facility generating, storing, treating, recycling, or disposing of wastes listed in a.-f.

3. Incidental Amounts of Special Waste
   The Contractor recognizes that many customers will produce some "Type B Special Waste," as defined below. Incidental quantities of "Type B Special Waste," do not require a Generator's Type B Special Waste Profile Sheet (Form WMNA-0089B) to be signed by the customer. However, the customer must identify the type and amount of Type B Special Wastes which will be provided to the Contractor in incidental amounts by completing the box in the lower right corner.

4. "Type B Special Waste" means any waste from a commercial or industrial activity meeting the descriptions which follow
   a. Friable asbestos waste from building demolition or cleaning wall board, wall spray coverings, pipe insulation, etc. Nonfriable asbestos is not a special waste unless it has been processed, handled or used in such a way that asbestos fibers may be freely released. Asbestos-bearing industrial process waste is a "Type A Special Waste.
   b. Commercial products or chemicals which are off-specification, outdated, unused or banned. Out-dated or off-specification, uncontaminated food or beverage products in original consumer containers are not included in this category, however, containers which once held commercial products or chemicals are included unless the container is empty. A container is empty when:
      All wastes have been removed that can be removed using the practices commonly employed to remove materials from the type of container, e.g., pouring, pumping or aspirating, and an end has been removed (for containers in excess of 25 gallons), and no more than 1 inch (2.54 centimeters) of residue remains on the bottom of the container or inner liner, or no more than 3% by weight of the total capacity of the container remains in the container (containers ≤ 110 gallons), or no more than 0.3% by weight of the total capacity of the container remains in the container (containers > 110 gallons.) Containers which once held ACUTELY HAZARDOUS WASTES must be triple rinsed with an appropriate solvent or cleaned by an equivalent method. Containers which once held substances regulated under the Federal Insecticide, Fungicide, and Rodenticide Act must be empty according to label instructions or triple rinsed.
   c. Untreated bio-medical waste - Any waste capable of inducing infection due to contamination with infectious agents from a bio-medical source including but not limited to a medical practitioner, hospital, medical clinic, nursing home, university medical laboratory, mortuary, taxidermist, veterinarian, veterinary hospital or animal testing laboratory. Sharps from these sources must be rendered harmless or placed in needle puncture proof containers. Residue from incineration of infectious wastes is a "Type A Special Waste."
   d. Treated bio-medical wastes - Any wastes from a bio-medical source including but not limited to a hospital, medical clinic, nursing home, medical practitioner, mortuary, taxidermist, veterinarian hospital, animal testing laboratory, or university medical laboratory which has been autoclaved or otherwise heat treated or sterilized so that it is no longer capable of inducing infection. Any sharps from these sources must be rendered harmless or placed in needle puncture proof containers.
   e. Liquids and sludges from septic tanks, food service grease traps, or washwater and wastewaters from commercial laundries, laundromats and car washes unless these wastes are managed at commercial or public treatment works.
   f. Chemical-containing equipment removed from service. Examples: filters, cathode ray tubes, lab equipment, acetylene tanks, fluorescent light tubes, etc.
   g. Waste produced from the demolition or dismantling of industrial process equipment or facilities contaminated with chemicals from the industrial process. Chemicals or wastes removed or drained from such equipment or facility are "Type A Special Wastes."

CUSTOMER ACKNOWLEDGES THAT HE HAS READ THE FOREGOING DEFINITION AND HAS IDENTIFIED THE TYPES AND AMOUNTS OF ANY TYPE B WASTE STREAMS PRODUCED IN INCIDENTAL AMOUNTS.

Jon Fink
CUSTOMER

AUTHORIZED SIGNATURE

DATE

INCIDENTAL WASTE TYPES AND AMOUNTS:
Triple Rinsed Empty Containers, Asbestos Wrap, Lab Equipment contained with treating solution - 65% of load, Scrap Metal - 35% of load only to contain this

General Manager of WMNA Division concurs that the above amounts of "Type B Special Wastes" are incidental to the load.
Signature:

Form WMNA-0038AD (2/89) Waste Management of North America
White - WMNA Division Canary - Customer

Central Disposal
3000 N.W. 48th Street
Pompano Beach, Florida 33073
305-977-0551

A Waste Management Company

SPECIAL WASTE SERVICE AGREEMENT

1. **SPECIAL WASTE.** This agreement relates to special waste with components and characteristics meeting the description contained in the "Generator's Waste Material Profile Sheet" with code number:

SALES	CODE
	046292

The customer represents that this special waste is not a "hazardous waste" as defined by the United States Environmental Protection Agency or by the state (or states) in which the waste is to be stored or disposed. In the event this waste is later determined to be hazardous or is later defined as hazardous waste, this agreement shall be subject to immediate termination by either party upon written notice to the other.

2. **SPECIAL WASTE QUANTITIES.** During the term of this agreement, customer will provide to contractor the following quantities of special waste, containerized as noted.
Per above profile number.

3. **CONTRACTOR SERVICES.** Contractor will provide customer the following services and equipment, as indicated by the contractors initials.
   a. ____ Equipment, as follows, to be provided at customer's location: N/A
   b. ____ Loading of the special waste onto transportation vehicles at customers location: N/A
   c. ____ Transportation of the special waste from: N/A to the following storage facility.
   d. ____ Transportation of the special waste from:

X 300 WEST BROWARD BLVD, FT. LAUDERDALE.

to the disposal facility shown in subsection e.
   e. ____ Contractor will cause the disposal of the special waste at the following disposal facility, which is fulling permitted to receive special waste.

Central Disposal Sanitary Landfill

(Note: If the disposal facility ceases operations or is later prohibited by law to recieve special wastes as described, this agreement shall be subject to immediate termination by either party.)

4. **SERVICE ARRANGEMENTS.** Contractor will provide services as follows:
No special service arrangements.

5. **FEES AND BILLING.** For contractors services, customer agrees to pay a fee as follows:
Standard Prevailing Rate.
Unless otherwise noted billing will be monthly and bills payable within 30 days of receipt. Fees will be increased to cover any increases in disposal charges at the disposal facility after date of signing.

6. **TERM.** This agreement shall have a term of one year from the date of signing, subject to the right of either party to terminate upon 7 day's written notice to the other party.

7. **MANIFESTS/SHIPPING PAPERS.** If manifests or shipping papers are required by law to accompany the special waste to the storage or disposal facility, the customer is responsible to prepare all required manifests or papers, in the lawfully required form, and in the lawfully required number.

8. **INDEPENDENT CONTRACTOR.** Contractor is, and shall perform this agreement as, an independent contractor, and shall have and maintain complete control over all of its employees, agents, and operations.

THE PARTIES HAVE SO AGREED ON X 1/15/90 (DATE)

SIGNATURE: X	for WMI use only SIGNATURE:
TITLE: X	TITLE:
CUSTOMER: X	CONTRACTOR:

POTENTIALLY CONTAMINATED CLOTHING

AND TDSA LINER

TRANSPORTATION MANIFESTS

SENT BY:BROWARD CENTRAL PROCNG: 3-16-90 2:14PM ; 3059755530→ 5198840111:# 1

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY
HAZARDOUS WASTE DIVISION
P.O. BOX 44307
BATON ROUGE, LOUISIANA 70804

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039, expires 9-30-91

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: FLD982217052 — Manifest Document No.: 00 9
2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
Sun Bank/South Florida, N.A. Ft. Lauderdale, Florida 33306
300 West Broward Blvd. attn: Douglas K. Sinclair

4. Generator's Phone (305) 766-7001

A. State Manifest Document Number: LA 1172844
B. State Generator's ID:

5. Transporter 1 Company Name: C.M. Penn and Sons.
6. US EPA ID Number: LAD034190215
C. State Transporter's ID:
D. Transporter's Phone: 504-261-5070

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address
Chemical Waste Management, Inc.
John Brannon Road, Carlyss, La. 70663
10. US EPA ID Number: LAD000777201
G. State Facility's ID:
H. Facility's Phone: 318-583-2168

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. RQ, Hazardous Waste Solid, N.O.S., ORM-E, NA-9189 (EPA K001) ESR-A10896	001	CM	00020	Y	K001
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above
a. Personal protective; Debris, triple rinsed empty drums pontions and bore liner.

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
"I certify that no absorbent has been added to waste described on line a. which would prohibit its being landfilled per RCRA 3004(c)."
If spilled in LA. Contain Material and Contact LDPS Hazmat 504-925-6595 and CWM.
Work Order # _____ CWM 24 Hour Emergency # 305-652-9721 (Safety Dept.)

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize the waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name: [signature] — Signature: Doug Sinclair — Month Day Year: 03 16 90

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: VAN WALTERS — Signature: Van Walters — Month Day Year: 03 16 90

18. Transporter 2 Acknowledgement of Receipt of Materials
Month Day Year

Post-it™ brand fax transmittal memo 7671 — # of pages ▸ 1

To: Steve Dugley	From: Doug Sinclair
Co.: CRA	Co.: Sun Bank
Dept.: 3-16-90	Phone #: 766-7001
Fax #: 572-884-0545	Fax #: 766-7010

Y this manifest except as noted in Item 19.
Month Day Year

EPA Form 8700-22 (Rev. 9/88) Previous edition is obsolete.

GENERATOR COPY

APPENDIX D

DATA VALIDATION REPORT

MEMO

TO: Steve Quigley

FROM: Joanne Staubitz

REFERENCE NO. 3050

DATE: February 28, 1990

RE: Sun Bank -Data Validation

The following memo details an assessment and validation of analytical results received from Radian Corporation (Radian) and Alvarez, Lehman and Associates, Inc. (ALA). Radian analyzed samples for pentachlorophenol (PCP), total suspended solids (TSS), oil and grease, total phenolics and Toxicity Characteristic Leaching Procedure (TCLP) for lead. ALA performed toxicity tests on the samples with the species Daphnia pulex.

Analytical Methodology

The analytical methods used by Radian for the PCP, total phenolics, TSS and oil and grease analyses are accredited protocols from the United States Environmental Protection Agency (USEPA) document "Test Methods for Evaluating Solid Waste," SW-846 3rd Edition, September 1986, Method 8270 and 9065, and USEPA document "Methods of Chemical Analysis of Water and Wastes", March 1983, Methods 160.2 and 413.2, respectively.

ALA performed 96-hour toxicity tests on Daphnia pulex following methods outlined in the USEPA document "Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms, 3rd Edition, 1985. (EPA-600/4-85/013).

Holding Times

Holding time criteria set out in USEPA "Test Methods for Evaluating Solid Waste", SW-846, 3rd Edition, September 1986 have been used in the examination of data received from Radian. The holding times are outlined as follows:

Analytical Group	*Maximum Holding Time -Collection to Analysis*
Phenols	28 days
Oil and Grease	28 days
TSS	7 days

Upon comparison of sample collection dates and analysis dates, it is noted that all samples were analyzed prior to the prescribed holding times.

Holding time criteria for samples used in toxicity tests with Daphnia sp. have been set out by the Ontario Ministry of the Environment at a maximum of five days. Samples sent to ALA were used in the toxicity tests prior to the five day holding time period.

Sample Preservation

All samples collected and submitted to Radian for total phenolics analysis must be qualified "J" since the samples were not maintained at a temperature of 4°C from the time of collection to the time of analysis (see Table 1).

Field QA/QC

Duplicates

As a check on sampling and laboratory precision, duplicate sets of samples were collected and submitted to each of the contract laboratories. Three sets of duplicate samples were collected and submitted to Radian for analysis, while one duplicate sample was sent to ALA for toxicity testing. The duplicate sample results were compared and a relative percent difference (RPD)[1] value calculated. All duplicate sample results indicated acceptable laboratory and field precision, with the exception of the duplicate samples collected for total phenolics and submitted to Radian for analysis (RPD = 26%). The discrepancy in the duplicate sample results may be due, however, to the improper handling and preservation of these samples as discussed earlier. These sample results have already been qualified as shown in Table 1.

Blanks

Rinsate blanks are collected in order to determine the presence of sample contamination resulting from sampling equipment and containers. A total of five rinsate blanks were prepared and submitted to Radian for analysis as water samples. Only one rinsate sample was found to contain detectable levels of analyte. Sample

---

1 $RPD = \frac{X1 - X2}{\bar{X}} \times 100\%$ where

where X_1 = initial sample result
X_2 = duplicate sample result
$\bar{X}$ = mean of duplicate sample results

TABLE 1

SUMMARY OF DATA QUALIFICATIONS DUE TO
IMPROPER SAMPLE PRESERVATION
TOTAL PHENOLICS ANALYSIS
SUN BANK SITE
FORT LAUDERDALE, FLORIDA

Sample ID	*Sample Description*	*Result (mg/L)*	*Qualifier*
BS-3050-WE-01A	Water from tank 801	.0057*(1)	J (2)
BS-3050-WE-02A	Water from Tank 532	.010*	J
BS-3050-WE-03A	Duplicate of BS-3050-WE-02A	.013*	J
BS-3050-WE-04A	Rinsate Blank	ND (.005) (3)	J
BS-3050-WE-05A	Water from sewage treatment plant	0.037	J

Notes:

(1) * The associated numerical value is estimated.
The result is less than 5 times the detection limit (laboratory qualifier).

(2) J - The associated numerical value is an estimated quantity.

(3) ND (.005) - not detected at a detection limit of .005 mg/L.

MS-011090-SQ-04 was found to contain PCP at 420* µg/mL. Because the associated sample results are greater than five times the concentration found in the blank, no data qualifications due to this blank contamination are required.

Laboratory QA/QC

Blanks

The purpose of assessing the results of laboratory/reagent blank analyses is to determine the existence and magnitude of sample contamination problems resulting from ambient conditions within the laboratory setting. All reagent blanks, prepared and analyzed by Radian, were found to be free of contamination. ALA did not provide laboratory blank results and, therefore, no conclusions can be drawn regarding sample contamination problems from within the ALA laboratory.

Surrogate Spikes

As a check on laboratory performance, Radian spiked four water samples and one reagent blank sample, submitted for PCP analysis, with a series of six surrogate spike compounds. All surrogate spike recoveries fell within the associated recovery limits, demonstrating acceptable laboratory performance for PCP analysis.

Matrix Spike/Matrix Spike Duplicate Recoveries

The recovery of matrix spiking compounds indicates the presence or absence of unusual matrix effects. Radian spiked two sets of water samples with acenaphthene, 4-chloro-3-methylphenol, 2-chlorophenol, 1,4-dichlorobenzene, 2,4-dinitrotoluene, N-nitrosodipropylamine, 4-nitrophenol, pentachlorophenol, phenol, pyrene, and 1,2,4-trichlorobenzene and analyzed these samples concurrently with routine samples. Radian also spiked one set of oil samples with PCP. All spike recoveries fell within the designated control limits, demonstrating acceptable laboratory accuracy for determining the concentration of PCP in water and oil samples.

Summary

Based on the assessment detailed in the foregoing, it is recommended that the data produced by Radian and ALA be accepted as accurate and complete with the specific qualifications noted herein.

---

* The associated numerical value is an estimated quantity. The result is less than five times the detection limit (laboratory qualifier).

APPENDIX E

WASTEWATER DISCHARGE PERMIT

3050 -F

City of Fort Lauderdale/Utilities

INDUSTRIAL USER PERMIT

Industrial User: Sun Bank

Business Name (if applicable): Sun Bank/South Florida, N.A.

Mailing Address: 300 W. Broward Blvd.
Street or P. O. Box

Ft. Lauderdale, Fla. 33312
City, State and Zip Code

Facility Address: Same -
Street Address

City, State and Zip Code

The above Industrial User is authorized to discharge industrial wastewater to the City of Fort Lauderdale sewer system and agrees to comply with City's Code of Ordinances Chapter 37 and any applicable provisions of Federal or State law or regulation as they may be amended from time to time and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other conditions set forth herein.

This permit is granted in accordance with the application filed on January 10, 1990 in the office of the Utilities Department, and in conformity with plans, specifications, and other data submitted to the City in support of the above application.

Effective Date: 1/24/90

Expiration Date: 2/24/90

Signed: _____
Authorized Officer of Company

Signed: _____
Utilities Director/Deputy Director

sa0226-3(jm3400)

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To Steve Quigley	From Doug Sinclair
Co. CRA	Co. Sun Bank
Dept. 1-29-90	Phone # 766-7001
Fax # 519-884-0525	Fax # 766-7010

City of Fort Lauderdale/Utilities

Part I

WASTEWATER DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

The Industrial User shall comply with the specific conditions listed below:

Parameter	Discharge Limits	Sample Frequency	Sample Type	Reporting Frequency
phenols	.05 mg/l	*	Grab	*
oil & grease	100 mg/l	*	Grab	*
Tot. suspended solid.	400 mg/l	*	Grab	*

* Must be sampled, tested, and reported to the Utilities Department prior to any discharge to the wastewater system. Discharge subject to approval.

Other:

Toxicity test to be required

Results to be based on no greater toxicity than an average grab sample of the influent to the POTW. Dilution factor to be no greater than 1000 parts of water to 1 part of proposed influent.

City of Fort Lauderdale/Utilities

Part II

SPECIFIC CONDITIONS

1. If applicable and the results of sampling reported in the permit application for Total Toxic Organic (TTO) are below .01 mg/l (10 ppb), the Industrial User may develop a solvent management plan. If the User elects to develop a plan, it will be developed within 90 days from the effective date of this permit. The plan will be submitted to the City for review and approval. Once approved, the Industrial user must comply with the plan and any reporting requirements specified by the City.

2. The Industrial User shall develop, within 90 days of the effective date of this permit, an accidental spill prevention plan to eliminate or minimize the accidental or slug discharge of pollutants into the wastewater system.

3. If required, the Industrial User shall construct a sampling facility(ies) within 90 days of the effective date of this permit. Location and type of facility will be determined by the City.

4. An Industrial User with a periodic batch discharge shall maintain a discharge log book available for inspection by the City. Included in the log shall be the date, time, quantity of discharge, analysis performed, laboratory performing analysis, name of person doing sampling and signature of person recording the event in log book. Records shall be kept for a period of not less than three (3) years.*

5. In order to comply with the wastewater discharge limitations specified in Part I, the Industrial User may be required to make in-plant process modifications and install a treatment facility. A compliance schedule will be developed and adhered to. Progress reports must be submitted to the City as specified by this permit.

*For the purpose of this permit, specific condition number four (4) shall be in effect.

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City of Fort Lauderdale/Utilities

Part III

REPORTING REQUIREMENTS

1. The Industrial User shall notify the City immediately upon any accidental or slug discharge to the sanitary sewer as outlined in the Accidental Release section of the City Code of Ordinances section 37-38(b). Formal written notification discussing circumstances and remedies must be submitted to the City within five (5) days of the occurrence.

2. The Industrial User shall notify and secure the City's approval prior to the introduction of wastewater or pollutants of a nature not previously established in the permit or permit application or any substantial change in the volume of the wastewater being introduced into the POTW from the User's industrial processes. Formal written notification shall follow within thirty (30) days of such introduction.

   The City shall be notified, in writing, prior to an changes made in the pretreatment system.

3. Any condition that results in a temporary state of non-compliance with limitations contained in this permit or other limitations specified in the City's Ordinance must be reported to the City immediately upon discovery of such condition. A written report of such occurrence may be required by the city.

4. The Industrial User must submit to the City, reports of the results of required sampling of the parameters specified in this permit within thirty (30) days of specified sampling period.

5. If a schedule of progress is necessary to achieve compliance by the Industrial User, periodic reports must be submitted on a schedule established by the Utilities Director.

6. Within thirty (30) days following the established compliance date in this permit, the Industrial User shall submit a final compliance report. The Industrial User will be required to sample its wastewater for the parameters specified, and report compliance. Any reasons for not complying and any steps being taken by the User to comply shall be part of the report.

7. All reports shall be submitted to the following address:

City of Fort Lauderdale
Utilities Department
P. O. Box 14250
Fort Lauderdale, FL 33302
ATTN: Environmental Inspections

City of Fort Lauderdale/Utilities

Part IV

STANDARD CONDITIONS

1. COMPLIANCE
The Industrial User shall comply with all the discharge standards listed in Chapter 37 of the City Code of Ordinances and discharge limits specified in this permit.

2. RIGHT OF ENTRY
The Industrial User shall allow the City or its representatives, to enter the premises of the User, at all reasonable hours for the purpose of inspection, sampling, or records review. Reasonable hours for the purpose of inspection and sampling shall include any time that the Industrial User is operating any process which results in a process wastewater discharge to the City's sewerage system.

3. RECORDS RETENTION
The Industrial User shall retain and preserve for no less than three (3) years, any records, books, documents, memoranda, reports, correspondence and any and all summaries thereof, relating to monitoring, sampling and chemical analyses made by or in behalf of the user in connection with its discharge.

All records that pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the City shall be retained and preserved by the Industrial User until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

4. RECORDING OF RESULTS
For each measurement or sample taken pursuant to the requirements of this permit, the user shall record the following information:

a. The exact place, date, and time of sampling;
b. The person doing the sampling;
c. The dates the analyses were performed;
d. The person(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of all required analyses.

5. DILUTION
No Industrial User shall increase the use of potable or process water or in any way attempt to dilute a discharge as partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

City of Fort Lauderdale/Utilities

Part IV

STANDARD CONDITIONS (continued)

6. PROPER DISPOSAL OF PRE-TREATMENT SLUDGES AND SPENT CHEMICALS
The disposal of sludges and spent chemicals generated shall be done in accordance with Section 405 of the Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act. User shall maintain records verifying compliance with this section. The user may be required to submit disposal records to the city on request.

7. SIGNATORY REQUIREMENTS
All reports required by this permit shall be signed by a designated officer of the Industrial User or his designee.

8. REVOCATION OF PERMIT
The permit issued by the City to the Industrial User may be revoked when, after inspection, monitoring or analysis it is determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations. Additionally, falsification or intentional misrepresentation of data or statements pertaining to the permit application or any other required reporting form, shall be cause for permit revocation.

9. LIMITATION ON PERMIT TRANSFER
Wastewater discharge permits are issued to a specific user for a specific operation and are not assignable to another user or transferable to any other location without the prior written approval of the City. Sale of a User shall obligate the purchaser to seek prior written approval of the City for continued discharge to the sewerage system.

10. FALSIFYING INFORMATION OR TAMPERING WITH MONITORING EQUIPMENT
Knowingly making any false statement on any report or other document required by this permit or knowingly rendering any monitoring device or method inaccurate, may result in punishment under the criminal laws of the City, as well as being subjected to civil penalties and relief.

11. MODIFICATION OR REVISION OF THE PERMIT
a. The terms and conditions of this permit may be subject to modification by the City at any time as limitations or requirements as identified in Chapter 37 of the City Code of Ordinances are modified or other just cause exists.

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APPENDIX F

HEALTH AND SAFETY PLAN

Chemical Waste Management, Inc.

ENRAC Division-South
515 West Greens Road, Suite 400
Houston, Texas 77067
713/875-1110

Recd CRA
DEC 2 1989

December 29, 1989

Mr. Stephen M. Quigley, P. Eng.
Conestoga-Rovers & Associates Limited
651 Colby Drive
Waterloo, Ontario, Canada N2V 1C2

Dear Mr. Quigley:

Enclosed please find copies of the required pre-mobilization submittals:

Assigned personnel OSHA training certificates
Physicians medical releases for assigned personnel
Draft Site Specific Health and Safety Plan

Should you have any questions, corrections, or revisions to these materials, please contact Tom Allen, Cesar Garcia, or me.

Sincerely,

Rebecca A. Eklund

Rebecca A. Eklund, CIH
Chemical Waste Management, Inc.
ENRAC-South Health and Safety Manager

Enclosures

DRAFT

SITE SPECIFIC
HEALTH AND SAFETY PLAN

for

PROCESSING AND REMOVAL OF DRUMMED WASTE

at

SUN BANK SITE
FT. LAUDERDALE, FLORIDA

CHEMICAL WASTE MANAGEMENT, INC.
ENVIRONMENTAL REMEDIAL ACTION DIVISION
SOUTHERN REGION
515 WEST GREENS ROAD, STE. 400A
HOUSTON, TEXAS 77067

DECEMBER 29, 1989

PREPARED BY: THOMAS A. ALLEN
REVIEWED BY: REBECCA A. EKLUND, CIH
CP#2023

Printed on recycled paper.

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1.0 INTRODUCTION

1.1 Purpose and Scope

This health and safety plan is intended to prescribe basic procedural and equipment requirements for worker protection. Operating conditions are expected to change as the various phases of the proposed work progress, requiring some modification of the plan. As appropriate, addenda will be proposed by the CWM-ENRAC Site Safety Officer and/or the Division Health and Safety Manager for the Conestoga-Rovers & Associates Engineer's (hereinafter referred to as "the Engineer") review as Sun Bank's representative on site. Changes involving an increase in protective measures may be implemented at the Project Manager's discretion. Changes involving a reduction in protective measures will require the prior approval of both the Engineer and the Division Health and Safety Manager.

1.2 Compliance Goals

This plan is designed to comply with all applicable state and federal OSHA regulations. It is also designed to comply with established CWM-ENRAC Health and Safety Program Policies, Procedures, and Guidelines. Copies of pertinent sections are attached in specific Appendices. Requests for changes to this plan will be reduced to writing and submitted to the Site Safety Officer, the Engineer, and the CWM-ENRAC Division Health and Safety Manager. Any change which upgrades requirements may be initiated immediately. Any change which downgrades these requirements will require the Engineer's and the CWM-ENRAC Division Health and Safety Manager's authorization.

1.3 Site Description

The work involves drum inspection, characterization for processing and segregation of approximately 193 drums containing both liquid (mineral spirits, water) and solid phases. These drums are currently stored under-roof at 300 West Broward Boulevard in Ft. Lauderdale, Florida.

1.4 Work Tasks

Specifically, the project consists of drummed waste identification and preparation of detailed logs, phase separation via decanting and oil/water separation, water treatment (manifolded granular activated carbon system), sludge removal/on-site storage, and triple-rinsing D.O.T-empty waste storage containers.

1.5 Affected Personnel

All CWM-ENRAC site personnel, site visitors, and specialty subcontractor personnel are subject to the provisions of this site specific Health and Safety Plan.

1.6 Personnel and Responsibilities

1.6.1 Field Operations Manager

1.6.1.1 The Field Operations Manager is Mr. D. Ray Mangrum. Mr. Mangrum's professional profile is attached (APPENDIX A).

1.6.1.2 The Field Operations Manager has overall responsibility for all aspects of the project

1.6.2 CWM-ENRAC Health and Safety Manager

1.6.2.1 The CWM-ENRAC Division Health and Safety Manager is Ms. Rebecca A. Eklund, CIH. Ms.

Eklund's professional profile is attached (APPENDIX A).

1.6.2.2 The CWM-ENRAC Health and Safety Manager is responsible for:

1.6.2.2.1 The review and accuracy of the Site Specific Health and Safety Plan.

1.6.2.2.2 Authorization of all changes to the plan.

1.6.2.2.3 Receiving reports on all accidents, injuries, and incidents, and investigating the causes.

1.6.2.2.4 Reviewing and confirming requests for personal protective equipment (PPE) changes.

1.6.2.2.5 Attendance at the Initial Site Specific Health and Safety Training Meeting.

1.6.2.2.6 Performing irritant smoke respirator fit test during the Initial Site Specific Health and Safety Training Meeting on all personnel expected to enter any controlled work zone.

1.6.3 Project Manager (PM)

1.6.3.1 The Project Manager will be Mr. Cesar Garcia. Mr. Garcia's professional profile is attached (APPENDIX A).

1.6.3.2 The Project Manager's is ultimately responsible for all on-site activities.

1.6.4 Site Safety Officer (SSO)

1.6.4.1 The SSO will be Mr. S. Bruce Dill. Mr. Dill's professional profile is attached (APPENDIX A).

1.6.4.2 The SSO has authority to stop work when violations of this Plan or any uncontrolled health or safety hazard exists.

1.6.4.3 The SSO is responsible for:

1.6.4.3.1 Documenting compliance with this Site Specific Health and Safety Plan and its Appendices through the maintenance of a daily Site Safety Officer's Log.

1.6.4.3.2 Reporting all infractions to the Project Manager and the Engineer as soon as possible and to the CWM-ENRAC Division Health and Safety Manager on a weekly basis.

1.6.4.3.3 Maintaining all records required by this Plan, including copies of documentation of training and medical approval to work for all personnel entering any controlled work area.

1.6.4.3.4 Training on-site personnel and visitors (as required).

1.6.4.3.5 Supervising the collection of air monitoring as required by Section 4 of this Plan.

1.6.4.3.6 Comparing air monitoring results to Plan Action Levels and initiating appropriate response actions.

1.6.4.3.7 Participating in meetings with local emergency response entities as organized by the Engineer.

1.6.4.3.8 Maintaining health and safety first aid supplies, emergency equipment, and air monitoring equipment and supplies.

2.0 MEDICAL SURVEILLANCE

2.1 Examination Requirements

2.1.1 Routine Medical Examination Protocol

All CWM-ENRAC personnel on-site shall have successfully completed a preplacement or annual in-service medical examination in accordance with CWM-ENRAC Health and Safety Procedure 6, and consistent with the provisions of the applicable OSHA standards. Documentation of this examination for all personnel on site will be maintained by the Site Safety Officer. This examination includes a complete medical and occupational history, physical examination, and selected biological sampling. Laboratory studies include a complete blood count (CBC); a heavy metal screen; PCB determination; urine analysis; chemistry panel (SMAC); pulmonary function test (FEV1, and FVC); EKG; chest X-ray (PA); pure-tone threshold audiometry; and vision screening, including color acuity determination.

2.1.1.1 Acceptable levels on all tests are prescribed by CWM's consulting occupational physicians'

group. These levels are communicated to all contract local medical providers. Medical providers retain the entire physical record and return a physician's statement of the employee's ability to perform the work, wear personal protective equipment, and wear respiratory protective equipment.

2.1.1.2 A urine specimen is collected during the pre-employment and annual physical on all employees for a drug screen processed by American Medical Laboratories. The results are handled entirely through CWM's consulting occupational physicians' group, Washington Occupation Health Associates. A pre-employment positive test precludes hiring. An in-service positive test precludes work in the field.

2.1.2 Additional Biological Tests

Additional tests may be conducted as recommended by the Health and Safety Manager and deemed appropriate by the occupational physician.

2.2 Emergency Medical Treatment

In the event of an employee injury or illness requiring emergency medical care beyond the capabilities of on-site CPR and first-aid trained personnel, the contingency plan (APPENDIX B--Environmental Management Department Plan [EMD-Plan]) will be utilized to move the injured person(s) to the closest, capable medical facility.

3.0 EMPLOYEE TRAINING AND INFORMATION

3.1 29 CFR 1910.120 Compliance

3.1.1 40 Hour Training

All ENRAC site personnel and sub-contractors who will enter any controlled work zone shall have completed the Basic Safety Training Course to comply with the Hazardous Waste Site Operations training requirements of OSHA (29 CFR 1910.120). The training is provided by the CWM-ENRAC Health and Safety Department or an equivalent, OSHA recognized, entity. This coursework is a combination of formal classroom training, practical exercise, and written and practical performance evaluation.

3.1.2 Supervisor Training

All Field Supervisors shall have completed, as a minimum, an additional eight hours of training in Hazardous Waste Site Supervision.

3.1.3 Update Training

Formal eight hour annual update training is required and documentation will be on site.

3.1.4 Daily Briefings

Daily crew briefings and site specific training will be used to augment the annual refresher courses. Documentation of attendance will be maintained on the Daily Safety Briefing form (APPENDIX C).

3.1.5 Site Safety Officer Training

The Site Safety Officer shall have completed, in addition, the Chemical Waste Management, Inc. 36 Hour Site Safety Officer Training Course.

3.1.6 Site Specific Health and Safety Training

Everyone entering the work area will be required to attend a Site Specific Health and Safety Training briefing. This briefing will include the information presented by the Engineer concerning the site and supervision of CWM-ENRAC's operations, and the information contained in this Site Specific Health and Safety Plan and all its appendices. All attendees will sign a form (APPENDIX C) verifying their attendance and acknowledging the information which has been presented. This briefing will be held on or near the site during the mobilization phase of the project and before any work with hazardous material is begun. This meeting will present the information required per 29 CFR 1910.1200 Hazard Communication.

3.1.7 Respirator Fit Testing

Respirator fit testing, using irritant smoke and half-face or full-face respirators, will be performed at the Site Specific Health and Safety Training meeting.

3.2 Subcontractors and All Site Visitors

All personnel entering any controlled work zone will be required to produce proof of training in compliance with 29 CFR 1910.120, complete the Site Specific Health and Safety Training, including a review of the entire Site Specific Health and Safety Plan, and attend all visit-concurrent daily crew briefings.

4.0 AIR QUALITY MONITORING PROGRAM

Air quality will be monitored in and around the active work location on a routine basis (minimum hourly), and/or as required by special or work-related conditions.

4.1 Organic Vapor Monitoring

4.1.1 Organic vapor levels will be monitored using an intrinsically safe MICROTIP (or equivalent instrument), an explosimenter and oxygen level meter on an hourly basis during active remediation in the work area.

4.1.2 Organic vapor readings in any active working location in excess of 100 parts per million (ppm) for a single reading or 50 ppm for two successive readings will require that all work cease, the area be evacuated, the Project Manager, Site Safety Officer and the Engineer be notified and the source of the organic vapor located and controlled.

4.1.3 Documentation of the calibration of the unit will be maintained by the Site Safety Officer.

4.1.4 Detector tube monitoring may be used whenever questions concerning the composition of the organic vapor become an issue.

4.2 Explosive Atmosphere Monitoring

4.2.1 A Lower Explosive Limit/Oxygen (LEL/O2) detector will be used on site to determine the safety of operations resulting from drum entry and other on-site work phases.

4.2.2 An LEL reading of greater than 10% will require all work to cease and the area to be evacuated until the source of the explosive gas is located and controlled.

4.2.3 An oxygen level of less than 19.5% will require up-wind evacuation until the source of the contaminant displacing 19.5% of the atmospheric oxygen is identified and mitigated via ventilation.

4.2.4 An oxygen level of less than 16% constitutes an IDLH and precludes entry. Forced mechanical ventilation of the area will be employed until the oxygen level has returned to and is maintained at 19% or higher.

4.2.5 Documentation of daily primary gas calibration will be maintained by the Site Safety Officer.

4.3 Reporting

4.3.1 Results of the air monitoring program will be documented by CWM on the Engineer's forms and shall include:

4.3.1.1 Site location date and time.

4.3.1.2 Work phase/operation in process description.

4.3.1.3 Temperature, wind speed and direction.

4.3.1.4 Area sampling location diagram.

4.3.1.5 Pertinent field notes - description of operations and complaints/symptoms, chemicals/materials/equipment in use, engineering/administration controls in effect, personal protective equipment in use, sampling observations,/comments and weather conditions during sampling event.

5.0 GENERAL SAFE WORK PRACTICES

5.1 Eating, drinking, chewing gum or tobacco, smoking, or any practice that presents the possibility of hand to mouth transfer and ingestion of material is prohibited in any and all areas where the possibility of contamination exists by virtue of the work being performed. At a minimum, this includes the Exclusion Zone and the Contamination Reduction Zone. A clean area for breaks will be established between the

initial decontamination procedures set-up and the entry to the decontamination trailer. No chewing gum, chewing tobacco, breath mints, or similar items will be carried into any controlled work area.

5.2 Hands must be thoroughly washed upon leaving any area designated as contaminated or suspected of contamination. No eating, drinking, smoking, or any similar activities may be performed before hands are thoroughly washed.

5.3 Thorough washing of the entire body and shampooing of hair should be accomplished whenever decontamination procedures for outer garments are in effect. The washing and shampooing should occur as soon as possible after the final wearing of protective garments and each time the person leaves the job site.

5.4 Legible and understandable precautionary labels shall be prominently affixed to all containers, including containers of raw materials, intermediates, products, mixtures, scrap, waste, debris, and contaminated clothing.

5.5 Contaminated protective equipment shall not be moved from the Contamination Reduction Zone to the Support Zone until it has been adequately cleaned and decontaminated or properly packaged and labeled as contaminated material.

5.6 Removal of contaminants from protective clothing or equipment by blowing, shaking, or any other means which may disperse materials into the air is prohibited. If wet methods for cleaning are unavailable, High Efficiency Particulate Air filtered vacuums may be used.

5.7 Portable or fixed emergency shower/eyewash stations shall be strategically located on-site. Every effort will be made to maintain the water at a comfortable temperature. Fixed showers (if available) shall be run at least once per shift to clear the lines and confirm water pressure. Portable showers shall be checked each shift and drained and refilled weekly.

5.8 A deluge shower or hose and nozzle shall be available if needed at the exit from the Exclusion Zone to wash down heavily contaminated personnel in emergencies. Wash facilities (tubs with soap solution and brushes) to remove heavy contamination before crossing the Contamination Reduction Zone will be established. Additional decontamination will be performed at the entry to the Support Zone before removing protective clothing.

5.9 Personnel on-site must use the "buddy" system when wearing any respiratory protective equipment. Communication between members must be maintained at all times. Emergency communications, to be used in case of radio breakdown or lack of radios, shall be prearranged. Visual contact must be maintained between buddied pairs on-site and each team should remain in close proximity to allow assistance to each other in case of emergencies.

5.10 Personnel shall inform each other of subjective symptoms of chemical exposure such as headache, dizziness, nausea, sleep disturbances, and irritation of the respiratory tract, eyes, or skin.

5.11 No facial hair which interferes with a satisfactory fit of the mask-to-face seal, will be allowed on personnel required to wear respiratory protective equipment.

5.12 All respiratory protection selection, use, and maintenance shall meet the requirements of established CWM-ENRAC procedures, and recognized consensus standards (American Industrial Hygiene Association, Occupational Safety and Health Administration, American National Standards Institute, National Institute for Occupational Safety and Health).

5.13 Appropriate work areas for Support, Contamination Reduction, Exclusion, and Equipment Decontamination will be established. Zones may be relocated as the work progresses. Additional areas or zones may be established as needed with the approval of the Project Manager, Site Safety Officer, and the Engineer.

5.14 All ENRAC and subcontractor personnel on-site are to be thoroughly briefed on the anticipated hazards, equipment requirements, safety practices, emergency procedures and communications methods, both initially and in routine briefings. These "routine" briefings will be held daily and attendance will be verified by signature. The contents will be adequate to comply with 29 CFR 1910.1200 Hazard Communication requirements, whether the site operation is exempted from the regulation or not.

5.15 As far as practical, all demolition will be accomplished using cold cutting techniques. When necessary, torch cutting will be used. Prior to any "hot work" being performed, CWM Hot Work Permits Procedure #15 (APPENDIX D) will be followed.

5.16 Any skin contact with surface water shall be avoided. Appropriate measures will be taken to reduce the exposure of personnel to rinsate water during decontamination of the area and equipment.

5.17 The ambient temperature will be monitored and the necessary controls to reduce employee heat or cold stress will be implemented. All personal protective equipment, as specified in the EMD Plan and this Health and Safety Plan will be used. Additional clothing will be supplied for cold stress situations. In heat stress situations, a shaded rest area will be provided, a reduced work:rest schedule will be used, and, in extreme instances, the use of man-cooling vortices or ice vests will be instituted. Should heat stress still be a concern, CWM Heat Stress Procedure 37 will be followed. (APPENDIX E).

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Introduction

It is important that personal protective equipment and safety requirements be appropriate to protect against the potential hazards at the site. Protective equipment is selected based on the contaminant type(s), concentration(s), and routes of entry. In situations where the type of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the personal protective equipment. In these cases, personal protective equipment is selected to provide adequate protection for the "worst case" scenario.

6.2 Levels of Protection

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Should be selected when the highest level of respiratory protection is needed, but a lesser level of skin protection is required.

Level C: Should be selected when the type(s) of airborne substance(s) is(are) known, the concentration(s) is(are) measured, and the criteria for using air-purifying respirators are met.

Level D: Should not be worn on any site with respiratory or skin hazards. Is primarily a work uniform providing minimal protection.

6.3 Required Protection

6.3.1 Each task, as determined by the Project Manager, has an assigned level of personnel protection included in the EMD Plan. (APPENDIX B--Section XI). These levels are based on the EPA Levels described in Section 6.2 of this plan, OSHA requirements, or a specified modification necessitated by the site or activity.

6.3.2 For the majority of the processing work involving potential for skin contact with liquids/sludge, a modified Level C requiring upgraded respiratory protection will be required. During site mobilization, equipment set-up, site clean-up, demobilization and other work phases not involving waste processing, Level D will be adequate, unless the site conditions require an upgraded level of protection.

6.3.3 ENRAC will provide its employees with appropriate personal protective equipment as specified in the EMD Plan. Only NIOSH/MSHA certified respiratory protective equipment will be utilized.

7.0 SITE SECURITY AND ENCLOSURES

7.1 Site Security

7.1.1 Site Security will be provided Sun Bank, if current security in inadequate.

7.1.2 CWM-ENRAC will, however, provide assistance in maintaining security (lock entry gate) when off-site.

7.1.3 CWM-ENRAC will limit vehicular access to authorized vehicles, maintain (and post) visitor and site sign-in/sign-out log, and a log of any security incidents.

7.2 Enclosures

7.2.1 Existing temporary fencing supplied by Sun Bank will be utilized for this project.

7.2.2 Work areas will be delineated per Section 8.0 of this plan using barrier tape with legends as specified by the US EPA for hazardous waste remediation sites.

8.0 WORK ZONES

8.1 General

8.1.1 A site must be controlled to reduce the probability of exposure to any contaminants present and to limit the transport of contaminants by personnel or equipment from the site.

8.1.2 A control system is required to assure that personnel and equipment working on the hazardous waste site are under appropriate health and safety surveillance. This includes the presence of a Site Safety Officer on site at all times.

8.1.3 The possibility of exposure or translocation of contaminants can be reduced or eliminated in a number of ways. Several which will be used are:

- Minimizing the number of personnel and equipment onsite consistent with effective operations.
- Establishing clearly marked work zones within the site.
- Establishing control points to regulate access to work zones.
- Conducting operations in a manner to reduce the exposure of personnel and equipment.
- Minimizing the airborne dispersion of contaminant(s) through professional equipment handling methods and soil moisture control.
- Implementing appropriate decontamination procedures for personnel and equipment.

8.2 <u>Field Operations Work Areas</u>

Work areas (zones) will be established based on work to be performed and the anticipated contamination level. Actual internal zones boundaries will be demarcated by barrier tapes. The outer Support Zone boundary will be fenced wherever possible. Within these zones, prescribed operations will occur utilizing appropriate personal protective equipment as assigned by task. Movement between areas will be controlled at access points. The planned zones are

- Exclusion Zone (contaminated);
- Contamination Reduction Zone (including a Clean Break Station);
- Support Zone (non-contaminated); and
- Equipment Decontamination Zone.

8.2.1 Exclusion Zone

The Exclusion Zone is ideally the innermost area of three concentric rings and is considered contaminated, dirty or "hot." Within this area, the prescribed protection (see APPENDIX B-EMD Plan) reflects the highest exposure anticipated for any task and must be worn by all entering personnel whether engaged in that task or not. An entry checkpoint or portal will be established at the periphery of the Exclusion Zone to control the flow of personnel and equipment between contiguous zones and to ascertain that the procedures established to enter and exit the zones are followed. The Exclusion Zone boundary will be established in accordance with the work schedule to contain all of the area under active remediation. The boundary will be physically secure and posted.

8.2.2 Contamination Reduction Zone

Between the Exclusion Zone and the Support Zone is the Contamination Reduction Zone. The purpose of this zone is to provide an area to prevent or reduce the transfer of contaminants which may have been picked up by personnel or equipment returning from the Exclusion Zone. All decontamination activities occur in this area.

A Clean Break Station will be established in the Contamination Reduction Zone. Entry into this area

will require decontamination per the Decontamination Schematic through the Field Wash. This area will be available for eating, smoking, drinking and using the toilet facilities.

The boundary between the Support Zone and the Contamination Reduction Zone is the contamination control line. This boundary separates the possibly-contaminated area from the clean zone. Entry into the Contamination Reduction Zone from the clean area will be through an access control point or portal. Personnel entering this zone, for whatever reason, will wear the prescribed personal protective equipment for working in the Contamination Reduction Zone (see APPENDIX B-EMD Plan). Exiting the Contamination Reduction Zone to the clean area requires the removal of any suspected, or known, contaminated personal protective equipment and compliance with decontamination procedures.

8.2.3 Support Zone

The Support Zone is the outermost of three rings and is considered a non-contaminated or clean area. It contains the Emergency Command Post for field operations and other elements necessary to support site activities. Normal street or Level D work clothes are the appropriate apparel within this zone.

8.2.4 Equipment Decontamination Zone

The Equipment Decontamination Zone is established as appropriate to clean vehicles and equipment by the most effective method and without requiring additional

movement of the equipment. Personal protective equipment required for equipment decontamination activities is prescribed in the EMD Plan (see APPENDIX B-EMD Plan).

8.3 Zone Dimensions

Considerable judgement is needed to assure safe working distances for each zone, balanced against practical work considerations. Physical barriers may constrain ideal locations. The zones will be placed where practical with the approval of the Project Manager, the Site Safety Officer, and the Engineer.

9.0 DECONTAMINATION PROCEDURES

As part of the system to prevent or reduce the physical transfer of contaminants by people and/or equipment from on-site, procedures will be instituted for decontaminating anything leaving the Exclusion Zone, Contamination Reduction Zone, or Equipment Decontamination Zone. These procedures include the decontamination of personnel, protective equipment, monitoring equipment, heavy machinery, clean-up equipment, etc.

9.1 Equipment Decontamination

9.1.1 Unless demonstrated that a particular piece of equipment is not contaminated, everything leaving the Exclusion Zone is considered contaminated and will be appropriately decontaminated.

9.1.2 In general, decontamination of equipment at the site will consist of physical removal of gross contamination by wiping or brushing down the area of contamination, wiping or spraying with mineral spirits, followed by

a detergent/water solution wash, and a final rinsing with clean water.

9.1.3 All wash water will be collected, processed through the waste water treatment system and disposed under the direction of the Engineer.

9.1.4 Any items for which decontamination is impossible will be placed in clearly marked and dated disposal containers which will be disposed with the sludge or left on site.

9.2 Personal Protective Equipment Decontamination

9.2.1 All non-disposable personnel protective equipment worn into the Exclusion Area will be decontaminated upon leaving the Contamination Reduction Zone.

9.2.2 Those items of personal protective equipment for which decontamination is impossible or, for which the non-hazardous disposal scenario is unacceptable, will be placed in clearly marked and dated disposal containers which will be disposed by the Engineer with the waste or left on-site.

9.2.3 All personal protective equipment decontaminated by detergent/water wash and rinse will be air dried.

9.2.4 The decontamination of personal protective equipment used for work in the Contamination Reduction Zone only is less complex than that for items used within the Exclusion Zone.

9.2.5 Spent brushes, sponges, containers, stands, etc., used in the decontamination process will be decontaminated using the procedures listed in Section 9.1 of this plan, if possible. Any waste products unfit for approved, non-hazardous disposal will be placed in clearly marked and dated disposal containers and

disposed by the Engineer with the sludge or left on-site.

9.3 Personnel Decontamination

9.3.1 Personnel who have donned personal protective equipment and entered the Contamination Reduction Zone or the Exclusion Zone, must use all decontamination procedures prescribed, regardless of the type or amount of work performed in these controlled zones.

9.3.2 Personnel will wash and remove personal protective equipment in the order found in the Decontamination Schematic (APPENDIX F).

9.3.3 A Field Wash (detergent/water wash and rinse of the entire face and hands up to the elbows) is required before entering the Clean Break Station. Eating, drinking, smoking, or any activity involving hand to mouth action, and use of the toilet facilities in the Clean Break Station requires a Field Wash.

9.4 Decontamination Schematic

The Decontamination Schematic is specified in APPENDIX F.

10.0 EMERGENCY RESPONSE PLAN

10.1 Site Emergency Warning System

Several warning systems may be utilized depending on the work-site conditions, the type and the degree of emergency involved. Among those available and appropriate for this site are

- Verbal communications
- Vehicle horns
- Portable hand-held compressed gas horns

- Telephones
- Two-way radios (if deemed necessary)

10.1.1 Verbal instructions with or without assistance are used to deal with specific incidents.

10.1.2 Horn signals are used to signify an emergency warning.

10.1.3 One long blast of vehicular or compressed gas horns is used on-site to signify emergency evacuation of the immediate work area to the predetermined rally point (as covered in the daily Safety and Health briefing), where a head count will be taken and further instructions given.

10.1.4 Repeated short blasts are used on-site or from off-site to signify evacuation of all personnel from the Exclusion Zone to the hot line where further instructions will be given after a head count is taken.

10.2 Emergency Equipment

The following equipment shall be available at the work site:

- First aid kit (10 man, including chemical burn kit)
- Emergency oxygen kit
- Two SCBA units
- Two Level B PPE sets
- Portable, pressurized eyewash and shower
- Hand-held compressed gas horns
- Personnel decontamination trailer, with adequate support materials, e.g., shampoo, soap, towels, blankets, nail brushes, etc.
- Appropriate spill containment and clean-up supplies and equipment
- Fire extinguishers, one 20# ABC, two smaller units
- Litter or stretcher
- Crutches

10.3 General Emergency Procedures

In case of an emergency or hazardous situation, the team member that observes this condition shall immediately give the alarm.

10.3.1 Upon hearing an alarm, all communications will cease and the member giving the alarm will proceed to give the Project Manager, Site Safety Officer and the Engineer all pertinent information.

10.3.2 Actions to be taken will be dictated by the emergency.

10.3.3 Power equipment will be shut down and operators will stand by for instruction.

10.3.4 Injured personnel will be, so far as necessary and prudent, processed through the entire Decontamination Process and the Personnel Decontamination Trailer.

10.3.5 In case of a fire, explosion and/or hazard alarm, individuals will proceed immediately to the rally point assigned in the Daily Safety and Health briefing.

10.3.6 Upon arrival at the rally point, a complete head count will be given to Project Manager, Site Safety Officer and the Engineer. Individuals will stay at the rally point until the area is secured and they are instructed to return to work by the Project Manager.

10.4 Personal Injury

10.4.1 If an injury occurs due to an accident or exposure to a hazardous substance, the CWM-ENRAC Command Post will be notified immediately.

10.4.2 The Site Safety Officer will be given all appropriate information concerning the nature and causative agents of the injury so that treatment preparations can be initiated.

10.4.3 If, in the Exclusion Zone, the injured person will be transported to the hot line where appropriate first aid, decontamination and treatment can begin.

10.4.4 If the injuries are beyond the capabilities of the CPR/1st Aid trained personnel on site, the injured employee will be transported to the nearest, capable medical facility (previously identified and in the EMD Plan--APPENDIX B) by the most logical mode of transportation, following the route in the EMD Plan Contingency Plan.

10.4.5 The SSO, or his designee will phone the hospital to inform them that the injured party is enroute and will describe the injuries to the emergency room personnel.

10.4.6 The Project Manager will be informed and will, with the Site Safety Officer and the Engineer, investigate the cause of the injury and make any necessary changes in work procedures.

10.5 Fire or Explosion

10.5.1 A detailed site contingency plan, as attached to the EMD-Plan, (APPENDIX B) will be completed before any work begins. This formalized plan includes emergency phone numbers, route maps to emergency services, rally points, and other information pertinent to the site operations.

10.5.2 Either fire or explosion will require a general evacuation alarm. After a head count at the rally point, at the direction of the Project Manager, any available earth moving equipment may be used to smother the fire with soil. If this is not prudent, the Fire Department will be notified immediately.

10.6 Off-Site Emergency Contingencies

10.6.1 The Engineer will be assisted in the preparation of an Off-Site Emergency Contingency Plan.

10.6.2 CWM-ENRAC Project Manager and Site Safety Officer will attend the Coordination Meeting with local emergency response and/or law enforcement personnel as scheduled by the Engineer. Other members of CWM-ENRAC management may attend as available.

10.6.3 CWM-ENRAC will coordinate immediate first aid emergency response with local medical providers and ambulance services.

11.0 NOISE CONTROL

11.1 Equipment Maintenance

Equipment will be maintained in good operating order for operational reasons as well as the peripheral benefit of reduced noise generation. Mufflers (in operating order) will be maintained on each piece of heavy equipment.

11.2 Personal Protective Equipment

Ear plugs will be worn by all heavy equipment operators during the operation of their equipment. The use of earmuffs over the ear plugs is optional. The use of earmuffs alone in conjunction with the use of the required safety glasses is not allowed.

12.0 LIGHTING

Lighting in conformance with or in excess of 29 CFR 1910.120 requirements will be secured by CWM-ENRAC if not readily available on site. No work will be performed in any inadequately lighted areas. All site travelways will be adequately lighted during all work shifts.

13.0 RECORDKEEPING

13.1 General

Recordkeeping shall be consistent with OSHA regulations in all respects. The following permanent records will be maintained in both the regional Health and Safety Office and at the site:

13.1.1 Safety Inspection Reports

13.1.2 Exposure Monitoring Records (a report form will be used for the Engineer [APPENDIX C] and a bound permanent log book will be used for site documentation)

13.1.3 OSHA 200 Log and Summary of Occupational Injuries and Illnesses - Current within 72 hours will be maintained in the Regional Office

13.1.4 Accident reports consistent with the established CWM-ENRAC procedures.

13.1.5 Respirator fit test records on irritant smoke for negative pressure air purifying respirators, half face and full face (APPENDIX C).

13.1.6 Training certificates documenting 29 CFR 1910.120 training requirement compliance for all on-site personnel.

13.1.7 Written verification of physician's approval for each person on site to wear personal protective equipment, use a respirator and perform the work assigned.

13.1.8 The Health and Safety Log, which documents the Site Safety Officer's daily activities pertaining to Health and Safety Compliance.

13.1.9 Copies of 1st Aid/CPR certificates for all personnel on site so certified.

13.2 Medical Records

Permanent medical records for all on site personnel shall be maintained in confidential files by the regional contract physicians. The physician's statements of medical capability to perform job functions and wear respirator protective equipment shall be maintained by the ENRAC Division Health and Safety Manager. Copies will be available on site for review.

APPENDIX A

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PROFESSIONAL PROFILE

RAY MANGRUM
SENIOR PROJECT MANAGER

EXPERIENCE

Long-standing history of coordinating on-site operations for major superfund and private enterprise cleanups. Recently completed Highlands Acid Pit Superfund project on time and within the project budget. Supervised solidification, excavation, and transportation of hazardous materials for the EPA during emergency Response Operations.

Supervised emergency response actions for several operations in the Southwest Region.

EDUCATION

Northeast University and Bossier Parish Community College, Business Major

Red Cross Basic First Aid
Red Cross CPR
CWM Site Safety Officer Training
LSU Fireman Training

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PROFESSIONAL PROFILE

REBECCA EKLUND, CIH
DIVISION HEALTH & SAFETY MANAGER

EDUCATION

1974-1976 MS, Industrial Hygiene, Central Missouri State University; Warrensburg, Missouri

1971 18 Graduate Hours; English Literature Creighton University; Omaha, Nebraska

1970-1971 BA, Summa Cum Laude, English, Bellevue College; Bellevue, Nebraska

1967-1969 Virginia Polytechnic Institute; Blacksburg, Virginia

CERTIFICATION

American Board of Industrial Hygiene, Comprehensive Practice #2023

EXPERIENCE

Chemical Waste Management, Inc., ENRAC Division, Division Health and Safety Manager, Houston, Texas

Aug, 1988 to Present: Responsible for industrial hygiene and safety aspects of hazardous waste site remediation operations; includes training, supervision of medical physical requirements, approval of personal protective measures, maintenance of safety and industrial hygiene equipment and supplies, and assurance of governmental regulation compliance.

Arch Consulting Services of Texas, Inc., Vice President, July, 1987 to August, 1988; Houston, Texas

Responsible for industrial hygiene project management for clients of the corporation; included submitting proposals, preparing asbestos abatement specifications, preparing monitoring schemes, managing onsite asbestos abatement and general industrial hygiene projects, advising clients on safety regulations, and interpreting governmental regulations.

Course instructor for courses on hazardous substances and asbestos worker, supervisor, and AHERA training.

Industrial Hygiene Project Manager, October, 1986 to July, 1987, Arch Consulting Services, Inc.; Baton Rouge, Louisiana

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Responsible for surveying, preparing specifications and managing on site projects, advising clients on safety and health regulations, and interpreting governmental regulations.

Course instructor for LSU asbestos worker, supervisor, and AHERA inspector training.

Freeport-McMoRan, Inc., Corporate Industrial Hygienist, October, 1979 to December, 1986, New Orleans, Louisiana

Responsible for the formulation of industrial health policies for the domestic properties of Freeport-McMoRan, Inc. Vice Chairman of the company TSCA Substantial Risk Assessment Committee. Freeport representative on occupational health committees of the American Mining Congress, The Fertilizer Institute, and the China Clay Producers. Instrumental in presentation of several in-house seminars on environmental and health concerns.

Tulane University; School of Public Health & Tropical Medicine, Department of Environmental Health Sciences--Adjunct Faculty.

Nalco, Chemical Company, Industrial Hygienist, September, 1978 to December, 1979, Garyville, Louisiana

Responsible for all industrial hygiene activities at this batch process water treatment chemical manufacturing facility. Several OSHA and suspect carcinogens in use. Performed respirator quantitative fit testing; installed continuous gas monitor; performed personnel monitoring; evaluated noise exposure; and formulated emergency procedures.

Delgado Junior College, New Orleans, Louisiana--Adjunct Faculty.

U.S. Department of Labor, Occupational Safety and Health Administration, Industrial Hygienist, July, 1976 to September, 1978, New Orleans, Louisiana.

Responsible for conducting total work place health inspections of all types of private industry. Selected to serve a sixty-day detail in the Technical Services Section of the OSHA Regional Office, Dallas, Texas. Industries inspected included a metal refinery, shipyards, agri-chemical complexes, grain elevators, and paint manufacturers.

PROFESSIONAL AFFILIATIONS & MEMBERSHIPS

AIHA; AAIH; ACGIH; Gulf Coast Section of AIHA; Occupational Health and Safety Committee, The Fertilizer Institute, 1980-1986; Occupational Health Committee, American Mining Congress, 1980-1986; Louisiana Industrial Health Council, 1983-1986; ASTM Synthetic Silica Exposure Task Force-16 of E-34 Committee, 1979-1985; Louisiana Environmental Health Association

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PROFESSIONAL PROFILE

CESAR GARCIA
PROJECT MANAGER

EDUCATION

M.S., Civil Engineering, Texas A&M University College Station, Texas, 1988

B.S., Agricultural Engineering, Texas A&M University College Station, Texas 1979

EXPERIENCE

1988 - Present. CWM-ENRAC Project Manager responsible for on-site implementation of hazardous waste site remediation projects.

1986 - 1988. Woodward-Clyde Consultants Houston, Texas, Staff Engineer

Experienced in the field of hazardous waste management and geotechnical engineering including several site manager positions, assistant site manager on a Superfund site; involvement in a variety of field activities concerning hazardous waste and non-hazardous related sites in Texas, Pennsylvania, Illinois, Mississippi, New York, and Nebraska; participation in the preparation of RCRA Part B applications for hazardous waste landfills; co-author on several reports for various industrial clients.

Scope of responsibilities included site interpretation of subsurface conditions, installation of monitoring wells, ground and surface water sampling, borehole logging and sampling, geophysical borehole logging, analysis and design of geotechnical structures, geotechnical construction, and slurry cut-off walls inspection.

May, 1984 - June, 1986 - Texas Transportation Institute, College Station, Texas, Research Assistant

Scope of responsibilities included design and construction of specialized laboratory tests and computer programs to be applied in the area of expansive soils.

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PROFESSIONAL PROFILE

BRUCE DILL
PROJECT MANAGER

EXPERIENCE

Mr. Dill performs project management duties on remedial hazardous waste cleanup projects, as well as planning, cost estimating, supervision, and execution of remedial operations, including hazardous waste sites from 1985. He interfaces with state and local agencies and coordinates between company management and clients. Mr. Dill is also responsible for the implementation of all approved methods for personnel safety on job sites. In addition, he has completed environmental training courses in hazards and protection, confined space entry, emergency response, hazard categorization, hazardous chemical handling, excavation safety, and project management professional development (basic and advanced).

Successful completion of past projects has demonstrated Mr. Dill's ability in the following areas:

- Site assessment, bid and work plan preparation;
- Full responsibility for site cleanups involving the removal of pesticides and investigation of buried drums;
- Supervising and scheduling all activities at several on-going sites in continuous operation;
- Administering contracts with both clients and major subcontractors;
- Preparation of technical reports for submittal to clients and regulatory agencies;
- Cost and budget control, including claim and Change Order submittal and overall review of invoicing functions;
- Overall responsibility for health and safety practices.

Past projects include:

- In-situ solidification and encapsulation of a 40,000 cubic yard lagoon for a Fortune 500 company at its Lonoke, Arkansas facility;

- Cleaning and removal of TEL-contaminated above-ground storage tanks;

- Cleanup and shredding of PCB-contaminated articles sponsored by Clean Sites, Inc. This operation consisted of a 15-man crew and lasted nine months; and

- Supervision of drummed materials, bulk solids and liquids for one year for the CWM Technical Services Division.

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EDUCATION

High School, York, Alabama
Red Cross Basic First Aid
Red Cross CPR
CWM Site Safety Officer Training

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APPENDIX B

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CHEMICAL WASTE MANAGEMENT, INC.
ENRAC DIVISION
SOUTHERN REGION
PAP B-900 - SECTION IX
ACTIVITIES MANAGEMENT PLAN
(EMD PLAN)

PROJECT: SUNBANK, Ft. LAUDERDALE		
JOB #:	DATE SUBMITTED:	PREPARED BY:
73237	12/14/89	THOMAS W. ALLEN PDM - FLORIDA

PLAN APPROVAL	
REBECCA A. EKLUND, C.I.H.	HEALTH & SAFETY MANAGER
SIGNATURE: Rebecca A. Eklund	DATE: 12-29-89

CUSTOMER NAME: SUN BANK c/o CONESTOGA-ROVERS	FACILITY LOCATION (IF DIFFERENT): SUN BANK
ADDRESS: 651 COLBY DR	300 WEST BROWARD BLVD
WATERLOO, ONTARIO CANADA N2V1C2	FT. LAUDERDALE FL
CONTACT NAME: STEVE Quigley Rick Sheppard	PROJECTED START DATE: JAN 2 1990
TELEPHONE: 519 8840510 *	PROJECTED COMPLETION DATE: JAN 20, 1990
NEW PROJECT: [X] YES [_] NO CONTRACT IN PLACE: [X] YES [_] NO ** PREVIOUS EMD PLAN: [_] YES [X] NO (IF YES AND LESS THAN ONE YEAR OLD, COMPLETE THIS PAGE ONLY, ATTACH PREVIOUS EMD-PLAN.)	COMMENTS: Job has FIXED End date of JAN 28 (Per CONTRACT)

* FAX TO WATERLOO OFFICE (519) 884 0525

** Should be Signed 12/15/89

JOB SITE VISITS

VISITOR AND DATE:	PURPOSE OF VISIT:
JOE ANDERSON Sept. 1989	SITE TOUR

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I. HEALTH & SAFETY PROGRAM OVERVIEW

POLICY STATEMENT

Chemical Waste Management employees are our most important asset and their well-being our greatest responsibility. The health and safety of every employee is a primary consideration in every business decision and plan. The protection of employees, the public and the environment is CWM's goal. This goal is accomplished by assuring that all employees are knowledgeable about potential hazards and accident prevention. This Health and Safety Plan has therefore been established to set the requirements and guidelines for management and employee work practices.

LINE OF AUTHORITY

All remedial action and emergency response activities will be managed by an on-site project manager. This individual has the ultimate responsibility for the health and safety (H & S) of employees under his/her charge. Implementation and enforcement of H & S activities are directed by this individual. The Site Safety Officer, an employee who has completed more advanced Health and Safety Training, must be assigned to the project. Employees are expected to follow established H & S Procedures and Guidelines and to report any discrepancies or incidents that may create an occupational hazard.

HAZARD EVALUATION

Prior to commencement of operations, an operations representative will review the worksite for health and safety as well as operational considerations. The Division Health and Safety Manager reviews the information and offers comments. This information is then compiled into an Environmental Management Department (EMD) Review Plan for health and safety, environmental and other regulatory considerations. Operations will not commence until the EMD Plan approval has been received.

COMMUNICATIONS AND TRAINING

All employees will attend Health and Safety training prior to commencement as required by the CWMI Health and Safety Program and Regulatory Requirements (e.g. Federal OSHA 29 CFR 1910.120). This training is provided by qualified CWMI employees and is supplemented by outside training programs. Supervisory employees are required to attend more advanced Health and Safety and Regulatory Training. Training records are maintained in the Health and Safety Department of the home office for the operations group. All employees must be trained in the specific on-site H & S considerations and the contingency plans and sign an acknowledgement upon receipt of such training. Finally, project employees must attend daily safety briefing to discuss pertinent and current H & S issues.

ACCIDENT INVESTIGATION

All incidences, accidents and injuries occurring at the worksite shall be reviewed by the supervising employee as well as the Division Health and Safety Manager. The employee and the supervisor are required to submit accident investigation reports as soon as feasible.

INFORMATION FEEDBACK

The site activities are constantly scrutinized by the Division Health and Safety Manager to insure that the Site Health and Safety Plan is satisfactory and is being complied with. Regional or Corporate Health and Safety Managers audit operations on at least a semiannual basis. Monitoring results of previous activities are used as a tool to develop Health and Safety plans for future activities. Review of completed projects, incidents, and near-incidents, are conducted to improve subsequent project planning.

On-site activities occasionally require changes in scope of operations or worker protection. EMD Plan revision approval must be obtained prior to such changes. This may be a verbal approval immediately followed up by a written confirmation.

WRITTEN PROGRAMS

Written programs governing general site activities are located in the home office of the operating group. The on-site EMD Plan and contingency plans will include any site specific requirements needed to supplement the plans.

II. SCOPE OF WORK (DETAILED)

DRUM Inspection (~193 55-Gallon), Characterization, Waste Segregation by Phase (Mineral Spirit, water, Pentachlorophenol Sludge (F027)) and processing of water/Mineral Spirit Phase through oil water separator (to be constructed on-site) and final treatment of H_2O through MANifolded GAC Units.

- [_] Soil Excavation
- [_] Building Decontamination
- [_] Equipment Decontamination
- [_] Drum Sampling/Management
- [_] Labpack
- [_] Tank Excavation
- [_] Transformer Retrofit
- [_] On-Site Treatment
- [X] On-Site Storage
- [_] Asbestos
- [_] Construction
- [_] Demolition
- [_] Dewatering
- [_] Pond Cleanup
- [X] ~~Phase~~ Segregation

- [_] Emergency Response?
- [_] Community Relations Involvement
- [_] Corporate Risk Management Notification?
  - Person Notified: _____
  - Date of Letter: _____

III. HAZARD EVALUATION (IDENTIFY SPECIFIC HAZARD, TASK, OR LOCATION)

List Major Contaminants/ Concentrations or Attach Chemical Analysis

Mineral Spirits

F027 Sludge (Pentachlorophenol)

Physical Hazards (Utilities, Terrain Flood, Unstable Soil, Etc.)

Utilization of Equipment - Fork Lift/Pumps

OSHA/ACGIH/NTP/IARC

- [_] Carcinogens _____ chemical
- [X] Regulated Mat'ls RCRA (Penta) regulation
- [X] MSDSs Attached

GWMPS No(s). No off-Site Disposal

- [_] Included
- [_] Approved _____ site(s)
- [_] To be completed on site
- [_] Submitted for approval

IV. MANPOWER (INCLUDE NAMES)

- [X] P.M. / SSO Cesar Garcia
- [_] H&S O _____
- [X] SSO S. Bruce Diul
- [_] Env Smplg Tech _____
- [X] Technician 2
- [_] Chemist _____
- [X] Operator(s) Fork Lift ONLY

List below all subcontractors utilized (including sub's)

CH Penn (Rolloff Box, TANKERS)	Prequalified? [X] Yes [_] No	
Robbie D. Wood (Rolloff/TANKERS ALT)	Prequalified? [X] Yes [_] No	
	Prequalified? [_] Yes [_] No	
	Prequalified? [_] Yes [_] No	

Explanation for any non-prequalified subcontractors utilized:

V. MATERIAL HANDLING EQUIPMENT/MATERIALS

(indicate size or description)

- [_] backhoe _____
- [_] centrifuge unit _____
- [_] crane _____
- [_] dozer _____
- [X] drums overpack for storage (3)
- [_] drum crusher _____
- [_] drum grabbers _____
- [_] cutting/welding machine (Torch should be onsite)
- [_] filtration unit _____
- [X] forklift Hertz (ETLand) has one
- [_] front-end loader w/ Drum Grapples
- [_] man-lift _____
- [_] plate & frame unit _____
- [X] pump & hoses _____
- [_] sampling equipment _____
- [_] _____

VI. TRANSPORTATION & DISPOSAL INFORMATION

Transporter(s) WMI disposal of Now Has Regis (Southern Shorthaul)

- [_] end-dumps
- [_] flatbeds
- [_] vacuum tankers
- [_] _____

Tarps [_] Yes [_] No

Ultimate Disposal Facility(ies)

- [_] CWMI, Carlyss, LA
- [_] CWMI, Emelle, AL
- [_] CWMI, Port Arthur, TX
- [_] SCA, Chicago, IL
- [_] TWI, Sauget, IL
- [_] Non-WMI - Approval Obtained
- [_] Waste Sampling Required: Describe Method _____

VII. PERMITS NECESSARY

Outside Regulators:

- [X] Local (specify) PM Should Check
- [_] Environmental
- [_] State
- [_] Federal
- [_] Other

CWM PAP Permitting Procedures:

- [_] Confined Space/Vessel Entry
- [_] Grounding/Bonding
- [X] Hot Work/Welding (Torch work)
- [_] Line-Breaking
- [_] _____

VIII. MEDICAL & TRAINING

Medical Requirements:

Entire crew received required annual baseline physical exams? [X] Yes [_] No _____

Special tests required : N/A [_] Yes [_] No

- [_] Prework [_] Complete?
- [_] During [_] Complete?
- [_] Postwork [_] Complete?

Training Requirements

CWM crew received initial 40-hour plus 24-hour OJT training? [X] Yes [_] No _____

Special training required per PAP permitting: _____

Complete? [X] Yes [_] No _____

Medical & training records on file at CWMI Houston location

Subcontractor(s) received required training? [_] Yes [_] No _____

Subcontractor(s) medical & training records on file at NA location.

IX. DECONTAMINATION

Disposable PPE: [X] Yes [_] No

Decon measures for: Equipment [X] Yes [_] No
Method: Mineral Spirit Spray* / Soap & Water → Rinse

Personnel [X] Yes [_] No
Method: Tub/Wash with soap & water, if contaminated;†

Vehicles [_] Yes [_] No
Method: N/A

Decon facility/equipment provided by Customer: [_] Yes [_] No

Decon equipment provided by CWMI: [_] Yes [_] No

*with Stainless Steel Pest. Sprayer †field wash, other

X. HEALTH AND SAFETY EQUIPMENT REQUIRED:

Monitoring Equipment:

- [X] LEL/02 Meter
- [_] Detector Tubes: _____
- [X] PID Monitor (HNu, TIP II)
- [_] FID (OVA)
- [_] H2S Monitor
- [_] CN Monitor
- [_] CO Monitor
- [_] Vacuum pumps
- [_] Personnel pumps
- [_] Personal sampling: NA

  Plan required: [_] Yes [X] No
- [_] Air/Soil/Water Sampling: NA

  Plan required: [_] Yes [X] No

Safety Equipment:

- [X] Safety showers or Hose
- [X] Portable eyewash
- [X] Fire extinguishers(s)
  - Class A [X]
  - B [X]
  - C [_]
  - Size: 20#, plus 2 smaller
- [_] Lifeline & harness
- [_] Extraction device
- [_] Ladders
- [X] Air horns
- [X] Water/Gatorade
- [_] Tarping racks
- [_] Fume hood
- [_] First Aid Kit [_] #10 [_] #24 [X] 36#
- [X] Stretcher/Litter
- [X] See List

(1) Stretcher
(2) One set crutches
(3) 2 Fire Extinguishers
(4) 2 SCBA's
(5) One cot
(6) Blankets/Towels
(7) First Aid Kit
(8) one hand held Siren/alarm
(9) 2 complete sets of Level B ppe
(10) Port EYEWASH/shower

XI. PERSONAL PROTECTION

Job Task(s): Dewatering

	EXCL [X]	CRZ [_]	SUP [_]
	EXCL [_]	CRZ [_]	SUP [_]
	EXCL [_]	CRZ [_]	SUP [_]
	EXCL [_]	CRZ [_]	SUP [_]

[_] Level A
[_] Level B
[X] Level C
[_] Mod Level C
[_] Level D
[_] Level E

Respiratory Protection:

Air-Purifying:
[_] half mask
[X] full mask
[_] PAPR
Cartridge type: Org Vapor/Acid Gas/high Eff dust (particulate) filters

Supplied Air:
[_] SCBA
[_] Airline
[_] Air/Egress
[_] _____

Eye/Head Protection:

[X] Hard hat
[_] Safety glasses, side shields
[_] Chemical-resistant goggles
[_] Face shield
[_] Hard hat liner
[_] _____

Bodysuit

[_] Tyvek, hooded
[X] Polytyvek, hooded
[_] Saranex, hooded
[_] Butyl
[_] PVC
[_] Neoprene
[_] Raingear (PVC)
[_] _____
[_] _____

Boots

[_] PVC, steel toed
[X] Neoprene, steel toed
[X] PVC booties
[_] Tyvek booties
[_] Leather, steel toed
[_] _____

Taped: [X] Yes [_] No

Gloves (inside, outside)

[X] Latex inside
[_] Viton
[_] PVC
[X] Neoprene, outside
[_] Neoprene, milled
[_] Silvershield
[_] Leather
[_] Cotton
[_] Driver's
[_] _____

Thermal

[X] Heat stress*
(attach H & S Procedure 37)
[_] Cold stress
(list additional clothing required)

* Possible as temps should be in Mid 70 - 80's

Hearing Protection

[X] Ear Plugs for equip operation
[_] _____

NOTES: See Page PS5-5 for PPE Requirements (CRA Contract Documents)

XI. PERSONAL PROTECTION

Job Task(s): Mobilization/Demobilization

	EXCL [X]	CRZ [X]	SUP [X]
	EXCL [_]	CRZ [_]	SUP [_]
	EXCL [_]	CRZ [_]	SUP [_]
	EXCL [_]	CRZ [_]	SUP [_]

[_] Level A
[_] Level B
[_] Level C
[_] Mod Level C
[X] Level D
[_] Level E

Respiratory Protection:

Air-Purifying:
[_] half mask
[_] full mask
[_] PAPR
Cartridge type: _____

Supplied Air:
[_] SCBA
[_] Airline
[_] Air/Egress
[_] _____

Eye/Head Protection:

[X] Hard hat
[X] Safety glasses, side shields
[_] Chemical-resistant goggles
[_] Face shield
[_] Hard hat liner
[_] _____

Bodysuit

[_] Tyvek, hooded
[_] Polytyvek, hooded
[_] Saranex, hooded
[_] Butyl
[_] PVC
[_] Neoprene
[_] Raingear (PVC)
[_] _____
[_] _____

Boots

[_] PVC, steel toed
[_] Neoprene, steel toed
[_] PVC booties
[_] Tyvek booties
[X] Leather, steel toed
[_] _____

Taped: [_] Yes [_] No

Gloves (inside, outside)

[_] Latex
[_] Viton
[_] PVC
[_] Neoprene
[_] Neoprene, milled
[_] Silvershield
[_] Leather
[_] Cotton
[_] Driver's
[X] as needed

Thermal

[_] Heat stress
(attach H & S Procedure 37)
[_] Cold stress
(list additional clothing required)
_____
_____
_____
_____

Hearing Protection

[X] Ear Plugs, as needed
[_] _____

NOTES:

_____
_____
_____
_____
_____
_____

To be filled out on-site

CHEMICAL WASTE MANAGEMENT-ENRAC SOUTH
HAZARDOUS WASTE OPERATIONS CONTINGENCY PLAN

GENERATOR NAME SUN BANK #	
LOCATION c/o Conestoga-Rovers 659 West Cuthy Drive Waterloo, Ontario Canada	
CONTACT Steve Quigley	TELEPHONE (519) 884 0510
# NO haz waste will go off-site	
EMERGENCY NUMBERS	

POLICE	INTRAPLANT SECURITY
FIRE DEPT	INTRAPLANT FIRE
AMBULANCE	INTRAPLANT MEDICAL

HOSPITAL:
TELEPHONE: _____
NAME: _____
ADDRESS: _____
_____
CONTACT: _____
ALT CONTACT: _____

ROUTE TO HOSPITAL:
_____
_____
_____

AGENCIES AND SERVICES RECEIVING A COPY OF CONTINGENCY PLAN

	DOCUMENTED?	
HOSPITAL(LISTED ABOVE) _____	[_] Yes	[_] No
_____	[_] Yes	[_] No
_____	[_] Yes	[_] No
_____	[_] Yes	[_] No
_____	[_] Yes	[_] No

EVACUATION ALARM SYSTEM

[_] CWM Alarm - One long horn blast denoting evacuation of the immediate area.
- Repeated short blasts used to signify evacuation of all personnel from the site.

[_] Site Specific -

EVACUATION ROUTE DESCRIPTION

EVACUATION ROUTE/EMERGENCY EQUIPMENT STATION /MAP-WORK ZONES/DECON LOCATIONS

ROUTE MAP TO MEDICAL FACILITY

REQUIRED EMERGENCY EQUIPMENT NOT SPECIFIED AS PART OF PROJECT EMD-PLAN

EXPOSURE SYMPTOMS & EMERGENCY MEDICAL EVALUATION/TREATMENT FOR CONTAMINANT

COMMUNICATION SYSTEMS (DESCRIBE)

SANITARY FACILITIES (DESCRIBE)

SOURCE OF POTABLE WATER: _____

TOILET FACILITIES: _____

SHOWER FACILITIES: _____

SITE MAP OR DRAWINGS:

SITE NOTES:

ON-SITE SPILL/RELEASE PROCEDURES

OFF-SITE SPILL/RELEASE PROCEDURES

REQUIRED SPILL/RELEASE EQUIPMENT

[_] Overpack	[_] Absorbent Pads/Booms	[_] _____
[_] SCBA	[_] Pumps	[_] _____
[_] Shovels	[_] Visqueen	[_] _____
[_] End-Loader	[_] Soil	[_] _____

MATERIAL SAFETY DATA SHEET OHS18150

OCCUPATIONAL HEALTH SERVICES, INC.
60 SEVENTH AVENUE, SUITE 2407
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 87-86-5
RTEC-NUMBER SM6300000

SUBSTANCE: PENTACHLOROPHENOL

TRADE NAMES/SYNONYMS:
PHENOL, PENTACHLORO: DOWICIDE 7: FUNGIFEN:
1-HYDROXYPENTACHLOROBENZENE: LAUXTOL: LIROPREM: PCP: PENCHLOROL:
PERMASAN: SANTOPHEN 20: STCC 4961380: NA 2020: C6HCL5O: OHS18150

CHEMICAL FAMILY:
HALOGEN COMPOUND, AROMATIC

MOLECULAR FORMULA: CL5-C6-O-H MOLECULAR WEIGHT: 266.34

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: PENTACHLOROPHENOL PERCENT: 100.0

OTHER CONTAMINANTS: TECHNICAL GRADE MATERIAL MAY CONTAIN TRACES OF CHLORINATED DIBENZODIOXINS

EXPOSURE LIMIT:
PENTACHLOROPHENOL:
0.5 MG/M3 OSHA TWA (SKIN)
0.5 MG/M3 ACGIH TWA (SKIN)

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: WHITE POWDER OR CRYSTALS OR DARK-COLORED FLAKES WITH A VERY PUNGENT ODOR WHEN HOT.

BOILING POINT: 588-590 F (309-310 C)
@ 754 MMHG (DEC) MELTING POINT: 374-376 F (190-191 C)

SPECIFIC GRAVITY: 1.978 @ 22 C SOLUBILITY IN WATER: 14 PPM @ 20 C

VAPOR DENSITY: 9.2 VAPOR PRESSURE: 0.00017 MMHG @ 20 C

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, BENZENE, CARBITOL, XYLENE,

CELLOSOLVE, DIETHYLENE GLYCOL, PARAFINIC PETROLEUM OILS, DILUTE ALKALI; MODERATELY SOLUBLE IN ETHYLENE GLYCOL, CARBON TETRACHLORIDE.

OTHER PHYSICAL DATA
TECHNICAL GRADE MATERIAL MAY MELT ABOVE 338 F (170 C)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 53).

USE AGENTS SUITABLE FOR TYPE OF FIRE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UPWIND.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
POISON B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:
POISON

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.365
EXCEPTIONS: 49CFR173.364

TOXICITY

PENTACHLOROPHENOL:
10 MG/24 HOURS SKIN-RABBIT OPEN MILD IRRITATION; 29 MG/KG ORAL-HUMAN LDLO; 401 MG/KG ORAL-MAN LDLO; 27 MG/KG ORAL-RAT LD50; 355 MG/M3 INHALATION-RAT LC50; 96 MG/KG SKIN-RAT LD50; 56 MG/KG INTRAPERITONEAL-RAT LD50; 100 MG/KG SUBCUTANEOUS-RAT LD50; 117 MG/KG ORAL-MOUSE LD50; 225 MG/M3 INHALATION-MOUSE LC50; 58 MG/KG INTRAPERITONEAL-MOUSE LD50; 135 MG/KG SUBCUTANEOUS-DOG LDLO; 70 MG/KG UNREPORTED-DOG LD50; 70 MG/KG ORAL-RABBIT LDLO; 40 MG/KG SKIN-RABBIT LDLO; 135 MG/KG INTRAPERITONEAL-RABBIT LDLO; 70 MG/KG SUBCUTANEOUS-RABBIT LDLO; 100 MG/KG UNREPORTED-GUINEA PIG LD50; 168 MG/KG ORAL-HAMSTER LD50; 380 MG/KG ORAL-DUCK LD50; 36 MG/KG UNREPORTED-FROG LD50; MUTAGENIC DATA (RTEC); REPRODUCTIVE EFFECTS DATA (RTEC); TUMORIGENIC DATA (RTEC).

CARCINOGEN STATUS: HUMAN LIMITED EVIDENCE, ANIMAL INADEQUATE EVIDENCE (IARC CLASS-2B). EXPOSURE TO CHLOROPHENOLS (INCLUDING PENTACHLOROPHENOL) WAS ASSOCIATED WITH THREE TO EIGHT-FOLD INCREASES IN RISK OF SOFT-TISSUE SARCOMA AND LYMPHOMA. CASES OF LEUKEMIA, HODGKIN'S DISEASE AND NON-HODGKIN'S LYMPHOMA HAVE ALSO BEEN REPORTED IN INDIVIDUALS EXPOSED TO PENTACHLOROPHENOL. PENTACHLOROPHENOL IS HIGHLY TOXIC, AND IS A METABOLIC ACCELERATOR. POISONING INCREASES BODY TEMPERATURE, OXYGEN CONSUMPTION, RESPIRATION AND HEART RATE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
PENTACHLOROPHENOL:
IRRITANT/HIGHLY TOXIC.
50 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- DUST OR MIST MAY CAUSE PAIN IN THE NOSE AND THROAT, VIOLENT SNEEZING, COUGH, IRRITATION OF THE UPPER RESPIRATORY TRACT, HEADACHE, DIZZINESS, TACHYCARDIA, TACHYPNEA, DYSPNEA, PULMONARY EDEMA, HYPERTHERMIA, PROFUSE SWEATING, MODERATE HYPERTENSION, CHEST PAIN, MOTOR WEAKNESS, IMPAIRED AUTONOMIC FUNCTION, PARESTHESIA, DIURESIS FOLLOWED BY OLIGURIA, CONVULSIONS, COMA, AND CIRCULATORY COLLAPSE WITH DEATH FROM HEART FAILURE.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SMALL DOSES MAY CAUSE WEAKNESS, ANOREXIA, WEIGHT LOSS, NAUSEA, VOMITING, DYSPNEA AND CHEST PAIN, EXCESSIVE SWEATING, HEADACHE, DIZZINESS, SEVERE BRONCHITIS, AND LIVER AND KIDNEY DAMAGE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE. IF BODY TEMPERATURE IS ELEVATED, REDUCE TO 37 C BY IMMERSION IN COOL WATER OR BY APPLYING COOLING BLANKET. IF BODY TEMPERATURE IS ABOVE 40 C, ICE WATER IS NECESSARY. (DREISBACH, HANDBOOK OF POISONING, 11TH EDITION). GET MEDICAL ATTENTION.

SKIN CONTACT:
PENTACHLOROPHENOL:
IRRITANT/HIGHLY TOXIC.
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION AND POSSIBLY BURNS. SUBSTANCE IS READILY ABSORBED THROUGH INTACT SKIN AND MAY CAUSE HEADACHE, DIZZINESS, TACHYCARDIA, TACHYPNEA, DYSPNEA, PULMONARY EDEMA, HYPERTHERMIA, PROFUSE SWEATING, MODERATE HYPERTENSION, CHEST PAIN, MOTOR WEAKNESS, IMPAIRED AUTONOMIC FUNCTION, PARESTHESIA, DIURESIS FOLLOWED BY OLIGURIA, CONVULSIONS, COMA, AND CIRCULATORY COLLAPSE WITH DEATH FROM HEART FAILURE.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SMALL DOSES MAY CAUSE ACNEFORM OR CONTACT DERMATITIS, FURUNCULOSIS, AND BROWN PIGMENTATION. CHLORACNE IS USUALLY PERSISTENT AND AFFECTS THE FACE, EARS, NECK, ARMS, SHOULDERS, CHEST, AND ABDOMEN. THERE MAY BE DRYNESS WITH INTENSE PRURITIS. BRONCHITIS AND LIVER AND KIDNEY DAMAGE ARE POSSIBLE FROM CHRONIC ABSORPTION.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

PENTACHLOROPHENOL:
IRRITANT.
ACUTE EXPOSURE- DUST AND MIST MAY CAUSE IRRITATION, LACRIMATION, ACUTE CONJUNCTIVITIS, CORNEAL OPACITY AND NUMBNESS, AND SLIGHT MYDRIASIS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
PENTACHLOROPHENOL:
IRRITANT/HIGHLY TOXIC.
ACUTE EXPOSURE- MAY CAUSE ABDOMINAL CRAMPS, HEADACHE, DIZZINESS, ANOREXIA, NAUSEA, VOMITING, HYPERTHERMIA, PROFUSE SWEATING, MODERATE HYPERTENSION, TACHYCARDIA, TACHYPNEA, CHEST PAIN, DYSPNEA, BRONCHITIS, IMPAIRED AUTONOMIC FUNCTION, MOTOR WEAKNESS, PARESTHESIA, DIURESIS FOLLOWED BY OLIGURIA, CONVULSIONS, COMA, AND CIRCULATORY COLLAPSE WITH DEATH FROM HEART FAILURE.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO SMALL DOSES MAY CAUSE WEAKNESS, ANOREXIA, WEIGHT LOSS, NAUSEA, VOMITING, DYSPNEA AND CHEST PAIN, EXCESSIVE SWEATING, HEADACHE, DIZZINESS, SEVERE BRONCHITIS, AND LIVER AND KIDNEY DAMAGE.

FIRST AID- IN THE ABSENCE OF CORROSIVE INJURY, REMOVE POISON BY IPECAC EMESIS. ACTIVATED CHARCOAL IS ALSO USEFUL. FOLLOW WITH 60 ML OF CASTOR OIL, WHICH DISSOLVES PHENOL, RETARDS ITS ABSORPTION, AND HASTENS ITS REMOVAL. FOLLOW CASTOR OIL BY GIVING 30-60 ML OF FLEET'S PHOSPHO-SODA DILUTED 1:4 IN WATER. GASTRIC LAVAGE AND EMESIS ARE CONTRAINDICATED IN THE PRESENCE OF ESOPHAGEAL INJURY. (DREISBACH, HANDBOOK OF POISONING, 11TH EDITION) GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
PENTACHLOROPHENOL:
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE CHLORIDE FUMES, TOXIC AND HAZARDOUS CHLORINATED PHENOLS AND OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING F THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE NVIRONMENTAL PROTECTION AGENCY.

STORAGE

ROTECT AGAINST PHYSICAL DAMAGE. STORE IN A COOL, DRY, WELL VENTILATED OCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE. OUTSIDE OR ETACHED STORAGE IS PREFERRED (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

TORE AT 4 C, PROTECT FROM LIGHT AND KEEP DRY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY.

SPILLS AND LEAKS

SOIL-RELEASE:
IG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL. OVER SOLIDS WITH A PLASTIC SHEET TO PREVENT DISSOLVING IN RAIN OR FIREFIGHTING WATER.

ATER-SPILL:
SE NATURAL DEEP WATER POCKETS, EXCAVATED LAGOONS, OR SAND BAG BARRIERS TO RAP MATERIAL AT BOTTOM. USE ACTIVATED CARBON AT 10 TIMES THE SPILLED AMOUNT F IT IS DISSOLVED AT 10 PPM OR GREATER CONCENTRATION. REMOVE TRAPPED MATERIAL ITH SUCTION HOSES. USE MECHANICAL DREDGES OR LIFTS TO REMOVE IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

CCUPATIONAL-SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR MALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO ONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL LACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. EEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 10 POUNDS
IE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES IAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS UBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE ND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF IIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE ENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROCESS ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS; OR DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

PENTACHLOROPHENOL:

5.0 MG/M3- CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST, MIST, AND FUME FILTER.
SUPPLIED-AIR RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.

12.5 MG/M3- SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.
POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A DUST, MIST, AND FUME FILTER.

25.0 MG/M3- CHEMICAL CARTRIDGE RESPIRATOR WITH FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S) IN COMBINATION WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE.
SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.

150 MG/M3- SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- AIR-PURIFYIG FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.
ESCAPE-TYPE SELF-CONTAINED BREATHING APPARTATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

EMERGENCY WASH FACILITIES:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 03/18/85 REVISION DATE: 04/12/89

****

Effective April 3, 1989

ENRAC INCIDENT REPORTING

In the event of injury, fire, explosion, spill, release, or other non-routine event, immediately contact one of the following people, starting with number one (1).

1.	R. A. Eklund	(713)875-4619	(713)320-9054
2.	Ray Mangrum	(713)875-4651	(713)371-1127
3.	Thom Bentley-Smith	(504)929-7667	(504)766-9324
4.	Robert Mangrum	(713)875-4689	(318)377-2108
5.	Claude Penn	(504)261-5070	(504)664-6359
6.	Bob Foye	(713)875-4628	(713)890-7223

CONTINGENCY PLAN BRIEFING LOG

BRIEFING OUTLINE: _____

_____

_____

_____

_____

_____

_____

DATE: _____ PROJECT MANAGER: _____

TIME: _____ CONDUCTOR: _____

SIGNATURE	PRINTED NAME

(Rev. 4/89) Check all boxes [_]; Use NA if box does not apply to this project

APPENDIX C

Printed on recycled paper.

Effective April 3, 1989

ENRAC INCIDENT REPORTING

In the event of injury, fire, explosion, spill, release, or other non-routine event, immediately contact one of the following people, starting with number one (1).

1.	R. A. Eklund	(713)875-4619	(713)320-9054
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5.	Claude Penn	(504)261-5070	(504)664-6359
6.	Bob Foye	(713)875-4628	(713)890-7223

Effective April 3, 1989

ENRAC INCIDENT REPORTING

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3.	Thom Bentley-Smith	(504)929-7667	(504)766-9324
4.	Robert Mangrum	(713)875-4689	(318)377-2108
5.	Claude Penn	(504)261-5070	(504)664-6359
6.	Bob Foye	(713)875-4628	(713)890-7223

CHEMICAL WASTE MANAGEMENT, INC.
ENRAC DIVISION
SAFETY BRIEFING REPORT

PROJECT # _____ DATE: _____ TIME: _____

CLIENT: _____ ADDRESS: _____

JOB LOCATION: _____

WORK OBJECTIVE: _____

SAFETY TOPICS

CHEMICAL HAZARDS: _____

PHYSICAL HAZARDS: _____

RESPIRATORY PROTECTIVE EQUIPMENT: _____

PROTECTIVE CLOTHING: _____

SAFETY/PERSONAL PROTECTIVE EQUIPMENT: _____

_____

SPECIFIC INSTRUCTIONS: _____

HOSPITAL/CLINIC: _____ PHONE: _____
HOSPITAL ADDRESS: _____
POLICE: _____ FIRE DEPT: _____
EMERGENCY PROCEDURES: _____

ATTENDEES

PRINT NAME	SIGNATURE

MEETING
CONDUCTED BY: _____ _____

CHEMICAL WASTE MANAGEMENT, INC.
ENRAC DIVISION
DAILY OPERATIONS LOG

00017

PROJECT: _____ DATE: _____

WORK AREAS: _____ SAFETY/ACCIDENTS: _____

WEATHER: MEETING TOPICS: _____

TEMPERATURE: HIGH _____ LOW _____

WIND: DIRECTION _____ SPEED _____

PRECIPITATION: TYPE _____

AMOUNT _____

HUMIDITY (CIRCLE ONE): H / M / L GENERAL: _____

SKY CONDITIONS: _____

PROJECT ACTIVITY

WORK CONDITIONS: _____

WORK PERFORMED: _____

PROJECT MANAGEMENT

OUTSIDE CONTACTS: _____

MILESTONES: _____

GENERAL: _____

RESPIRATOR FIT TEST RECORD

NAME _____ LOCATION _____

SSN# _____

RESPIRATOR BRAND: _____

TYPE : FULL FACE

SIZE : S M L XL

TEST MEDIA (CIRCLE ONE):
SACCHARIN AMYLACETATE IRRITANT SMOKE AMMONIA

RESPIRATOR BRAND: _____

TYPE : HALF FACE

SIZE : S M L XL

TEST MEDIA (CIRCLE ONE):
SACCHARIN AMYLACETATE IRRITANT SMOKE AMMONIA

RESPIRATOR BRAND: _____

TYPE : _____

SIZE : S M L XL

TEST MEDIA (CIRCLE ONE):
SACCHARIN AMYLACETATE IRRITANT SMOKE AMMONIA

PRESCRIPTION LENSES: YES NO

SMOK SPEC: YES NO

EMPLOYEE WEIGHT: _____

_____ _____
SIGNATURE OF TESTER DATE

_____ _____
SIGNATURE OF EMPLOYEE DATE

COMMENTS: _____

_____

_____

AIR MONITORING REPORT

SITE LOCATION: _____ DATE: _____

_____ METHOD #: _____

WORK PROCESS/OPERATION NAME: _____

TEMPERATURE: _____ F° WIND: _____ mph WIND DIRECTION: W← →E (N ↑ S ↓)

SITE MAP LOCATION #: _____

_____

_____

NAME: _____ JOB DESCRIPTION: _____

SSN#: _____ PPE: _____

PUMP MAKE: _____ SERIAL #: _____

PRE-CAL: _____ lpm POST-CAL: _____ lpm

PRE-WEIGHT: _____ mg POST-WEIGHT: _____ mg

SAMPLE NUMBER: _____ LAB NUMBER: _____

PUMP START TIME: _____ PUMP STOP TIME: _____

TOTAL SAMPLE TIME: _____ min AIR VOLUME: _____ liters

ANALYTICAL RESULTS: _____ mg TWA: _____ mg/M³ ppm
(Circle One)

FIELD NOTES

DESCRIPTION OF OPERATIONS/COMPLAINTS/SYMPTOMS:

_____

_____

CHEMICALS IN USE: _____

MATERIALS/EQUIPMENT IN USE: _____

CONTROLS IN EFFECT: _____

WEATHER CONDITIONS: _____

COMMENTS: _____

_____

_____

_____

CHEMICAL WASTE MANAGEMENT-ENRAC SOUTH

MONITORING RECORDS

PROJECT NAME:

DATE:_____DAY:_____SHIFT:_____

PROJECT NO.:

HNU CALIBRATED:___ QA CHECK STANDARD READING:_____PPM

MONITORING RESULTS

TIME	DUST/AEROSOL*			ORGANIC VAPOR PID#			COMMENTS
	UPWIND mg/M3	DOWNWIND mg/M3	WORK AREA mg/M3	UPWIND ppm	DOWNWIND ppm	WORK AREA ppm	

* MIE, Inc. Miniram Aerosol Monitor, Model PDM-3.
\# HNU Photoionization Detector, Model PI-101, Calibrated to Benzene Std.

ADDITIONAL COMMENTS:_____

SITE SAFETY OFFICER:_____

HEALTH AND SAFETY PLAN SIGN OFF SHEET

DATE: _____ PROJECT MANAGER: _____

TIME: _____ CONDUCTOR: _____

SIGNATURE	PRINTED NAME

APPENDIX D

Printed on recycled paper.

HEALTH & SAFETY PROGRAM	TITLE
PROCEDURE 15 PAGE 1 of 2	HOT WORK
DATE: 10/6/88	REVISION DATE:

I. PURPOSE:

To specify minimum conditions for the performance of "hot work" in hazardous areas.

II. SCOPE:

This procedure is applicable to all CWM operations.

III. DEFINITIONS:

A. Hot work is defined as the performance of activities in a hazardous area:

- which could potentially produce a spark,
- which involve heating, a heated or a hot surface
- involving an open flame.

B. Hazardous area means a location or area which meets the conditions described in Article 500 through 503 of the National Electric Code. Essentially these are areas or locations where fire and/or explosion could occur.

C. Flammable refers to material classifications such that the flash point of the material is less than 140°F at standard temperature and pressure.

D. Combustible refers to those materials whose flash point is greater than 140°F. NOTE: classification of materials may change if the material is handled at temperatures in excess of standard temperature, or at pressures less than standard pressure.

IV. REQUIREMENTS:

A. Each Division handling, storing, or transporting hazardous substances shall develop a "hot work" program which contains at least the following components:

1. a written description of the program.
2. a list of personnel qualified to authorize performance of "hot work".

3. a listing of the hazardous locations where "hot work" is required to be authorized or a listing of the areas where "hot work" authorization is not required. If the not required option is used, it is assumed that all other areas require authorization for the performance of "hot work".

4. a training program for those designated as qualified to authorize "hot work" performance
   a. which is explained in writing,
   b. which is site specific,
   c. which contains specific instruction on the use, calibration, and limitations of monitoring equipment to be used.

B. The Division program shall only utilize the CWM authorization tag or "CWM Hot Work Permit".

C. The Division shall permit the performance of "hot work" only after review and approval by the designated CWM employee.

D. Non-CWM employees are not authorized to issue a "Hot Work" Permit at CWM operations, unless the area in question is fenced or otherwise separated from CWM operations and is not inhabited by any CWM personnel.

V. HOT WORK PERMITS:

A. Hot work permits are available from WMI Office Services, Oak Brook. Use the standard office supply order form.

B. One copy of the Permit shall be posted at the operation at all times. A new permit must be obtained:

- at the beginning of each shift.
- if the work area is unattended for more than 15 continuous minutes.

Chemical Waste Management, Inc.

BURNING & WELDING PERMIT

both sides
permit must
completed

PERMIT NUMBER _____

A Burning and Welding Permit is required in any designated flammable" or "No Smoking" area and/or in any tank, vessel, sewer, or similar enclosed space; or on pipe lines anywhere in Division operations.

GOOD THIS DATE ONLY _____ m. TO _____ m.

BLDG. OR LOCATION _____ FLOOR _____

EQUIPMENT: _____

PURPOSE: _____

I certify that the location where the above work is to be done has been personally examined. The required precautions for safe burning or welding appearing on the reverse side of this card have been checked as indicated.

PRODUCTION SUPERVISOR _____

MAINTENANCE SUPERVISOR _____

I have been properly instructed for safe burning and welding and understand my duties.

WELDER _____ WELDER _____

FIRE WATCH _____ FIRE WATCH _____

BEFORE THIS PERMIT CAN BE SIGNED THE FOLLOWING RULES MUST BE SATISFACTORILY COMPLIED WITH AND APPROPRIATE BOX CHECKED.

1. **NO BURNING OR WELDING TO BE PERMITTED WHER SPRINKLERS ARE OUT OF SERVICE.**
   ☐ SPRINKLERS CHECKED.

2. NO BURNING OR WELDING TO BE PERMITTED IN PRESENCE O FLAMMABLE DUST, VAPORS, AND LIQUIDS OR UNPURGE TANKS, LINES, ETC. AND EQUIPMENT PREVIOUSLY CONTAININ SUCH MATERIAL.

   A. TANKS, LINES, OTHER EQUIPMENT, CLEANED AND PURGED
      ☐ YES ☐ NOT NECESSARY.

   B. ATMOSPHERE TESTED FOR FLAMMABLE VAPORS?
      ☐ YES _____ ATMOSPHERE TESTE
      (SIGNATURE)
      ☐ NOT NECESSARY _____ (SIGNATUR

   C. TANK ENTRY PERMIT COMPLETED?
      ☐ YES ☐ NOT NECESSARY.

   D. LINE BREAKING PERMIT OR CHECK LIST COMPLETED
      ☐ YES ☐ NOT NECESSARY.

3. BEFORE BURNING OR WELDING OPERATIONS ARE STARTED TH FOLLOWING APPLICABLE PRECAUTIONS MUST BE TAKEN AN APPROPRIATE BOX CHECKED.

   A. AREA SWEPT CLEAN AND WET DOWN, FLOORS AND SU ROUNDINGS?
      ☐ YES ☐ NOT NECESSARY.

   B. ALL COMBUSTIBLES MOVED 30-40 FEET FROM OPERATION C PROTECTED WITH ASBESTOS CURTAINS, METAL GUARDS, C FLAME-PROOFED TARPAULINS (NOT ORDINAR TARPAULINS)?
      ☐ YES ☐ NOT NECESSARY.

   C. ALL FLOOR OR WALL OPENINGS WITHIN 40 FEET OF OPER TION COVERED?
      ☐ YES ☐ NOT NECESSARY.

   D. MEN ASSIGNED TO WATCH FOR DANGEROUS SPARKS AREA AS WELL AS FLOORS ABOVE AND BELOW?
      ☐ YES ☐ NOT NECESSARY.

   E. PROPER FIRE PROTECTION PROVIDED — HOSES OR E TINGUISHERS?
      ☐ YES ☐ NOT NECESSARY.

4. BURNING OR WELDING EQUIPMENT INSPECTED AND FOUND SAFE CONDITION?
   ☐ YES

5. THE AREA INCLUDING FLOORS ABOVE AND BELOW SHOULD E CHECKED AT LEAST ½ HOUR AFTER WORK IS COMPLETED.
   ☐ AREA CHECKED.

APPENDIX E

Printed on recycled paper.

HEALTH AND SAFETY PROGRAM	TITLE
PROCEDURE 37 PAGE 1 of 8	HEAT STRESS PREVENTION
DATE: June 1, 1988	REVISION DATE: N/A

I. PURPOSE

To set forth the requirements necessary for implementation of a heat stress prevention program.

II. SCOPE

This procedure applies to all operating Divisions in Chemical Waste Management, Inc. who work in hot environs or utilize protective clothing.

III. GENERAL

The Heat Stress Program shall be implemented whenever a heat stress environment exists. Preventive measures should be instituted first to prevent heat stress. If the preventive measures are not effective, worker monitoring and control measures shall be implemented.

IV. DEFINITIONS - FOR THE PURPOSE OF THIS PROCEDURE

Air Temperature: The temperature measured with a standard mercury-in-glass thermometer with the bulb shielded from radiant heat sources (e.g. the sun).

Heart Rate Monitor: An electronic instrument which measures the pulse as an indicator of heart rate. The Pulse Meter manufactured by Labtron is recommended.

Heat Disorder: A general term used to describe the illnesses associated with excessive heat exposure.

Heat Stress: The combination of environmental and physical work factors that constitute the total heat load imposed on the body. Environmental factors such as air temperature, can affect the body's heat transfer capability. If the worker then must perform strenuous work under unfavorable ambient conditions, heat stress conditions exist.

VI. PROGRAM COMPONENTS

A. PROGRAM ADMINISTRATOR

Responsibility and authority for the Heat Stress Prevention Program shall be assigned to a single person at each operating location.

1. For large facilities, this responsibility may be assigned to the designated safety representative.

2. For small facilities or operations, the program may be administered by a technical manager, superintendent, foreman, or other qualified person responsible to the general manager.

3. For off-site remedial action (ENRAC) and related projects (Lab Packs, PCB handling, etc.), the designated Site Safety Officer is responsible for program administration.

B. GUIDELINES FOR DETERMINING WHEN A HEAT STRESS PROGRAM IS TO BE IMPLEMENTED

The incidence of heat stress is the result of a variety of factors. The following list contains some of the many factors which may require a Heat Stress Program evaluation and/or program implemention:

1. Ambient Temperature

2. Humidity

3. Type of Work Required - The metabolic heat generated during heavy, moderate or light work.

4. Required Work Clothing - The potential for heat stress increases as the impermeability of the work clothing increases.

5. Employee symptoms and/or complaints.

6. Employee conditioning/acclimatization.

Whenever the Program Administrator has determined a heat stress environment exists, then the Heat Stress Preventive Measures section VI (C) shall be implemented. If Heat Stress Preventive Measures are not successful, worker monitoring will commence and Heat Stress Control Measures are implemented. Worker monitoring will reduce heat stress related injuries by adjusting the work/rest times.

VI. PROGRAM COMPONENTS (continued)

c. Modifying the thermal environment or shielding. Control of radiant heat gain is best accomplished by shielding. An example would be an umbrella to shade the worker from the sun (e.g. commercially available umbrellas for heavy equipment operators). Reducing heat gain from convection may be accomplished by supplying cooler air to the work environment. As a minimum, break areas, locker rooms, and lunchrooms should be located in shaded areas.

d. Reduce the temperature of the rest area. The rest area should be maintained at a temperature of approximately 77°F.

e. Clothing modifications to reduce the amount of time an employee is in full protective clothing.

f. Fluid Replacement: Water and drinks shall be available to employees so that fluid loss by sweating is replaced. Employees should be encouraged to drink more fluids when working in hot environments.

g. Reduce the amount of time employees are working in a hot environment. Work/rest periods should be developed according to the results of the worker monitoring program. Scheduling heavy workloads for a cooler part of the day is another successful method.

IF PREVENTIVE MEASURES ARE NOT EFFECTIVE IN REDUCING HEAT STRESS AS EVIDENCED BY HEAT STRESS ILLNESSES AND/OR EMPLOYEE COMPLAINTS, THEN WORKER MONITORING AND CONTROL MEASURES SHALL BE IMPLEMENTED.

D. WORKER MONITORING

1. Weight Loss Monitoring

Measure the employee's weight on a scale accurate to ± 0.25 pound at the beginning and end of each work day to see determine if adequate fluids are being taken in to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, is nude. THE BODY WATER LOSS SHOULD NOT EXCEED 1.5 PERCENT TOTAL BODY WEIGHT LOSS IN A WORK DAY.

2. Heart Rate Monitoring

The incident of heat stress depends on a variety of factors. Therefore, in work environments in which preventive measures have not been effective all workers shall be monitored. Workers wearing normal work clothing should be monitored whenever the dry bulb temperature exceeds 70°F and workers wearing impermeable protective work clothing should be monitored whenever the dry bulb temperature exceeds 60°F.

VI. PROGRAM COMPONENTS (continued)

E. CONTROL MEASURES BASED ON:

1. Heart Rate

If the heart rate exceeds 110 beats per minute, shorten the next work cycle one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

2. Oral Temperature

a. If the oral temperature exceeds 99.6°F, shorten the next work cycle by one-third without changing the rest period.

b. If the oral temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one-third

c. DO NOT PERMIT A WORKER TO WEAR A SEMI-PERMEABLE OR IMPERMEABLE GARMENT WHEN HIS/HER ORAL TEMPERATURE EXCEEDS 100.6°F.

F. RECORDKEEPING

The monitoring results shall be recorded, and the records maintained by the Program Administrator for one year. The daily log (Table 1) shall be completed and a copy included in each worker's medical file.

G. EMPLOYEE NOTIFICATION

Employees shall be notified by the program administrator of the monitoring results contained in the daily log and their significance. In addition, the notification to affected employees shall describe how heat stress will be controlled.

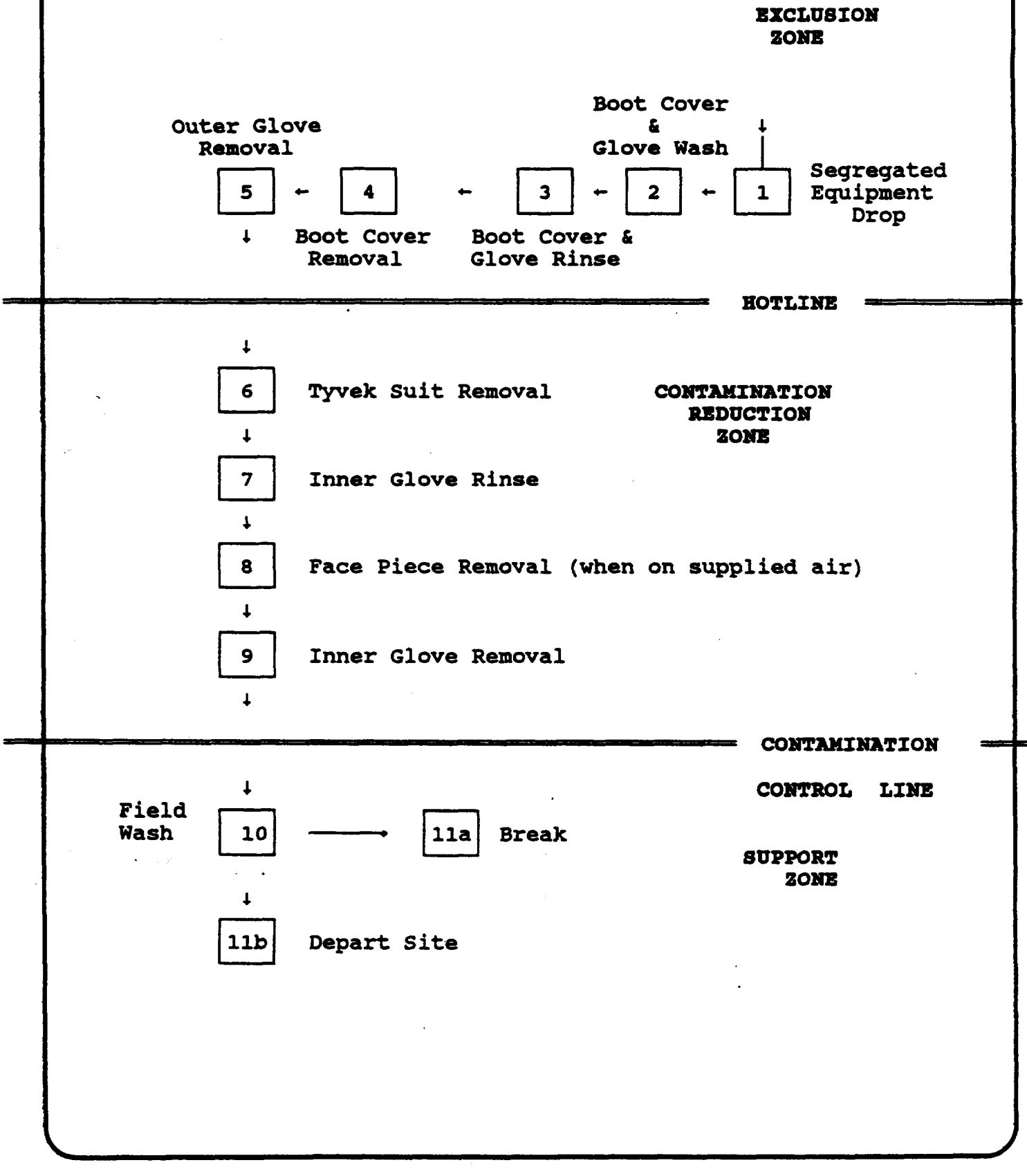
H. EFFECTIVENESS EVALUATION

The effectiveness of the heat stress prevention program shall be evaluated periodically (at least annually) by the program administrator. The evaluation should include a review of the written program, control measures implemented, employee benefit resulting from the program, and the effectiveness of the program to reduce the occurrence of heat stress related illnesses.

APPENDIX F

Printed on recycled paper.

DECONTAMINATION SCHEMATIC



Printed on recycled paper

Certificate of Completion

this is to certify that

STEVEN BRUCE DILL

has successfully completed the

Chemical Waste Management, Inc.

REFRESHER TRAINING

6 HOURS (ADDITIONAL 2 HOURS SITE SPECIFIC REQUIRED)
29 CFR 1910.120 (E)(8)

on this 30TH day of JULY, 1989

Dennis E Kennedy
ENRAC INDUSTRIAL HYGIENE SPECIALIST

Rebecca A Eklund
ENRAC HEALTH AND SAFETY MANAGER

Certificate of Completion

this is to certify that

STEVEN BRUCE DILL

has successfully completed the

Chemical Waste Management, Inc.

REFRESHER TRAINING

6 HOURS (ADDITIONAL 2 HOURS SITE SPECIFIC REQUIRED)

29 CFR 1910.120 (E)(8)

on this 3RD & 4TH day of JANUARY, 1989

Rebecca A. Eklund

Certificate of Completion

this is to certify that

Bruce S. Dill

has successfully completed the

Chemical Waste Management, Inc.

Course in

Site Safety Officer Training

on this 17-21 day of August 1987

Roger N Marcotte
Trainer/Title
FIELD SERVICES SOUTH
Safety and TEchnical Coordinator

K. Gran Townsend
Executive/Title
Regional Safety/Health Manager

WASTE MANAGEMENT, INCORP ATED
PHYSICAL EXAMINATION AUTHORIZATION AND REPORT

EN Rec. 25 —

J. Bruce Dill — Name
419-04-6891 — SS Number
Project Manager — Job Title

Date and Time of Appointment: 6/8/89 (Date) 8:00 AM (Time)

Examination Type (circle one) A B C (D)

Reason for Examination: ___ Pre-placement ✓ In Service ___ Return to Duty ___ Termination ___ Treatment

	Attached		In Medical Provider Guide		Not Required
Job Description:	___	or	___	or	✓
Exposure Data:	___	or	___	or	✓
PPE Required:	___	or	___	or	✓

Previous Medical Data Location: ___

R.A. Eklund / RAE — Site Designate
6/6/89 — Date

FROM: Dr. W. R. Simpkins (Examining Physician)

I have personally examined J. Bruce Dill and have reviewed the results of the required ancillary studies and I have determined that this person.

___ Is medically qualified for the job described.

___ Is NOT medically qualified for the job described.

✓ Is medically qualified for the job described with the following limitations. Must wear corrective lenses

Limitations effective until: ___

The employee (can) (cannot) wear a respirator.
The employee (can) (cannot) wear the PPE required.

✓ The employee has been informed of the examination results and any conditions requiring further examinations and treatment.

***** PLEASE VERIFY ON THE BACK OF THIS FORM THAT THE SERVICES REQUESTED WERE PERFORMED.**

PHYSICIAN NAME W.R. Simpkins, M.D.
ADDRESS: Drawer T
Livingston, AL 35470
TELEPHONE NUMBER: (205) 652-2684

(Physician's Signature)
788.792
6/9/89 — Date

WM-HR03 5/87

Printed on recycled paper.

Certificate of Completion

this is to certify that

FRANK BOYD

587-61-7564

has successfully completed the

Chemical Waste Management, Inc.

SITE SAFETY OFFICER TRAINING
(36 HOURS)

on this 1st day of SEPTEMBER 1989

Connie E Kennedy
ENRAC INDUSTRIAL HYGIENE SPECIALIST

Rebecca A. Eklund
ENRAC HEALTH AND SAFETY MANAGER

WASTE MANAGEMENT, INCORPORATED
PHYSICAL EXAMINATION AUTHORIZATION AND REPORT

Grover Frank Boyd, Jr | 587-61-7564 | _____
Name | SS Number | Job Title

Date and Time of Appointment: 5/12/89 (Date) | 8:30 AM (Time)

Examination Type (circle one): A B C (D)

Reason for Examination: ✓ Pre-placement ____ In Service ____ Return to Duty ____ Termination ____ Treatment

	Attached		In Medical Provider Guide		Not Required
Job Description:	_____	or	_____	or	✓
Exposure Data:	_____	or	_____	or	✓
PPE Required:	_____	or	_____	or	✓

Previous Medical Data Location: _____

P A Eklund — 5/11/89
Site Designate — Date

FROM: Dr. MERLIN LUGO
(Examining Physician)

I have personally examined FRANK BOYD GROVER and have reviewed the results of the required ancillary studies and I have determined that this person.

X Is medically qualified for the job described.

_____ Is NOT medically qualified for the job described.

_____ Is medically qualified for the job described with the following limitations. _____

Limitations effective until: _____

The employee (can) (cannot) wear a respirator.
The employee (can) (cannot) wear the PPE required.

X The employee has been informed of the examination results and any conditions requiring further examinations and treatment.

***** PLEASE VERIFY ON THE BACK OF THIS FORM THAT THE SERVICES REQUESTED WERE PERFORMED.**

PHYSICIAN NAME: MERLIN LUGO
ADDRESS: 700 WAUGH DR.
HOUSTON, TEXAS 77019
TELEPHONE NUMBER: (713) 520 . 1011

Merlin D. Lugo Jr. MD
(Physician's Signature)
788.792
May 18, 89
Date

WM-HR03 5/87

Printed on recycled paper

PHYSICAL EXAMINATION AUTHORIZATION AND REPORT

Cesar Garcia	460 39 6915	Project Mgr
Name	SS Number	Job Title

Date and Time of Appointment: 9,5,89 (Date) 9:00 AM (Time)

Examination Type (circle one) A B C (D)

Reason for Examination: ___ Pre-placement ✓ In Service ___ Return to Duty ___ Termination ___ Treatment

	Attached		In Medical Provider Guide		Not Required
Job Description:	___	or	✓	or	___
Exposure Data:	___	or	✓	or	___
PPE Required:	___	or	✓	or	___

Previous Medical Data Location: ___

Rae Eklund — Site Designate — 9,5,89 — Date

788.792

FROM: Dr. #443 William S. Moore, M.D. (Examining Physician)

I have personally examined CESAR GARCIA. and have reviewed the results of the required ancillary studies and I have determined that this person.

✓ is medically qualified for the job described.

___ is NOT medically qualified for the job described.

___ is medically qualified for the job described with the following limitations. ___

Limitations effective until: ___

The employee (can) (cannot) wear a respirator.
The employee (can) (cannot) wear the PPE required.

✓ The employee has been informed of the examination results and any conditions requiring further examinations and treatment.

*** PLEASE VERIFY ON THE BACK OF THIS FORM THAT THE SERVICES REQUESTED HERE PERFORMED.

PHYSICIAN NAME [illegible] M.D.

ADDRESS: KELSEY-SEYBOLD CLINIC P.A.
4775 WILL CLAYTON PARKWAY
HOUSTON, TEXAS 77032

TELEPHONE NUMBER: ( )

(Physician's Signature)

788.792

9,5,89. Date

WM-HR03 5/87

Printed on recycled paper

Certificate of Completion

this is to certify that

CESAR GARCIA

460-39-6915

has successfully completed the

Chemical Waste Management, Inc.

29 CFR 1910.120 (e) (8)

Hazardous Waste Operations

Refresher Training

8 Hours

on this 20TH day of DECEMBER, 1989

ENRAC Industrial Hygiene Specialist

Rebecca A. Eklund

ENRAC Health and Safety Manager

Certificate of Completion

this is to certify that

CESAR GARCIA

has successfully completed the

Chemical Waste Management, Inc.

Safety Training Program on

SITE [illegible] COURSE

on this 30th day [illegible] September, 1988

Instructor

General Manager

Certificate of Completion

this is to certify that

CESAR GARCIA

has successfully completed the

Chemical Waste Management, Inc.

40 HOUR TRAINING

29 CFR 1910.120 (e)(ix)

on this 12 day of August, 1988

Rebecca A. Eklund

ENRAC HEALTH & SAFETY MANAGER

LITHO IN U.S.A.

FROM: Dr. _____
(Examining Physician)

I have personally examined Russell Mangrum and have reviewed the results of the required ancillary studies and I have determined that this person.

✓ Is medically qualified for the job described.

_____ Is NOT medically qualified for the job described.

_____ Is medically qualified for the job described with the following limitations. _____

_____

_____

_____

Limitations effective until: none

The employee (can) (cannot) wear a respirator.
The employee (can) (cannot) wear the PPE required.

✓ The employee has been informed of the examination results and any conditions requiring further examinations and treatment.

PHYSICIAN NAME Russell L Cook M

ADDRESS: 210 Jackson Ave - Ste. 503
Memphis, TN 38105

TELEPHONE NUMBER: (901) 527-7421

_____ cc
(Physician's Signature)

12, 14, 88 cc
Date

WM-HR03 5/87

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Haz Mat Specialists
is pleased to present
this certificate of completion to:
SPECIALISTS
BATON
who has sucessfully completed
ROUGE
40 HR. OSHA CFR. 1910.1200
HAZARD COMMUNICATIONS
COURSE.
LA
Date 9/16/88
Instructor

CERTIFICATE

THE PERSON WHOSE NAME APPEARS ON THIS CARD HAS BEEN TRAINED AS REQUIRED BY 29 CFR 1910.120.

Russell T. Mangrum 433-25-9127

THE PERSON WHOSE NAME APPEARS ON THIS CARD HAS BEEN FITTED AND TESTED FOR THE USE OF RESPIRATOR(S) DESCRIBED BELOW:

X SCOTT FULL FACE SIZE: __ S __ M __ L __ XL

__ MSA HALF FACE SIZE: __ S __ M X L __ XL

__ OTHER 8 HR. RECERTIFICATION

__ SOSA __ AIRLINE

3-8-89

TRAINING OFFICER SIGNATURE DATE

Reference 5

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Saadi Motamedi, South Florida District Office

THROUGH: Jim Crane, Bureau of Waste Cleanup /B for JC

FROM: Ligia Mora-Applegate, Bureau of Waste Cleanup

DATE: July 24, 1991

SUBJECT: Sunbank--West Broward Boulevard Branch, Analytical Data for Groundwater and Soils

---

Dr. Christopher Teaf and I have reviewed the subject document prepared for this site by Conestoga Rovers Associates (CRA). I am including Dr. Teaf's comments for your information.

I recommend that quarterly monitoring be conducted for a year at this site for all the parameters of concern including PCP and mineral spirits. If the contaminant concentrations do not decrease below the toxicity equivalent concentrations for any dioxin or dibenzofurans and/or criteria for all other contaminants after the duration of the monitoring period, then supplemental contamination assessment and/or remediation may be required.

A monitoring plan should be proposed by the responsible party for your evaluation and approval.

/sr

The Florida State University
Tallahassee, Florida 32306-4016

Institute of Science and Public Affairs
361 Bellamy Building

July 22, 1991

Ms. Ligia Mora-Applegate
Contract Manager - FDER Contract WM-331
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Ligia:

As you requested, I have reviewed the brief summary materials you sent regarding the Sun Bank site in Ft. Lauderdale. At some point it may be useful to check several of the items presented in Table 6 and Table 7 regarding the units for the dioxins. One area of concern is that MW-5, off-site, exhibits the greatest concentrations for several of the analytes. This raises a question regarding whether site characterization is complete.

The detected values for dioxins and furans in groundwater and soils are low in comparison with health-based guidance concentrations. Although the documentation provided in the package was limited, it is assumed that there are not drinking water uses of groundwater nearby and that the site development activities (e.g., paving and construction) will make such uses even less likely in the future. This interpretation coupled with the low concentrations supports the suggestion that "no-further-action" is appropriate at this site. It is worth noting that the MCL value provided for TCDD is a proposed value and may or may not be ultimately adopted. Thus, the limited exceedances of this proposed value appear to be of limited concern at this point. Exceedances of Florida Groundwater Guidance Concentrations for other analytes likewise appear to be of limited concern at this site. In several cases these are exceedances of secondary, rather than primary standards.

Please call me when you have had an opportunity to review these conclusions so that we can finalize the comments.

Regards,

Chris

Christopher M. Teaf, Ph.D.
Associate Director

CMT/lk

CONTAMINATION ASSESSMENT REPORT
VOLUME I

Sun Bank Property
Fort Lauderdale, Florida

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WEST PALM BEACH

AUGUST 1991
REF. NO. 3050 (8)

CONESTOGA-ROVERS & ASSOCIATES

CRA
Consulting Engineers

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August 22, 1991

Reference No. 3050

Mr. Douglas Sinclair
Sun Bank
1431 Northeast 26th Street
Wilton Manors, Florida
U.S.A. 33305

Dear Mr. Sinclair:

Re: Final Contamination Assessment Report - West Broward Blvd. Property

Enclosed are 4 copies of the final Contamination Assessment Report (CAR) for the Sun Bank Property at 300 West Broward Blvd., Ft. Lauderdale. This report incorporates the results of all field and analytical activities conducted in accordance with the scope of the Contamination Assessment Plan for the Property as modified by comments received from the Florida Department of Environmental Regulation (FDER).

CRA recommends that 3 copies of this report be submitted to the FDER at your earliest convenience.

If you have any questions, please do not hesitate to contact our office.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Stephen M. Quigley, P. Eng.

SMQ/bjr
Encl.

c.c. Les Oakes (King and Spalding)
Richard Shepherd (CRA)

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1.0 INTRODUCTION

This Contamination Assessment Report (CAR) has been prepared on behalf of Sun Bank, South Florida, N.A. (Sun Bank) by Conestoga-Rovers & Associates (CRA) for the Sun Bank branch located at 300 West Broward Boulevard in Fort Lauderdale, Florida (Property or Site). The location of the Property is shown on Figure 1.1.

The CAR has been prepared pursuant to the scope of work presented in the Contamination Assessment Plan (CAP), (Enviropact, Inc. 1989a) as amended by correspondence between CRA, Sun Bank and the Florida Department of Environmental Regulation (FDER) dated November 21, 1989, December 18, 1989, March 28, 1990, April 24, 1990 and June 21, 1990. The reporting of the collection and the analyses of investigative samples has been completed pursuant to the Quality Assurance Project Plan (CRA, 1991) as orally approved by the FDER on June 24, 1991.

1.1 PROPERTY HISTORY

This historical account for the Property is based on a review of available aerial photography, City of Fort Lauderdale records and previous investigative efforts completed on behalf of Sun Bank.

Historical aerial photographs are presented in Appendix A. Inspection of these photographs indicates the presence of a

lumber processing facility, Gate City Door and Sash (Gate City), as early as 1949.

Gate City apparently occupied a four city block section of downtown Ft. Lauderdale until sometime in the late 1960s, bounded by West Broward Boulevard on the north, Third Avenue on the west, Andrews Ave. on the east and SW 2nd Street on the south. The exact date Gate City ceased operation has not been established.

The aerial photographs do not indicate the presence of other underground storage tanks in the area of the Property.

The Property was purchased by Sun Bank in 1972 for future use. At this time, the Gate City facility was no longer in operation. The Property was undisturbed until late 1988 when a warehouse building was demolished. The construction of the parking lot commenced on January 30, 1989.

In February, 1989, Sun Bank began construction of a parking lot adjacent to the Property. Sun Bank's contractor discovered a suspected underground storage tank in the course of its excavations on February 27, 1989.

On February 28, 1989, Enviropact, Inc., an environmental consulting firm retained by Sun Bank, directed the unearthing of four 2000-gallon tanks which were discovered to contain liquids. During the excavation, seven inches of rain fell, filling the excavation with sufficient

water to float one of the tanks. The tank shifted and an estimated volume of between 6 to 89 gallons of its liquid contents escaped from the tank into the rainwater filling the excavation (Enviropact, 1989b). This estimate was based on witness accounts of the incident.

Enviropact, under the direction of the Broward County Environmental Quality Control Board (BCEQCB), removed the liquids from the excavated area using vacuum tanker trucks. The liquids were later transferred to drums for storage. Enviropact recovered approximately 500 gallons of product and rainwater from the excavated area. The contents of the four tanks, liquids and sludges, were also removed and placed in drums. The drums were placed on wooden pallets on visqueen sheeting in a fenced area situated on Sun Bank's property. A detailed record of the origin of the contents of each drum was prepared for use in decisions regarding disposition of the contents.

Analyses of the tanks' contents indicated that one of the tanks contained a mineral spirit/pentachlorophenol solution, one tank contained mineral spirits and the remaining two tanks contained water. Enviropact's analytical data for the four tank materials are presented in Table 1.1.

Enviropact Inc. completed a magnetometer survey of the Property in May 1989 to investigate the presence of other buried metallic objects such as tanks. The results of the survey, which were reported in the Contamination Assessment Plan Report (Enviropact, 1989a), indicated that no

TABLE 1.1

TANK CONTENTS - ANALYTICAL DATA
SUN BANK PROPERTY

Parameter	STD. G.L.	*Tank 1*	*Tank 2*	*Tank 3*	*Tank 4*
H.C., IR		65.3%	118 mg/l	>94.8%	7,230 mg/l
% water		1.4	89.7	2.4	64.3
Barium		1.51 mg/kg	1.9 mg/kg	1.70 mg/kg	0.817 mg/kg
Chromium		0.704 mg/kg	0.43 mg/kg	0.88 mg/kg	0.372 mg/kg
naphthalene	10	4,000 mg/kg	<300 mg/kg	5,000 mg/kg	3,000 mg/kg
pentachlorophenol	30	14,000 mg/kg	<1600 mg/kg	2,000 mg/kg	<1,600 mg/kg
styrene	4 mg/L	21,250 mg/kg	<300 mg/kg	2,250 mg/kg	<1,250 mg/kg
total xylene	50	1,600 mg/kg	<330 mg/kg	2,250 mg/kg	11,620 mg/kg
1,2-dibromo-3-chloropropane		21,250 mg/kg	<330 mg/kg	2,250 mg/kg	<1250 mg/kg
1,2-dichloropropene		21,250 mg/kg	<330 mg/kg	2,250 mg/kg	<1,250 mg/kg
2-methyl naphthalene		2,000 mg/kg	<330 mg/kg	4,000 mg/kg	400 mg/kg

Note: H.C., IR - Total hydrocarbons by infrared spectroscopy.

Source: Enviropact, Inc. "Emergency Response and Initial Remedial Action at Sun Bank Lot, 300 West Broward Boulevard, Ft. Lauderdale, Florida", April 14, 1989.

additional buried metallic objects such as drums or tanks were present on-Property.

1.2 REMEDIAL AND INVESTIGATIVE HISTORY

In July 1989, Sun Bank completed the installation of a Temporary Drum Storage Area (TDSA). The TDSA was designed to meet standards equivalent to those established in 40 CFR Part 265 for the storage of drummed material. Sun Bank prepared a document entitled, "Procedures to Prevent Hazards Plan and Contingency Plan - Temporary Drum Storage Facility - Sun Bank, Fort Lauderdale, Florida" (CRA, 1989a). Copies of the plan were submitted by Sun Bank to the local police and fire departments, the BCEQCB, the Florida Department of Environmental Regulation (FDER) and Sun Bank Inspectors and Emergency Coordinators.

On August 25, 1989, Sun Bank submitted a document entitled "Work Plan, Containerized Aqueous Material Processing and Sludge Disposal, Sun Bank Site, Fort Lauderdale, Florida" (CRA, 1989b) (the Work Plan) to the FDER which addressed the processing and disposition of the drummed material stored in the TDSA.

Sun Bank continued to discuss with the FDER the disposition of the contents of the drums. On January 2, 1990, prior to executing a Consent Order with the FDER, Sun Bank began cleanup of the Property in accordance with the Work Plan and as modified by discussions with the FDER.

On March 4, 1990, Sun Bank completed the tasks in the Work Plan pursuant to the Consent Order which was signed by the State of Florida on February 2, 1990. The completed action was documented in the report entitled "Construction Report - Sun Bank Site" (CRA, 1990d).

Since the volume of the tank contents were not determined prior to excavation, no comparison may be made to determine the volume of spilled material. Water, mineral spirits and sludge may have been released; however, based upon the large volume of product recovered during the Enviropact emergency response action, it is likely only a small fraction of this volume was released to the environment.

1.3 OBJECTIVES OF THE CONTAMINATION ASSESSMENT REPORT

The purpose of this Contamination Assessment Report is defined in Exhibit 1 to the Consent Order, "Corrective Actions for Groundwater Contamination Cases" and summarized as follows:

- establish the horizontal and vertical extent of contamination;
- determine the source(s), transport mechanism(s) and rate of direction of movement of contaminant in the respective media and characterize the resultant contamination;
- determine the amount of product and time period over which it was lost;
- characterize geology and hydrogeology of the Property; and

- provide a Property history.

The Property history is provided above, the remaining objectives are addressed in the following Sections.

2.0 NATURAL RESOURCES SURVEY

2.1 PHYSIOGRAPHY AND LAND USE

The Sun Bank Property is located in the central eastern portion of Broward County. The county is relatively flat and not greater than 22 feet above sea level. The significant physiographic feature of Broward County is the Atlantic Coastal Ridge. The Atlantic Coastal Ridge is a natural feature 10 to 22 feet above sea level and may reach five miles in width.

Surficial drainage is poor west of the Atlantic Coastal Ridge, creating standing water which makes up the Everglades. However, development and urbanization has moved 12 to 20 miles west of the coast draining low lying areas via manmade channels and levees.

Local land uses are predominantly commercial/light industrial and low to medium density residential. The most significant land uses in the vicinity of the Property are municipal government and financial institutions.

2.2 SURFACE WATER

Surface water bodies in the vicinity of the Property are limited to the New River which is located approximately 600 to 900 feet south of the Property as shown on Figure 2.1.

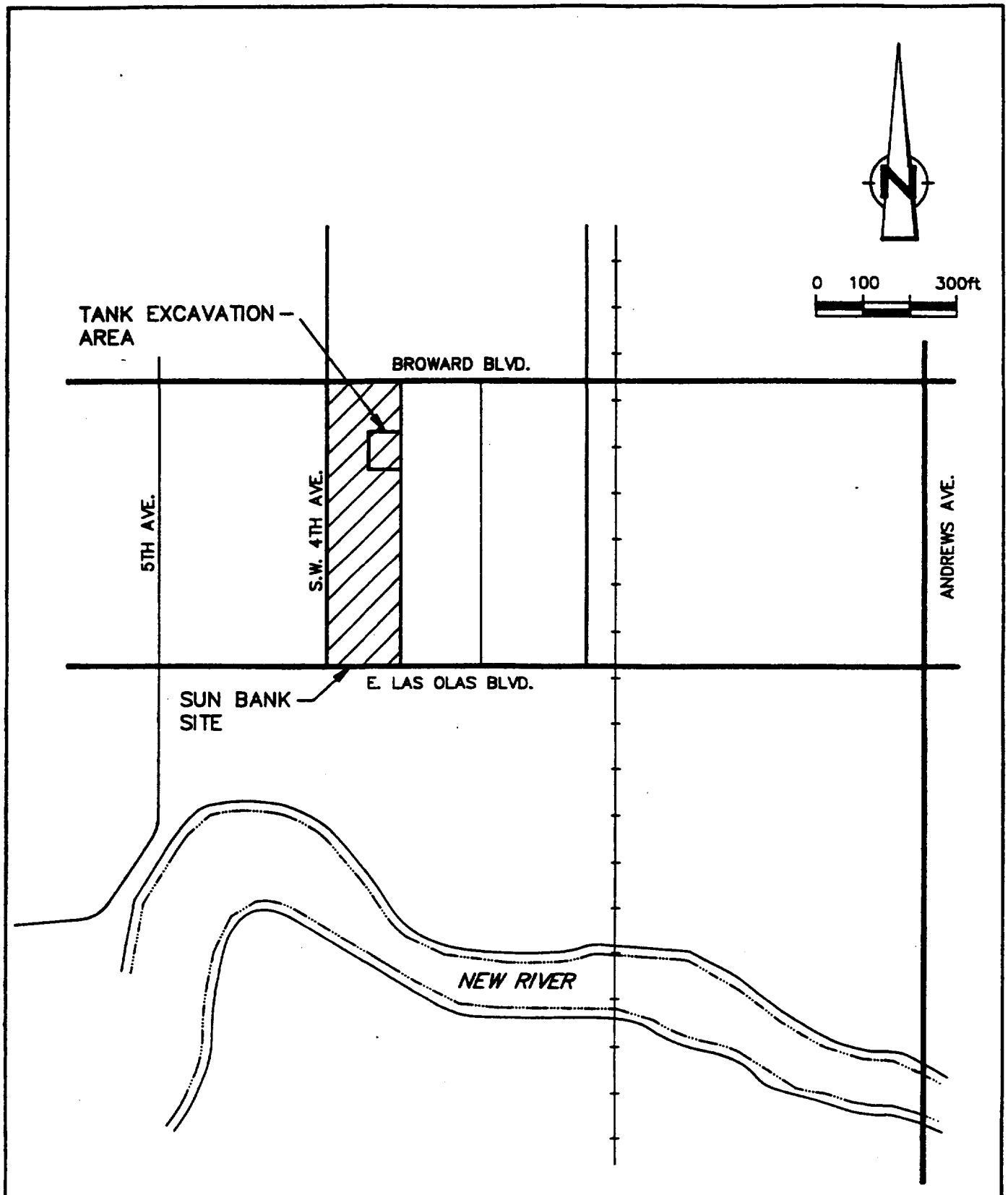


figure 2.1

LOCAL SURFACE WATER

Sun Bank, Ft. Lauderdale, Florida

CRA

3050-17/05/91-8-0 (P-03)

The New River is part of the South Florida Intracoastal Waterways and discharges to the Atlantic Ocean. The river banks are used heavily for private dwellings, hotels and restaurants.

2.3 CLIMATE

The climate of Ft. Lauderdale and South Florida in general is characterized as subtropical. Summers are typically long and warm, with ample precipitation, while the winters tend to be mild and dry. Winds tend to be from the east to southeast. The mean daily high temperature is 83.5°F and the mean daily low is 66.6°F (National Climate Data Center, 1991).

3.0 WELL INVENTORY AND WATER USE

A well inventory was completed for the vicinity of the Property by searching available well completion reports at the South Florida Water Management District offices. Table 3.1 summarizes the data from the completion reports which are presented in Appendix B.

The majority of well installations in the immediate area of the Site (1/2 mile radius) are associated with groundwater monitoring. There is limited use of groundwater from the Biscayne Aquifer for irrigation (lawn watering) near the Property. Both of the irrigation wells are upgradient (Northeast) of the Property approximately 1 mile distant. These users of groundwater are not considered significant. Public supply wells which withdraw groundwater from the Biscayne Aquifer (approximately 70 feet deep) are located approximately 5 miles to the south-southwest of the Property for the cities of Davie and Hollywood respectively.

TABLE 3.1

WELL INVENTORY
SUN BANK PROPERTY
FT. LAUDERDALE, FLORIDA

	Location	*Well Use*	*Depth*	*Date Completed*	*Construction*
1.	307 NW 1st Avenue (16 wells)	Monitoring	13 feet	08/03/89	2" PVC
2.	115 S Andrews Ave. (8 wells)	Monitoring	12-15 feet	09/07/90	2" PVC
3.	201 SE 6th Street	Monitoring	14 feet	09/24/90	4" PVC
4.	3000 SW 4th Avenue (18 wells)	Monitoring	12-56 feet	09/12/90 (repaired)	2" PVC
5.	307 NW 1st Avenue (4 wells)	Monitoring	15 feet	07/29/89	2" PVC
6.	848 NE 2nd Avenue	Irrigation (1)	36 feet	08/29/85	2" Galv.
7.	301 N. Andrews Avenue	Monitoring	13.5 feet	06/21/88	2" PVC
8.	609 NE 9th Avenue	Irrigation (1)	45 feet	12/04/85	2" Galv.
9.	SW 23rd Avenue @ Stirling Rd.	Public Supply (2)	max. 69 feet	9/29/76	18" B.S.
10.	S. Rainbow Dr. @ Hollywood Blvd.	Public Supply (2)	70 feet	10/14/81	20" B.S.

Notes:

max. - Maximum depth
PVC - Polyvinyl chloride
Galv. - galvanized steel
B.S. - black steel
(1) - located approximately 1 mile from the Property
(2) - located approximately 5 miles distant from the Property

4.0 PROPERTY FEATURES INVESTIGATIONS

4.1 BOREHOLE/MONITORING WELL INSTALLATIONS

4.1.1 Drilling and Installation Procedure

Florida Test Drilling of West Palm Beach, Florida was retained by Sun Bank to perform the monitoring well installation and borehole investigation as required by the approved CAP. The drilling program began on November 27, 1990, and was completed on November 29, 1990. All drilling was performed using an Acker AD2 drilling rig.

Six wells were installed to identify and delineate chemical groundwater quality. Five of the wells were shallow (mid-screen elevation -3.9 to -6.3 feet AMSL) and designed to intersect the water table at the screen interval. One deep well was constructed (MW1A-mid-screen elevation of -15.2 feet AMSL) and placed in the middle of the source area to determine the vertical limits of groundwater quality . The monitoring well construction summary is presented in Table 4.1 and Figure 4.1 illustrates specific well locations.

Soil samples were collected from the auger cuttings at 5-foot intervals from surface to depth of the hole. It was originally intended to collect soil samples using a split spoon sampler, however, due to the fluid characteristic of the soil beneath the water table, the augers would partially fill with cuttings, preventing the collection of a representative sample. Therefore, samples from the 1 to 3 foot interval were scraped from the side of

TABLE 4.1

MONITORING WELL CONSTRUCTION SUMMARY
SUN BANK, FT. LAUDERDALE, FLORIDA

Well Number	*Date Installed*	*Well Depth (ft. BGS)*	*Screen Length*	*Reference Elevation (ft. AMSL)*	*Ground Elevation (ft. AMSL)*	*Mid-Screen Elevation (ft. AMSL)*
MW1A	11/28/90	25	5	5.42	4.8	-15.2
MW2	11/28/90	12	10	5.11	5.0	-4.5
MW3	11/27/90	12.5	10	4.89	4.9	-5.1
MW4	11/29/90	12	10	5.59	5.6	-3.9
MW5	11/29/90	13.5	10	4.40	4.7	-6.3
MW6	11/27/90	11.5	10	4.60	4.7	-4.3

Notes:

1. BGS - Below Ground Surface
2. AMSL - Above Mean Sea Level
3. Reference elevations for all monitoring wells are the top of riser pipe.

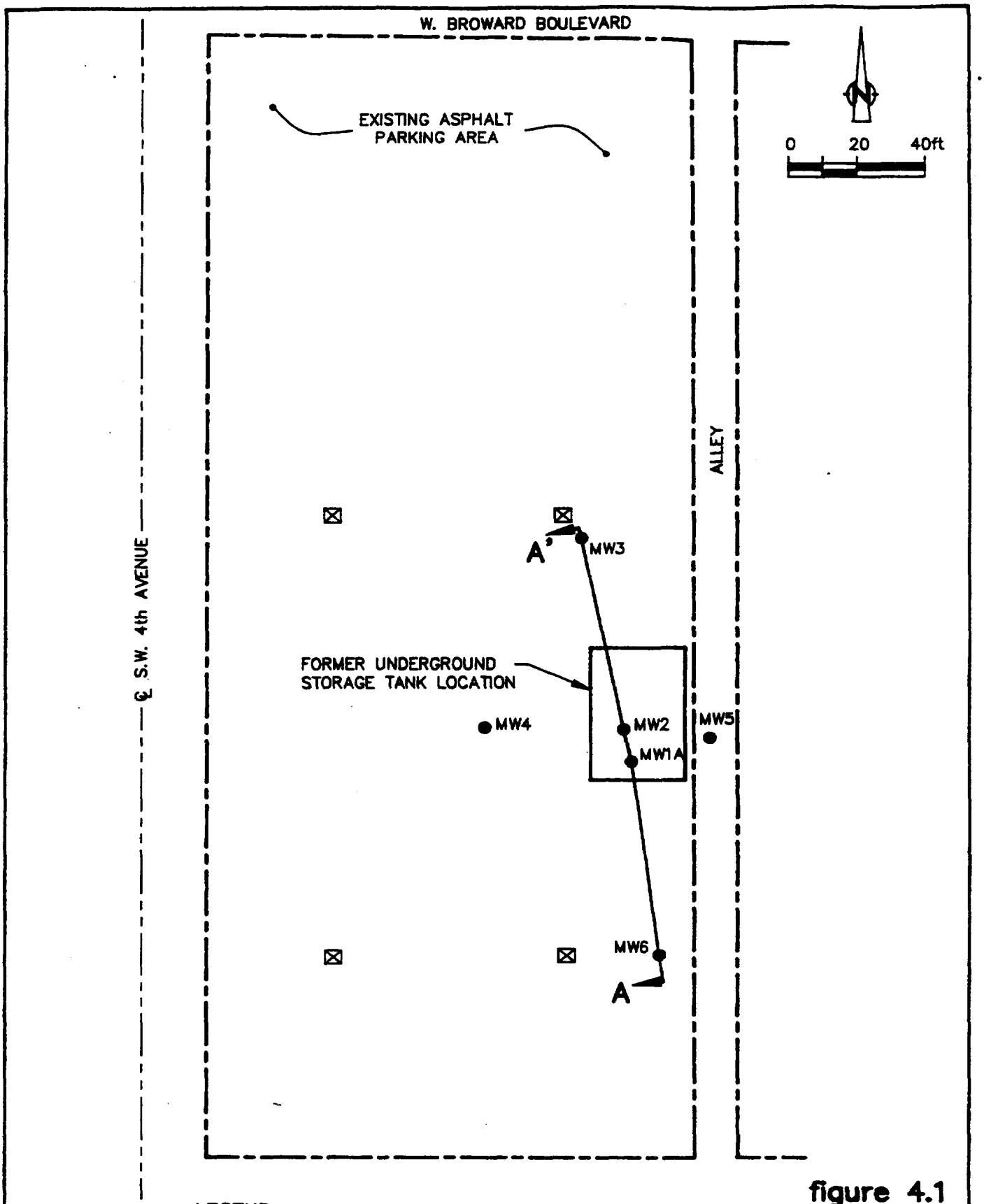


figure 4.1

MONITORING WELL LOCATIONS
SUN BANK SITE
Ft. Lauderdale, Florida

CRA

3050-6/02/91-8-0 (P-01)

the hole upon removing the augers. Samples from deeper horizons were collected directly from the augers after drilling to the depth of interest and removing the augers from the borehole.

The work space, borehole and auger cuttings were monitored regularly with an HNu photoionization detectors (HNu) for total organic vapors throughout the drilling of each borehole. HNu readings remained at background for all monitoring wells with the exception of MW2, where 15 ppm total organic vapors above background downhole at the water table was encountered. Elevated HNu readings were not encountered above or below the water table at MW2. At MW1A, about 8 feet south of MW2, no readings above background were detected throughout the drilling of the boring.

At the appropriate depth, the two inch diameter polyvinyl chloride (PVC) well screen and riser pipe were installed inside the augers. Prior to installation, the well screen and riser pipe were cleaned with a high pressure wash, followed by an Alconox detergent wash, isopropanol rinse and a final deionized water rinse.

The proposed design for the well installation included setting the top of the screen at 2 feet above the water table and to install the sand pack 2 feet above the screen. The water table was found to occur at the Property at approximately 4 feet below ground surface. In order to accommodate for the shallow water table in wells MW2-MW6, the sand pack was set 6 inches to one foot above the screen. Similarly, the bentonite pellet seal ranged from 6 inches to one foot in thickness.

For the deep well (MW1A), the remaining annulus between the top of the bentonite seal to one foot below ground surface was backfilled with a cement/bentonite grout via a tremie pipe. All wells were completed with a lockable flush mount top and concrete pad six inches to one foot in thickness.

Stratigraphic and instrumentation logs for the monitoring wells are presented in Appendix C.

4.1.2 Well Stabilization

Following installation, the monitoring wells were developed and stabilized. The objective of well development was to purge and surge around the well screen, thus increasing the natural permeability and porosity of the previously undisturbed sediment and and removing any incidental contamination which may have been introduced during well installation. The wells were developed using a precleaned, stainless-steel, bottom-filling bailer and new nylon rope dedicated to each well.

During development, all wells stabilized based on three consistent and consecutive readings of pH, specific conductance, and temperature. Readings were taken after a minimum of three well volumes and removed; thereafter, readings were taken between at least one well volume until stabilized. Table 4.2 summarizes the data collected. All

TABLE 4.2

MONITORING WELL STABILIZATION SUMMARY
SUN BANK, FT. LAUDERDALE, FLORIDA

Well	*Date*	*pH*	*Conductivity (umhos)*	*Temperature (°C)*	*Clarity*	*Total Gallons Removed*
MW1A	11/29/90	7.2	418	80.2	Sl. Silty	40
MW2	11/29/90	7.4	496	78.8	V. Silty	30
MW3	11/27/90	7.3	387	80.4	Silty	28
MW4	11/29/90	7.3	594	77.5	V. Silty	25
MW5	11/29/90	8.3	223	80.3	V. Silty	30
MW6	11/27/90	7.4	322	80.3	Silty	30

Note:

Stabilization was conducted via bailing.

development water was contained and transferred to drums which are currently stored on-Property.

Well stabilization logs are provided in Appendix D.

4.1.3 Hydraulic Conductivity

4.1.3.1 Single Well Response Tests

A single well response test was conducted on each monitoring well installed. Each test was performed using a model 2109 Telog data logger and 10 pounds per square inch transducer and a stainless steel rod (slug) of known volume.

The Telog data logger recorded the water level at one second intervals as the slug was introduced (falling head). Upon reaching equilibrium, the slug was removed and the data logger recorded the response of the water level as it attained static again (rising head). After each test at each well, the information recorded on the data logger was transferred onto a floppy disc via an Epson Equity lap top computer.

The results of the data collected for each test are presented in Appendix E.

4.1.3.2 Soil Characteristic Analysis

Five soil samples were collected from the augers in the screened intervals of each monitoring well. The samples were analyzed for grain size analysis by Braun Engineering and Testing of Minneapolis, Minnesota.

The grain size curves determine the size distribution of the soil particles in the sediment. The data presented on these curves indicate that the wells are screened in a medium to fine grained sand with less than 10 percent silt and clay.

The resultant grain size distribution curves are presented in Appendix F.

4.1.4 Borehole Investigation

Soil samples were collected for chemical analyses from the drilling of monitoring wells MW2 and MW4 to assess the chemical quality of the soils in the former location of the storage tanks (see Figure 4.1). Samples were collected at 1 to 3 feet and 8 to 10 feet below ground surface.

Boreholes were constructed using 6 3/4 inch hollow stem augers. Samples from the 1 to 3 foot interval were scraped from the side of the borehole after removal of the auger. The samples from the 8 to 10 foot

interval were collected directly from the auger after drilling to 10 feet and removing the auger from the borehole.

It was originally intended to collect samples via a split spoon sampler; however, the large volume of sample required for all the parameters and the free flowing nature of the soils rendered split spoon sampling impractical. The alternative for the 1 to 3 foot sample interval was to scrape away a portion of the soil that made contact with the auger. Soil was then collected from the side of the borehole using cleaned sample collection tools such as spoons and transferred into sample jars. Samples from the 8 to 10 foot interval were collected from the auger due to the fluid characteristic of the soil below the water table as discussed in Section 4.1.1.

Prior to sample collection, utensils were cleaned with an Alconox detergent wash and water rinse, followed by an isopropanol/deionized water rinse. One rinsate blank per soil sampling round was collected by pouring deionized water over the decontaminated utensils and into sample jars. The rinsate blank was used to determine the quality of the decontamination procedure.

The blind duplicate and matrix spike samples were collected in a precleaned aluminium pan and composited prior to collection in sample jars. The frequency of collection of these Quality Control samples was one per soil sampling round.

Borehole details are summarized in Table 4.1 and stratigraphic logs are presented in Appendix C.

4.2 GROUNDWATER SAMPLING

Two rounds of samples have been collected from the six monitoring wells. Sampling occurred in November 1990 and February 1991. Field notes and measurements associated with the sampling rounds are summarized in Tables 4.3 and 4.4, respectively.

All of the monitoring wells were sampled according to the following protocols.

1. A round of water levels were taken prior to sampling with an electric water level tape. Measurements were to the nearest 0.01 foot.

2. New disposable nitrile or latex gloves were used when sampling each well.

3. Prior to sampling, each well was purged using a precleaned, stainless steel bottom filling bailer to remove a minimum of five times the standing water volume in the well. After the required volume had been removed, the well was sampled within a half hour. Purged groundwater not used for sampling was collected and contained in 55-gallon drums and stored on Property.

4. Upon removal of the required volume of water and prior to sampling each well, pH, specific conductance and temperature were recorded.

TABLE 4.3

ROUND ONE (NOVEMBER 28, 29 & 30, 1990)
GROUNDWATER SAMPLING
SUN BANK, FT. LAUDERDALE, FLORIDA

Location	*Sample ID*	*Time*	*pH*	*Conductivity (umhos)*	*Temperature (°F)*	*Clarity*	*Gallons Removed*
MW1A	W-113090-PS-01	07:40	7.43	412	77.8	Slightly Silty	20
	W-112990-PS-07	06:30	-	-	-	-	Rinsate
	W-113090-PS-08	07:40	7.43	412	77.8	Slightly Silty	Duplicate
MW2	W-113090-PS-02	08:25	7.10	554	79.5	Silty	7.5
MW3	W-112890-PS-03	19:00	6.95	384	77.8	Silty	7.5
MW4	W-113090-PS-04	09:05	7.35	619	79.0	Very Silty	7.5 (MS/MSD)
MW5	W-113090-PS-05	09:45	8.33	216	79.6	Very Silty	7.5
MW6	W-112890-PS-06	16:30	6.94	332	80.1	Silty	7.5

Note:

1. Gallons removed is prior to sampling.
2. All samples analyzed for TCL VOCs, BTEX, TCL BNAs, TCL Pesticides/PCBs, polychorinated dibenzo-p-dioxins and dibenzofurans.
3. MS/MSD - Matrix Spike - matrix spike duplicate

TABLE 4.4

ROUND TWO (FEBRUARY 20, 1991)
GROUNDWATER SAMPLING
SUN BANK, FT. LAUDERDALE, FLORIDA

Location	*Sample ID*	*Time*	*pH*	*Conductivity (umhos)*	*Temperature (°F)*	*Clarity*	*Gallons Removed*
MW1A	W-022091-PS-001	16:45	7.0	340	27	Slightly Silty	18
MW2	W-022091-PS-002	16:15	6.9	610	25	Silty	7.5
	W-022091-PS-008	16:15	6.9	610	25	Silty	Duplicate
MW3	W-022091-PS-003	18:30	7.0	450	24	Silty	7.5
MW4	W-022091-PS-004	17:40	6.9	530	25	Silty	7.5
	W-022091-PS-007	17:00	-	-	-	Clear	Rinsate
MW5	W-022091-PS-005	18:00	7.2	320	26	Silty	7.5
MW6	W-022091-PS-006	15:45	6.7	330	25	Silty	7.5
Composite of all Drums Containing Purged Water	W-022091-PS-009	18:30	-	-	-	-	-
Decontamination Fluid Drum	W-022091-PS-010	18:35	-	-	-	-	-

Note:

1. Gallons removed is prior to sampling.
2. All samples analyzed for TCL VOCs, BTEX, TCL BNAs, TCL Pesticides/PCBs, polychorinated dibenzo-p-dioxins and dibenzofurans.
3. The drum samples were analysed for TCL VOCs, BTEX and TCL BNAs.

5. Samples were collected from each well for Target Compound List (TCL), Volatile Organic Compound (VOCs), Base/Neutral and Acid Extractables (BNAs), Polychlorinated Biphenyls (PCBs), pesticides, mineral spirits and polychlorinated dibenzo-p-dioxins and dibenzofurans. Upon collection, samples were immediately placed in coolers with ice.

6. A blind duplicate sample was collected at a frequency of one per sampling round.

7. A bailer rinse water sample was collected at a frequency of one per sampling round. The rinse water sample consisted of distilled water poured into or over precleaned sampling equipment, then into sampling containers. The analyses for this sample provides a quality assurance check on the decontamination procedures employed for the bailers.

8. A matrix spike sample was collected at a frequency of one per sampling round. The matrix spike sample was collected at least three times the volume required for analyses.

9. All disposable gloves, tyveks and rope were collected and contained on-Property.

4.3 WASTEWATER DRUM SAMPLING

Purged water not used for sampling was collected and contained in 55-gallon drums and stored on-Property. The two rounds of sampling events and development water had generated five drums. The drilling program had generated one drum of decontamination fluids from drill rig cleaning and well material decontamination with some purged groundwater.

A sample from each of the five drums containing purged groundwater was collected, composited and analyzed for TCL VOCs, BTEX and TCL BNAs (including pentachlorophenol). The drum containing the decontamination fluids were also sampled and analyzed for the above mentioned parameters. Table 4.4 presents the identification number in reference to the samples collected.

4.4 SUBSURFACE SOIL SAMPLING

Subsurface soil samples were collected from two boreholes at the 1 to 3-foot and 8 to 10-foot stratigraphic intervals.

Each sample was analyzed for TCL VOCs, BTEX, TCL BNAs, pesticides, PCBs, and polychlorinated dibenzo-p-dioxins and dibenzofuran isomers. A summary of borehole sampling activities is presented in Table 4.5.

TABLE 4.5

SOIL SAMPLING SUMMARY
SUNBANK, FT. LAUDERDALE, FLORIDA

Location	*Sample ID*	*Time*	*Depth (ft. BGS)*	*Remarks*
MW2	S-112890-PS-10	15:00	1-3	Collect from side of borehole (MS/MSD)
	S-112890-PS-09	15:00	1-3	Duplicate
	S-112890-PS-11	15:30	8-10	Collect from augers, saturated
MW4	S-112990-PS-12	08:45	1-3	Collect from side of borehole
	S-112990-PS-13	09:15	8-10	Collect from augers, saturated
	S-112990-PS-14	08:00	N/A	Rinsate prior to sample 12

Note:

All samples were analyzed for TCL VOCs, BTEX, TCL BNAs, TCL Pesticides/PCBs, polychlorinated dibenzo-p-dioxins and dibenzofurans.

MS/MSD - Matrix Spike/Matrix Spike Duplicate.

4.5 HYDRAULIC MONITORING

Groundwater elevations were measured at each monitoring well on November 30, 1990 and February 21, 1991. The data collected were converted to elevation above mean sea level (AMSL). The elevations are presented in Table 4.6.

4.6 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) samples were collected in accordance with the CAP. During the groundwater and soil sampling, one rinsate blank, one duplicate and one matrix spike sample were collected at a frequency of one per sample round.

Sample containers were supplied by the analytical laboratory for the collection of all samples. All sample containers were precleaned by the laboratory and stored at the sampling site in an area and in a manner to prevent breakage and contamination of the clean containers. Trip blanks for VOCs were included with sample containers shipped to the Property.

A chain-of-custody record sheet was completed for each sample at the time the sample was collected and accompanied the sample throughout the analytical process. The chain-of-custody procedure was as follows:

TABLE 4.6

GROUNDWATER ELEVATIONS
SUN BANK, FT. LAUDERDALE, FLORIDA

Well Number	*Reference Elevation (ft. AMSL)*	*11/30/90*	*02/21/91*
MW1A	5.42	1.18	0.81
MW2	5.11	1.15	0.80
MW3	4.89	1.16	0.80
MW4	5.59	1.21	0.84
MW5	4.40	1.11	0.80
MW6	4.60	1.14	0.75

Notes:

1. All elevations presented are in feet above mean sea level.

2. Reference elevations for all monitoring wells are the top of riser pipe.

3. Reference elevations determined by level survey from bench mark of 6.91 feet located on concrete slab for the small vacant building south of the Sun Bank Branch.

1. The Property sampler filled in all required information on the sample labels when the samples were collected;

2. The original custody form was sealed in plastic and placed within the shipping container;

3. The shipping container was sealed with a security seal;

4. Custody was transferred to the analytical laboratory which checked the integrity of the security seal upon receipt and retrieved the custody form from the shipping container; and

5. Sample disposal will be done by the laboratory. Upon disposal, the laboratory will sign the next open "Relinquished by" box and words "Disposal" will be written in the "Received by" box.

A summary of the groundwater QA/QC samples submitted for analysis is shown in Tables 4.3 and Table 4.4. A summary of the subsurface soil QA/QC samples submitted for analysis is shown in Table 4.5.

4.7 EQUIPMENT CLEANING

Prior to mobilization, the drill rig and all associated equipment was thoroughly steam cleaned to remove oil, grease, mud and other foreign matter. Subsequently, before drilling at each borehole, the

augers, cuttings bits, samplers, drill steel and associated equipment were cleaned to prevent cross contamination from the previous drilling location. Special attention was given to the threaded sections of the drill rods and soil samplers.

Following final rinse, openings and threaded sections were visually inspected to verify that they were free of soil particles and other solid material which may potentially have contributed to possible cross contamination.

Prior to installation of the monitoring wells, the casing and screens were cleaned with a hot water detergent solution in a high pressure wash, followed by an isopropanol/distilled water rinse. Equipment was protected from all forms of solvent contact between final rinse and actual use at the sample site. All solvent rinse liquids were integrated with the decontamination water and stored on-Property in a 55-gallon drum pending analysis and ultimate disposal.

The stainless steel bailers used to collected groundwater samples were cleaned in accordance with the following procedure:

i) wash with potable water and a laboratory grade non-phosphate detergent (Alconox);
ii) rinse with potable water;
iii) rinse with isopropanol;
iv) air dry;
v) wrap with aluminum foil; and

vi) a final rinse with distilled water immediately prior to use.

5.0 GEOLOGY/HYDROGEOLOGY

5.1 REGIONAL FEATURES

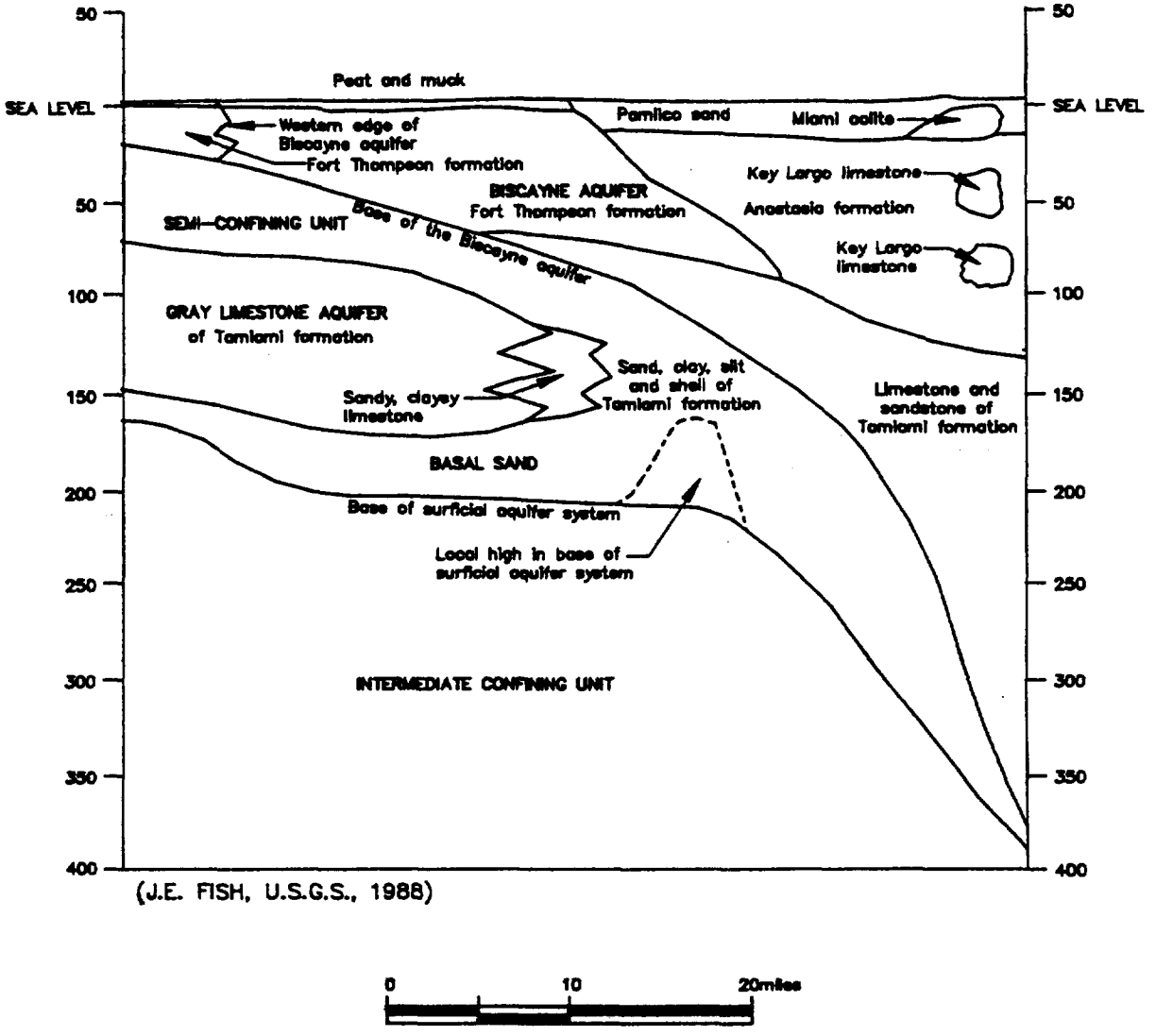
5.1.1 Regional Geology

The Property is located in the central eastern portion of Broward County and is underlain with interfingered sedimentary formations, Quarternary in age. The formations are primarily composed of sand, sandstone and limestone. Underlying the Quarternary formations are Tertiary sandstones and limestones.

The geology of Broward County is complex and indicative of coastal environments. Sedimentary types can vary from 1 to 160 feet in thickness. Areally, the sedimentary types are discontinuous with formations dipping in an easterly direction. Figure 5.1 presents a simple schematic cross-section of geologic formations across Broward County; sedimentary types that make up the formations are not shown.

The Pamlico sand formation is found at or near surface. This formation is a medium to fine grained sand with little lime mud.

Underlying the Pamlico sand is the Anastasia formation. This formation is primarily sand, but in some areas can be found as a limestone or sandstone.



(J.E. FISH, U.S.G.S., 1988)

figure 5.1

SCHEMATIC GEOLOGIC CROSS-SECTION BROWARD COUNTY

Sun Bank, Ft. Lauderdale, Florida

CRA

3050-17/05/91-8-0 (X-02)

The underlying formations of the Fort Thompson and Hawthorne are primarily limestone, with the exception of the Tamiami formation. The Tamiami is composed of a cavity-riddled limestone and a low permeability sandstone.

5.1.2 Regional Hydrogeology

The principle surficial aquifer in Broward County is the Biscayne Aquifer. The Biscayne Aquifer encompasses the southeastern tip of Florida as shown on Figure 5.2.

The vast contrast in sediment types creates a variety of permeabilities within the Biscayne Aquifer. Hydraulic conductivity ranges from 0.1 to greater than 1,000 ft/day throughout the aquifer. The Biscayne Aquifer ranges in depth from 20 feet in west Broward County to approximately 370 feet along the coast.

5.2 PROPERTY FEATURES

5.2.1 Property Geology

The Property stratigraphy has been determined from the boreholes drilled during this investigation. The information from the boreholes is very localized and encompasses an area of approximately 8,700 square feet and 25 feet deep. A distribution of geologic units is

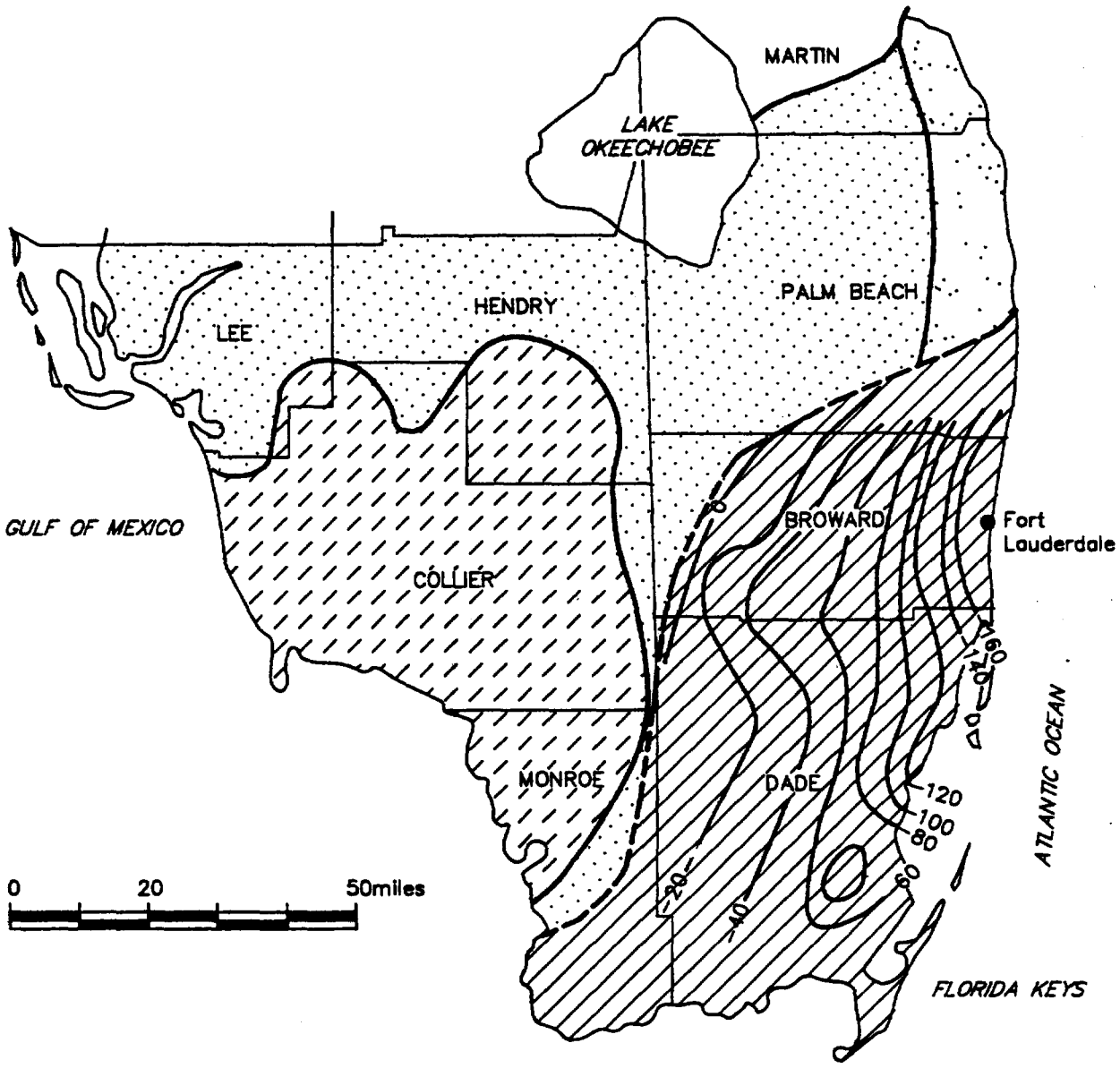


figure 5.2

AREAL EXTENT AND BASAL ELEVATION BISCAYNE AQUIFER

Sun Bank, Ft. Lauderdale, Florida

CRA

3050-17/05/91-8-0 (P-04)

illustrated on Figure 5.3. The location of the cross-section is presented in Figure 4.1.

Examination of this figure indicates an upper layer of medium to fine grained sand, dark brown. This layer was disturbed in some areas, indicating fill. This uppermost layer varied in thickness from 3 to 5 feet.

Below the brown sand is a tan colored, fine grained sand with some lime mud. The total depth of this lower unit was not determined during this investigation. Based on the regional data, the depth of this unit may be 80 to 160 feet thick.

5.2.2 Property Hydrogeology

5.2.2.1 Hydraulic Conductivity

The area of study during this investigation is of one single hydrostratigraphic unit. This unit is a surficial aquifer and is unconfined.

The hydraulic conductivity of the aquifer was estimated from single well response tests and from grain size distribution.

All the wells with the exception of MW1A were screened at the water table; therefore, the Bouwer and Rice method (1977) to calculate hydraulic conductivity was most representative. However, at well MW1A,

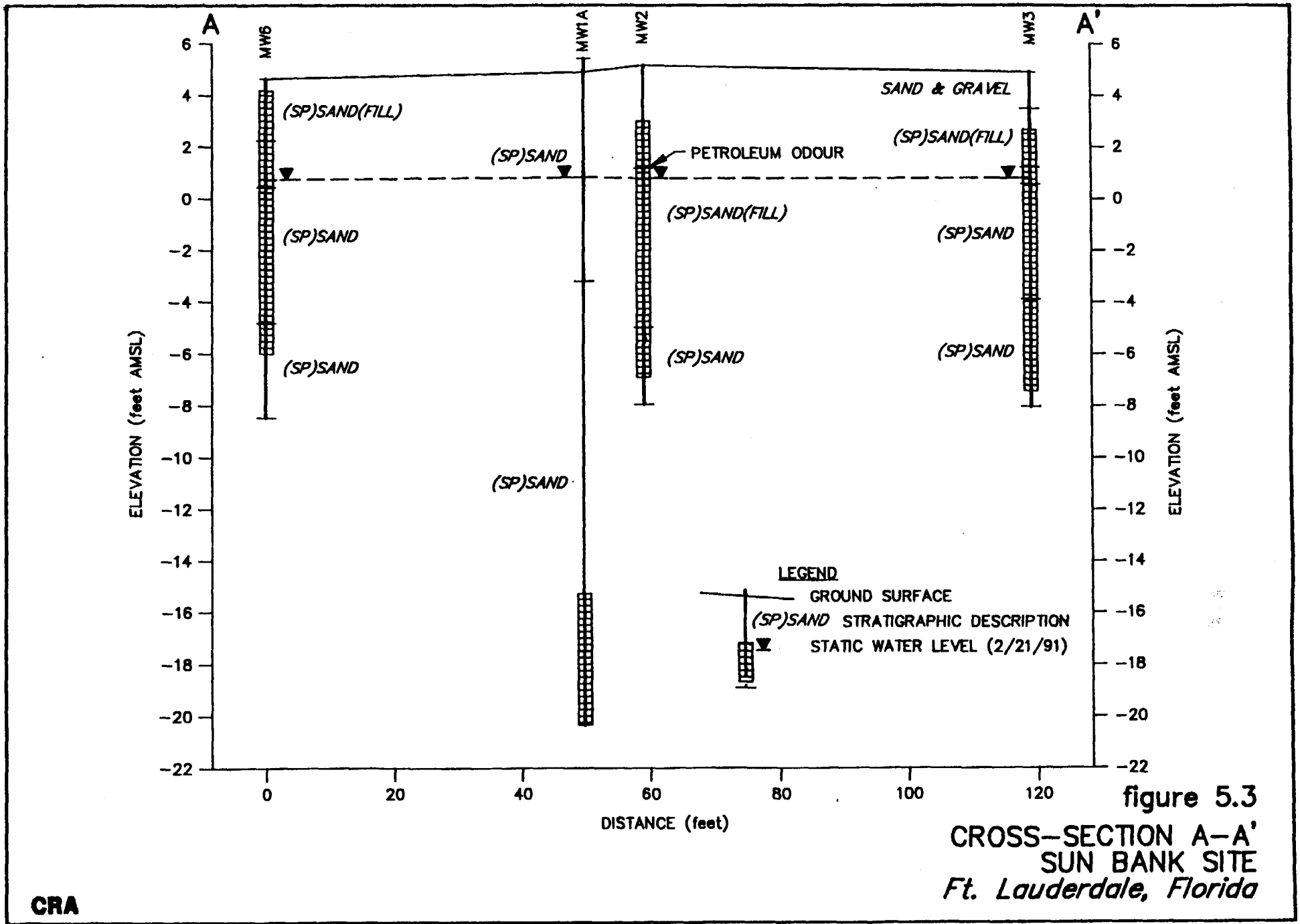


figure 5.3

CROSS-SECTION A-A'
SUN BANK SITE
Ft. Lauderdale, Florida

CRA

3050-6/02/91-8-0 (X-01)

the well screen was set below the water table and, for comparison, hydraulic conductivity was also calculated by the Hvorslev method (1951).

Hydraulic conductivity is determined from the Bouwer-Rice Method:

$$K = \frac{r_c^2 \ln \left[\frac{Re}{r_w}\right]}{2L_e} \frac{1}{t} \ln \left(\frac{Y_o}{Y_t}\right)$$

where:

K = hydraulic conductivity
r_c = radius of well casing
R_e = effective radial distance which Y is effected
r_w = radius of the screen interval including sand pack
L_e = length of screen
Y_o = Y at time zero
Y_t = Y at time t
ln = natural logarithm (base e)

Using the Hvorslev Method:

$$K = \frac{r^2 \ln (L/R)}{2LT_o}$$

where:

K = hydraulic conductivity
L = length of screen
R = radius of screen
r = radius of easing

T_o = time of head ratio h/ho
ln = natural logarithm (base e)

The range of hydraulic conductivity varies from 55.3 feet/day to 8.6 feet/day with a geometric mean of 10.5 feet/day as shown in Table 5.1. The calculated values are typical of the formation in which the wells are screened.

5.2.2.2 Hydraulic Gradients

Groundwater elevations are shown on Figure 5.4. Groundwater contours shown on these figures indicate a southeasterly flow. The horizontal hydraulic gradient for the Property is approximately 0.0011 ft/ft.

5.2.2.3 Groundwater Flow Velocity

The horizontal groundwater flow rate for the aquifer in the vicinity of the Property can be estimated based on the average linear groundwater velocity (V). This average linear groundwater velocity is defined by the following equation (Freeze and Cherry, 1979):

$V = Ki/n$

where:

K = hydraulic conductivity (10.5 ft/day, calculated)

TABLE 5.1

HYDRAULIC CONDUCTIVITY VALUES
SUN BANK, FT. LAUDERDALE, FLORIDA

Well	*Hydraulic Conductivity*
MW1A:	
Hvorslev Method	50.7 ft/day
Bouwer-Rice Method	55.3 ft/day
MW2:	
Bouwer-Rice Method	8.6 ft/day
MW3:	
Bouwer-Rice Method	16.4 ft/day
MW4:	
Bouwer-Rice Method	4.1 ft/day
MW5:	
Bouwer-Rice Method	10.4 ft/day
MW6:	
Bouwer-Rice Method	26.7 ft/day
Geometric mean	10.5 ft/day

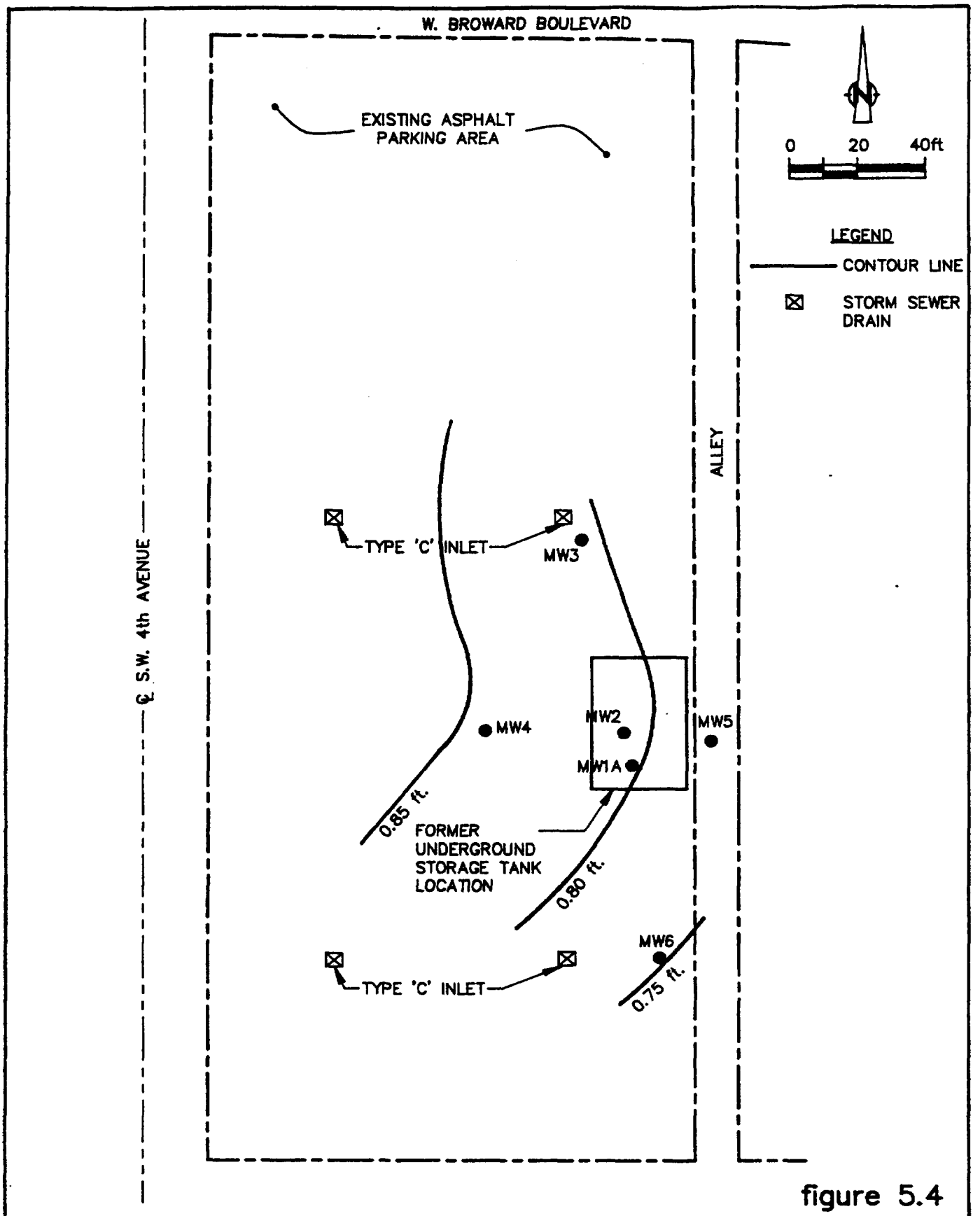


figure 5.4

GROUNDWATER CONTOURS
SUN BANK SITE
Ft. Lauderdale, Florida

1) ALL ELEVATIONS PRESENTED ARE IN FEET ABOVE MEAN SEA LEVEL.

2) ELEVATIONS ARE AS OF 02/21/91

CRA

3050-15/07/91-8-0 (P-05)

i = hydraulic gradient (0.0011 ft/ft, calculated)

n = assumed porosity (0.3)

The average groundwater velocity is estimated to be 0.04 ft/day, or 14 ft/year, at the Property.

5.2.2.4 Groundwater Flux

The groundwater flux is the amount of water which discharges from a given area in a unit time, and is determined by:

$Q = KiA$

where:

Q = volume discharged (cu.ft/day)

K = hydraulic conductivity (10.5 ft/day)

i = hydraulic gradient (0.0011 ft/ft)

A = cross-sectional area (ft^2)

The groundwater flux passing beneath the Property is calculated for a cross-section perpendicular to the direction of groundwater flow. The length of the discharge area was assumed to be 360 feet and the saturated aquifer thickness between 75-155 feet. While the Biscayne Aquifer ranges in thickness from 80-160 feet, the surface of this aquifer is located approximately 5 feet below ground surface on-Property. By using an average hydraulic conductivity of 10.5 ft/day and a hydraulic gradient of 0.0011 ft/ft, the discharge through the Biscayne Aquifer is between 310-645 ft^3/day.

6.0 PROPERTY CHARACTERIZATION

6.1 DATA BASE

The data base for contaminant assessment consists of the physical data presented in Section 2.0 through 5.0 and analytical results of collected soil and groundwater samples.

6.1.1 Analytical Data Base

The analytical data base consists of the following:

- 5 subsurface soil samples collected from 2 boreholes at depths of 1 to 3 feet and 8 to 10 feet;
- 14 groundwater samples collected from 6 monitoring wells located on-Property; and
- quality assurance/control samples.

Each sample collected was analyzed for parameters which includes the following:

- VOCs
- BNAs
- chlorinated pesticides and PCBs; and
- dibenzo-p-dioxins and dibenzofuran isomers.

6.1.2 Analytical Methods and Data Validation

All analyses were conducted by Wadsworth Alert Laboratories in accordance with the Quality Assurance Project Plan (QAPP). Wadsworth subcontracted the analysis of water and soil samples to Triangle Laboratories Inc.

Reports received from each laboratory were assessed and validated by CRA's quality assurance/quality control (QA/QC) Officer based on a review of standard quality control criteria specified in the analytical methods, specific QC objectives outlined by the QAPP and in accordance with general guidance documents issued by the USEPA.

The data validation reports are presented in Appendix G.

Table 6.1 presents a summary of USEPA toxicity equivalence factors (TEF) which establish the toxicity of dioxin and dibenzofuran isomers relative to 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD). The TEFs are used to determine the associated soil and groundwater concentration levels at which dioxin and dibenzofuran concentrations would be of concern. The table also indicates the toxicity equivalent concentrations (TEC) which can be used to assess the analytical detection exceedences of these guidance concentrations.

TABLE 6.1

TOXICITY EQUIVALENCY FACTORS AND APPLICABLE LEVELS OF CONCERN - DIOXINS AND DIBENZOFURANS SUN BANK PROPERTY FT. LAUDERDALE, FLORIDA

Congener	*TEF*[1]	*TEC Concentration Range of Concern*		
		µg/kg[a]	*ng/L*[b]	*ng/L*[c]
2,3,7,8-TCDD	1.00	20	10	0.05
1,2,3,7,8-PeCDD	0.50	40	20	0.1
1,2,3,4,7,8-HxCDD	0.04	500	250	1.25
1,2,3,7,9-HxCDD	0.04	500	250	1.25
1,2,3,6,7,8-HxCDD	0.04	500	250	1.25
1,2,3,4,6,7,8-HpCDD	0.001	20,000	10,000	50
OCDD	--	--	--	--
2,3,7,8-TCDF	0.10	200	100	0.5
2,3,4,7,8-PeCDF	0.10	200	100	0.5
1,2,3,7,8-PeCDF	0.10	200	100	0.5
1,2,3,4,7,8-HxCDF	0.01	2,000	1,000	5
1,2,3,7,8,9-HxCDF	0.01	2,000	1,000	5
1,2,3,6,7,8-HxCDF	0.01	2,000	1,000	5
2,3,4,6,7,8-HxCDF	0.01	2,000	1,000	5
1,2,3,4,6,7,8-HpCDF	0.001	20,000	10,000	50
1,2,3,4,7,8,9-HpCDF	0.001	20,000	10,000	50
OCDF	--	--	--	--
Total TCDD	0.01	2,000	1,000	5
Total PeCDD	0.005	4,000	2,000	10
Total HxCDD	0.0004	50,000	25,000	125
Total HpCDD	0.00001	2,000,000	1,000,000	5,000
Total TCDF	0.001	20,000	10,000	50
Total PeCDF	0.001	20,000	10,000	50
Total HxCDF	0.0001	200,000	100,000	500
Total HpCDF	0.00001	2,000,000	1,000,000	5,000

Notes:

(a) Based on the Times Beach Missouri cleanup criteria for a residential site of 20 µg/kg 2,3,7,8-TCDD
(Reference: United States Environmental Protection Agency "Dioxin Cleanup Update", May 13, 1988).

(b) Based on Florida Groundwater Guidance Concentration for 2,3,7,8-TCDD of 10 ng/L.

(c) Based on the proposed Federal MCL for 2,3,7,8-TCDD of 0.05 ng/L.

(1) Reference - USEPA "Test Methods for Evaluating Solid Waste", SW-846, Method 8290 (Draft), June 1987.

6.1.3 Regulatory Criteria

Regulatory criteria and standards for groundwater, based on Federal drinking water standards and state groundwater guidance, are shown in Table 6.2.

6.2 SOIL ASSESSMENT

Analytical results for all soil analyses are presented in Appendix H and a summary of detections is presented in Table 6.3. Boreholes were drilled to complete monitoring wells MW2 and MW4. Samples were collected at depths of 1-3' and 8-10'. MW2 is located in the center of the tank excavation area while MW4 is west of this area. The soil samples collected from MW2 exhibited limited detection of BNAs at levels less than 1 mg/kg and below the laboratory detection limit. Pentachlorophenol was detected in one sample (1 to 3-foot interval) at 0.28 mg/kg, below the laboratory detection limit.

There were no detections of 2,3,7,8-TCDD or 2,3,7,8-tetrachloro-dibenzo-furan (TCDF) in any soil samples. There were no exceedences of the TECs for dioxin and dibenzofuran isomers based on the cleanup criterion for Times Beach, Missouri of 20 µg/kg.

The detections of acetone in 3 of 5 soil samples at levels between 17 and 26 mg/kg appear to be the result of field contamination of

TABLE 6.2

GROUNDWATER REGULATORY CRITIERA
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

	Federal MCL/pMCL (1) (mg/L)	*Florida MCL (2) (mg/L)*	*Florida GW Guidance Concentration (3) (mg/L)*
acetone	0.7		
benzene	0.005	0.001	0.001
bromodichloromethane	0.1		
chloroform	0.1		
ethylbenzene	0.7/0.002		0.002
total Xylenes	10/0.05		0.05
acenaphthylene	0.01		0.01
anthracene	0.01		0.01
benzo (b) fluoranthene	0.01		0.01
benzo (k) fluoranthene	0.01		0.01
benzo (a) pyrene	0.01		0.01
chrysene	0.01		0.01
fluoranthene	0.042		0.042
phenanthrene	0.01		0.01
pyrene	0.01		0.01
naphthalene	0.01		0.01
pentachlorophenol			0.03
2,3,7,8-TCDD (µg/L) (4)	0.00005		0.01

Notes:

(1) USEPA National Primary and Secondary Drinking Water Regulations 40 CFR 141-3 (54 Fed. Reg. 22062) May 1989.
(2) References to be provided.
(3) Florida Groundwater Guidance Concentrations, Florida Department of Environmental Regulations, February, 1989 (Guidance concentrations in this table are only to be used as a screening guideline for groundwater contamination and without further justification cannot be used as standards)
(4) Proposed MCL

TABLE 6.3
ANALYTICAL RESULTS FOR SOIL SAMPLING
SUNBANK PROPERTY, FT. LAUDERDALE, FLORIDA

Triangle Lab Identification	*OK 3004-4*			*OK 3004-3*			*OK 3004-5*		*OL 0302-7*		*OL 0302-8*	
Wadsworth Identification	*S-112890-PS-10*			*S-112890-PS-09*			*S-112890-PS-11*		*S-112990-PS-12*		*S-112990-PS-13*	
Well Identification	MW 2 (1'-3')			MW 2 (Duplicate)			MW 2 (8'-10')		MW 4 (1'-3')		MW 4 (8'-10')	
	Result		Det.Limit	Result		Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit
Volatile Organics												
(mg/kg)												
Acetone							17	5	36	5	27	5
Benzene												
Bromodichloromethane												
Chloroform												
Ethylbenzene												
Total Xylenes												
Selected Organic Compounds												
NOT DETECTED												
Xylenes												
Benzene												
Ethylbenzene												
Base/Neutral Extractable Organics												
(mg/kg)												
Acenaphthylene	0.03	J	0.35	0.02	J	0.36						
Anthracene	0.01	J	0.35									
Benzo(b)fluoranthene	0.26	J	0.35									
Benzo(k)fluroanthene	0.3	J	0.35									
Benzo(a)pyrene	0.14	J	0.35									
Chrysene	0.08	J	0.35									
Dibenzofuran	0.02	J	0.35									
Fluoranthene	0.07	J	0.35	0.04	J	0.36						
Phenanthrene	0.02	J	0.35	0.02	J	0.36						
Pyrene	0.09	J	0.35	0.08	J	0.36						
Acid Extractable Organics												
(mg/kg)												
Pentachlorophenol	0.28	J	0.35									
Pesticides												
NOT DETECTED												
Polychlorinated Biphenyls												
NOT DETECTED												

TABLE 6.3
ANALYTICAL RESULTS FOR SOIL SAMPLING
SUNBANK PROPERTY, FT. LAUDERDALE, FLORIDA

Triangle Lab Identification	*OK 3004-4*		*OK 3004-3*		*OK 3004-5*		*OL 0302-7*		*OL 0302-8*	
Wadsworth Identification	*S-112890-PS-10*		*S-112890-PS-09*		*S-112890-PS-11*		*S-112990-PS-12*		*S-112990-PS-13*	
Well Identification	MW 2 (1'-3')		MW 2 (Duplicate)		MW 2 (8'-10')		MW 4 (1'-3')		MW 4 (8'-10')	
	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit	Result	Det.Limit
Dioxins										
(µg/kg)										
123478-HxCDD			0.03							
123678-HxCDD	1.2		1.5		0.16		0.88		0.03	
123789-HxCDD	0.14		0.15		0.01		0.11			
1234678-HpCDD	38.2	J	72.3	J	6.2		32.6		1.5	
OCDD	684		852		65.4		357		21	
123478-HxCDF	0.16		0.17		0.01		0.13		0.006	
123678-HxCDF	0.06		0.04				0.05		0.002	(1)
234678-HxCDF	0.03		0.04				0.04		0.002	
1234678-HpCDF	13.6		16.1		1.8		9.8		0.46	
1234789-HpCDF	0.5		0.6		0.07		0.33		0.01	
OCDF	64.1		79.6		6.6		34.1		1.6	
Total TCDD	0.53	(1)U	0.46	(1)U	0.24	(1)U	0.01		0.03	
Total PeCDD	0.15						.014 (1)			
Total HxCDD	3.9		5.5		0.55		2.6		0.1	
Total HpCDD	7.09	J	131	J	11		59.3		2.8	
Total TCDF	0.05	(1)U	0.04	(1)U	0.17	(1)	0.005		0.002	
Total PeCDF	0.45	J	0.08	J			0.05			
Total HxCDF	10.1		11.2		1.5		5.6		0.24	
Total HpCDF	70.3		124		11.5		45.1		1.9	

NOTES:
(1) = Estimated maximum possible concentration.
= Not detected.
U = The material was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
J = The associated numerical quantity is estimated.

equipment. Acetone is a common contaminant in isopropanol, one of the solvents used in equipment decontamination.

6.3 GROUNDWATER ASSESSMENT

Monitoring wells were sampled in November 1990 and February 1991. Analytical data tables for analyses completed on groundwater samples are presented in Appendix H.

At no time during installation or sampling of the Property monitoring wells was the presence of free mineral spirits observed. Mineral spirits, the principal constituent of the storage tank contents, would be expected to be floating on the surface of the water table if a substantial release of the tanks' contents had occurred.

To evaluate the potential impact of contaminants migrating off Property, concentrations of each compound were compared to regulatory criteria and guidance discussed in Section 6.1.3 to determine if contaminants are present in potential drinking water at levels of concern. A summary of the detections by well and the exceedances of the referenced standards and criteria by well location is presented in Table 6.4.

A discussion of the analytical data for each group of compounds analyzed is presented in the following Sections.

TABLE 6.4

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		*Round 1 (duplicate)*		*Round 2*		*Round 2 (duplicate)*		*Exceedances of Criteria*
MW 1A											
VOCs	(µg/l)	benzene	2	J	ND (1)		3				(A) Rounds 1 and 2
		ethylbenzene	62	J	12	J	51	J			(A) Rounds 1 and 2
		total xylenes	51	J	8	J	4				(A) Round 1
		dichloroethene, 1,2-					1				
		chloroform			8	J					
SOCs	(µg/l)	total xylenes	19		18		2				
		benzene	2	J	2	J	3				
		ethylbenzene	73		68		51	J			
BNAs	(µg/l)	napthalene					85				(A) Round 2
Dioxins	(ng/l)	1,2,3,4,6,7,8-HpCDD	0.17	J	0.37		0.47				
		OCDD	17	J	26.7		61.2				
		1,2,3,4,6,7,8-HpCDF					0.07	(1)			
		OCDF	0.06	J	0.28	J	0.86				
		Total TCDD	0.1		5.6	U (1)	0.29				
		Total PeCDD	0.23		ND (0.2)		0.32				
		Total HxCDD	2	J	3.2	J	8				
		Total HpCDD	1.7	J	3.1	J	5.4				
		Total TCDF	0.33	U (1)	0.36	U (1)	0.2	(1)			
		Total PeCDF	0.1		0.12	(1)					
		Total HxCDF	ND (0.03)		0.07	(1)	0.08				
		Total HpCDF	0.05		0.16	J	0.32				
MW 2											
VOCs	(µg/l)	ethylbenzene	6								
		total xylenes	5								
SOCs	(µg/l)	ethylbenzene	7								
		total xylenes	4								
BNAs	(µg/l)	napthalene					11		11		(A) Round 2
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD					3.7		5.5		
		1,2,3,7,8,9-HxCDD					0.21		0.31		
		1,2,3,4,6,7,8-HpCDD	~~2.1~~				~~126~~		~~199~~		(B) Rounds 1 and 2
		OCDD	~~25.5~~				1810		2340		
		1,2,3,4,7,8-HxCDF					0.21	(1)	0.49		
		1,2,3,6,7,8-HxCDF					0.11		0.23		
		2,3,4,6,7,8-HxCDF					0.13		0.05		
		1,2,3,4,6,7,8-HpCDF	0.54				40.2		54.9		(C)
		1,2,3,4,7,8,9-HpCDF					0.91	(1)	1.66		
		OCDF	2.1				165		221		
		Total TCDD	0.29				4.6	(1)	0.05		
		Total PeCDD					1.5	(1)	4.2		
		Total HxCDD	0.11				13.5		22.7		
		Total HpCDD	3.7				216		350		
		Total TCDF	0.36	U (1)			0.19	(1)	0.18		
		Total PeCDF					0.85		1.9		
		Total HxCDF	0.33				35.3		51.2		
		Total HpCDF	2.6				205		258		

TABLE 6.4

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		*Round 1 (duplicate)*		*Round 2*		*Exceedances of Criteria*
MW 3									
VOCs	*(µg/l)*	acetone	48	J					
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD					0.22		
		1,2,3,4,6,7,8-HpCDD	0.15				6.2		
		OCDD	3.5				124		
		1,2,3,4,6,7,8-HpCDF	0.04	(1)			2.4		
		OCDF	0.24				12		
		Total TCDD	5.6	U (1)			4.9	(1)	(B) Rounds 1 and 2
		Total HxCDD	0.18	(1)			0.38		
		Total HpCDD	0.15				11.5		
		Total TCDF	0.27	U (1)			0.22	(1)	
		Total HxCDF	0.02				1.5		
		Total HpCDF	0.15				11.4		
MW 4									
VOCs	*(µg/l)*	acetone	79						
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD					0.38	(1)	
		1,2,3,4,6,7,8-HpCDD					16.8		
		OCDD	0.98				319		
		1,2,3,4,6,7,8-HpCDF					6.1		
		OCDF	0.04				26.3		
		Total TCDD	5.5	U (1)			12.36	(1)	
		Total HxCDD					0.15		
		Total HpCDD					29.3		
		Total TCDF	0.3	U (1)			0.4	(1)	
		Total HxCDF					4.4		
		Total HpCDF					26.9		
MW 5									
Dioxins	*(ng/l)*	1,2,3,6,7,8-HxCDD	0.77				9.3		(B) Round 2
		1,2,3,7,8,9-HxCDD					0.31		
		1,2,3,4,6,7,8-HpCDD					319		(B) Round 2
		OCDD	948				7530		
		1,2,3,4,7,8-HxCDF	0.08				1.1		
		1,2,3,6,7,8-HxCDF					0.22	(1)	
		1,2,3,4,6,7,8-HpCDF	14.2				133		(B) Round 2
		1,2,3,4,7,8,9-HpCDF	0.33	(1)			4.78	(1)	
		OCDF	55.4				719		
		Total TCDD	4.9	U (1)			0.46		
		Total PeCDD	0.65	(1)			5		
		Total HxCDD	15.5				56.4		
		Total HpCDD	46.3				647		
		Total TCDF	0.23	U (1)			0.12		
		Total PeCDF	0.05	(1)			2.1		
		Total HxCDF	1.8				108		
		Total HpCDF	68.8				787		

TABLE 6.4

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		*Round 1 (duplicate)*	*Round 2*	*Round 2 (duplicate)*	*Exceedances of Criteria*
MW 6								
Dioxins	*(ng/l)*	1,2,3,4,6,7,8-HpCDD			4.1			
		OCDD	3.1		77.3			
		1,2,3,4,6,7,8-HpCDF	0.05		1.6			
		OCDF	0.21		7.3			
		Total TCDD	6	U (1)	6.1	(1)		
		Total HxCDD			0.09	(1)		
		Total HpCDD			7.3			
		Total TCDF	0.37	U (1)	0.2	(1)		
		Total HxCDF			0.95			
		Total HpCDF	0.22		7.5			

NOTES

VOCs Volatile Organic Compounds
SOCs Selected Organic Compounds
BNAs Base Neutral Acid Extractable Organic Compounds
µg/l micrograms per litre = parts per billion
ng/l nanograms per litre = parts per trillion
ND Not detected (the detection limit is in brackets)
(1) Estimated Maximum Possible Concentration (EMPC)

U The material was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
J The associated numerical quantity is estimated.
(A) Exceedence in based on the Florida Groundwater Guidance Concentrations
(B) Exceedence is based on the TEC's shown in Table 7 for the proposed MCL for 2,3,7,8-TCDD
(C) The mean of detection for round 2 was 47.6 which is less than the TEC of 50 ng/l based on the proposed MCL for 2,3,7,8-TCDD.

6.3.1 Volatile Organic Compounds

Samples were analyzed for TCL VOCs and separately for benzene, ethylbenzene, xylene and toluene.

No detections of VOCs other than acetone occurred in MW3 and MW4. There were no detections of VOCs in samples from MW5 and MW6. Acetone is not considered to be a contaminant of concern for the Property. As was discussed in Section 6.2, acetone is a common contaminant in isopropanol, a material used to decontaminate downhole equipment, and the detections of this compound are believed to result from field contamination.

Did it show up in Decon Blank?

Two detections of ethylbenzene in MW1A exceeded the Florida Groundwater Guidance concentration of 2 µg/L but are below the Federal MCL of 700 µg/L. Ethylbenzene was detected in one sample from MW2 at levels slightly above the Florida Groundwater Guidance concentration.

Chloroform and 1,2-dichloroethane were detected once in MW1A at low levels. Benzene was detected in samples from MW1A at levels slightly above Florida Groundwater Guidance Concentrations and Florida Drinking Water Criteria (1 µg/L), but below the Federal MCL (5 µg/L). Xylenes were detected in MW1A in both sampling rounds and once at MW2 at levels below criteria and guidance concentrations. Ethylbenzene and xylenes are constituents of mineral spirits, in addition to most other petroleum based solvents, including gasoline.

6.3.2 Base, Neutral and Acid Extractable Compounds

The only BNA compound detected in samples from on Property monitoring wells was naphthalene. Naphthalene was detected in Round 2 samples from both MW1A and MW2 at levels exceeding the Florida Groundwater Guidance Concentrations. These detections from the second sampling round indicate that naphthalene may be present in the groundwater samples, but the detections have not been confirmed by the results of the first sampling round. Naphthalene is a trace constituent of wood treating solutions.

6.3.3 Pesticides and PCBs

No pesticides or polychlorinated biphenyls were detected in any groundwater samples from the on Property monitoring wells.

6.3.4 Dibenzo-p-Dioxin and Dibenzofuran Isomers

Dibenzo-p-dioxin and dibenzofuran isomers were detected in all monitoring wells, but the majority of detections occurred in samples from MW2 and MW5. There were no exceedances of the TEC based on the Florida Groundwater Guidance concentration and seven exceedances of the

TEC based on the proposed Federal Maximum Contaminant Level in samples from MW2, MW3 and MW5.

6.3.5 Drummed Water

Water collected during purging of the monitoring wells was found to contain small amounts of toluene and ethylbenzene. Water collected during decontamination of various drilling tools and sampling equipment was found to contain acetone (100,000 µg/L) and methylene chloride (460 µg/L). One drum of the decontamination fluids is present on-Property.

6.4 SUMMARY

Petroleum odor observed by drillers

Since no mineral spirits were observed to be present on the water surface during installation or sampling of the groundwater monitoring wells, it appears that any release of mineral spirits from the storage tanks consisted of a small quantity of the tanks' contents and produced no observable impact to groundwater. It is likely that the immediate cleanup of the tank contents released to the excavation area prevented adverse impacts to the groundwater and soil.

The analytical results from soil sampling indicate limited detections of VOCs at levels only slightly above the detection limits. Several BNAs were qualitatively identified in samples from MW2 at levels below the

detection limits. There were no exceedances of the TEC (based on the Times Beach criterion) for any dibenzo-p-dioxin or dibenzofuran isomer in any soil samples.

The analytical results for groundwater samples indicate several small exceedances of Florida Groundwater Guidance Concentrations. These exceedances occurred in samples collected from MW1A which is located in the center of the tank excavation area and is screened at 25 feet below ground surface. It is suspected that the higher concentrations of VOCs in MW1A (25') relative to MW2 (12') are due to the existence of the former storage tanks in the ground for more than 40 years and small leaks which may have occurred during that time.

The results of analyses of samples collected from monitoring wells downgradient from the former storage tank location do not exhibit levels of contaminants which exceed regulatory criteria or guidance concentrations. The analytical data indicate some limited impact to groundwater in the vicinity of the former storage tanks at levels only slightly above drinking water criteria.

The impact of the former storage tanks on groundwater outside of the immediate location of these tanks is not considered to be quantifiable.

7.0 CONTAMINANT TRANSPORT AND FATE

While the degree of contamination at the Property is such that exposure is unlikely, an evaluation of potential transport pathways is required under the Consent Order. The relevant pathways discussed in the following sections include; air, surface water and sediment; and groundwater.

7.1 CONTAMINANT PROPERTIES

Contaminants found on-Property include VOCs, BNAs and dioxin/dibenzofuran isomers. All of these compounds may be classified by: solubility; tendency to evaporate or volatilize; and the proportion of compound which is adsorbed to organic material in a water-soil or air-soil system at equilibrium (mobility). VOCs are characterized by high solubility, high volatility and high mobility (not strongly adsorbed to organic material). The BNA compounds are characterized by low solubility, low volatility and moderate mobility. Dioxin and dibenzofuran isomer are characterized as being nearly insoluble, non-volatile and slightly mobile.

The pathways of exposure identified in Table 7.1 are incomplete. An exposure pathway is incomplete due to either the lack of quantifiable impact in the transport medium or the lack of a human receptor.

TABLE 7.1

CONTAINMENT TRANSPORT PATHWAYS
SUN BANK PROPERTY, FT LAUDERDALE, FLORIDA

Source	*Release Mechanism*	*Release Probability*	*Exposure Point*	*Pathway Complete*
Transport Medium-Air				
Surface Sediment	Volatilization	low	New River	No
Surface Soil	Airborne Particulate	nil	on-Site	No
Subsurface Soil	Volatilization	nil	on-Site	No
Groundwater	Volatilization	nil	on-Site	No
Surface Water	Volatilization	nil	New River	No
Transport Medium - Surface Water				
Groundwater	Surface Discharge	nil	New River	No
Surface Sediment	Runoff	nil	New River	No
Transport Medium - Groundwater				
Subsurface Soil	Leaching	low	Irrigation & Public Supply Wells	No
Surface Soil	Leaching	low	Irrigation & Public Supply Wells	No

7.2 AIR PATHWAY

The potential for release of organic vapors and particulates to air was evaluated. Table 7.1 identifies several potential sources evaluated for releases of organic vapors by volatilization. Volatilization of organic compounds from subsurface soils and groundwater does not occur to an appreciable extent since these areas of contamination are not exposed to the atmosphere. In addition, the low levels of volatile species detected in the subsurface soils and groundwater indicate that if volatilization were to occur from the subsurface matrices, the potential impact would be negligible.

Volatilization from surface water in the New River is a potential source; however, the River's distance from the Property and the absence of an observed impact of the former storage tanks upon downgradient wells on-Property (Section 6.0) renders the possibility of organic vapor release from discharge to surface water negligible.

Surficial soils at the Property consist largely of imported fill which was brought on-Property to form the base for a proposed parking lot. Therefore, these soils do not appear to have been impacted by the former buried tanks. Accordingly, the potential for the release of contaminants to the atmosphere from surficial soils is considered to be insignificant.

A potential source of transport of airborne particulates could occur during the excavation of subsurface soil containing low levels of dibenzo-p-dioxin and dibenzofuran isomers. These compounds would adsorb to dust particles and be subject to kinetic transport. The frequency of

transport would be dependant upon the moisture of the surface soil and the degree of vegetation (especially grasses or other small plants). The presence of either would tend to decrease the emissions. However, it has previously been established the concentration of these compounds are substantially below the levels established by the USEPA for a residential setting.

BNA's could be transported with airborne particulates during the excavation of subsurface soils. However, analytical data indicate that these compounds are only potentially present in a limited area at levels below laboratory detection limits. Therefore, the impact of any such potential release is not considered to be significant.

All exposure pathways are found to be incomplete.

7.3 SURFACE WATER AND SEDIMENT PATHWAY

The nearest surface water body, the New River, is described in Section 2.2. While there is potential for exposure to contaminants in the New River exists, the lack of contamination detected downgradient from the Property (between the former storage tank location and the New River) and the distance from the Property makes this an incomplete pathway and no quantifiable exposure is expected to occur.

No surface drainage paths are known to exist from the Property to the New River and the potential for release is non-existent. In

addition, the surficial soils are not considered to have been impacted by the former storage tanks (see Section 7.2).

7.4 GROUNDWATER PATHWAY

Compounds in groundwater would tend to migrate in the direction of groundwater flow (southwest) at a range of velocities that are a function of the groundwater flow velocity, the tendency of each compound to be adsorbed or to the subsurface materials, the nature of those materials and diffusion mechanisms.

The groundwater flow velocity has been estimated in Section 5.2.2.3 to be 14 ft/year. Given that the nearest irrigation well is approximately 1 mile downgradient from the Property and public supply wells are located approximately 5 miles from the Property, groundwater could be expected to reach these wells on the order of several hundred years, if the groundwater flow path connected the Property and these wells. This connection has not been examined nor is it considered to be likely.

There were limited detections of groundwater contamination at the Property and no substantial impact detected downgradient of the Property. The limited detections on-Property consisted of the soluble and mobile VOCs. Migration of VOCs will tend to follow the groundwater flow path. Aqueous concentrations will tend to decrease as migration occurs due to attenuating mechanisms such as adsorption, hydrodynamic dispersion, dilution, biological degradation and oxidation.

Due to these mechanisms and the significant travel times required for on-Property groundwater to reach any exposure point, exposure to contaminated groundwater through either public supply or irrigation wells is considered improbable.

The exposure pathways were found to be incomplete.

7.5 SUMMARY

While the presence of some highly mobile contaminants is known, the low concentration of these contaminants and their very localized presence coupled with the extreme distance and improbable discharge pathways make the potential for exposure to on-Property contaminants unlikely to occur.

8.0 SUMMARY AND CONCLUSIONS OF CONTAMINATION ASSESSMENT

The analytical data from the analyses of soil and groundwater samples do not indicate a quantifiable impact from former Property operations at downgradient wells. The data indicate some limited impact to groundwater in the vicinity of the former storage tanks at levels only slightly above the proposed EPA drinking water standard for 2,3,7,8-TCDD based on a TEF for all isomers and Florida Groundwater Guidance for benzene, total xylenes and napthalene.

Surrounding land uses in the area of the Property are predominantly commercial/light industrial and low to medium density residential. Local surface water is limited to the New River which is located approximately 600 to 900 feet south of the Property.

A well inventory was completed for the vicinity of the Property. Two irrigation wells are located approximately 1 mile away from the Property. The nearest public supply wells are approximately 5 miles to the south-southwest of the Property.

As part of the Property investigation, six monitoring wells were installed and soil samples from two boreholes collected. Two rounds of chemical analysis for groundwater samples occurred. As part of the monitoring well installations and groundwater analyses, single well response tests were conducted. As well, soil samples were submitted for grain size distribution analysis.

Regional geology was characterized as being composed of interfingered sedimentary formations consisting of sand, sandstone and limestone. Upper layers of Property soils were characterized as common fill. The common estimated hydraulic conductivity is 10.5 ft/day. The horizontal hydraulic gradient was determined to be 0.0011 ft/ft and the linear groundwater flow velocity to be 14 ft/year. This results in an estimated groundwater flux of 310-645 ft^3/day.

Analytical results from groundwater sampling indicate limited impact in the vicinity of the underground storage tanks only slightly above regulatory criteria. Toxicity Equivalence Concentrations for dibenzo-p-dioxin or dibenzofuran isomers were not exceeded in any soil sample. The downgradient groundwater impact is not considered to be quantifiable. No observable release of mineral spirits from the storage tanks has occurred.

The generation of an additional impact on groundwater or the transport of contaminants through groundwater will be minimized by Sun Bank's planned parking lot for the Property. The asphalt surface will minimize infiltration in the area of the former storage tanks.

The combination of low contaminant concentrations, extreme distance to exposure receptors and improbable discharge pathways make potential exposure unlikely to occur.

The potential for contaminant transport and subsequent

exposure to the local area has been determined to be very low based on the low source concentrations and improbable and incomplete transport pathways.

9.0 RECOMMENDATIONS

Based on the lack of a quantifiable impact on groundwater off the Property, and the fact that there are no known users of groundwater in the vicinity of the Property, no further investigative or remedial actions are recommended. The present limited impact to groundwater under the former tank location will be further mitigated by natural attenuation mechanisms.

10.0 REFERENCES

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4. Conestoga-Rovers & Associates, "Procedures to Prevent Hazards Plan and Contingency Plan - Temporary Drum Storage Facility, Sun Bank, Fort Lauderdale, Florida", July 1989a.

5. Conestoga-Rovers & Associates, "Work Plan - Containerized Aqueous Material Processing and Sludge Disposal - Sun Bank Property, Fort Lauderdale, Florida", August 1989b.

6. Conestoga-Rovers & Associates, "Construction Report - Sun Bank Property - Fort Lauderdale, Florida", March 1990b.

7. National Oceanic and Atmospheric Administration, Climatological Data, Annual Summaries, South Eastern Florida. National Climate Data Centre, Asheville, North Carolina.

8. Bouwer and Rice, 1977, Rapid Infiltration System for Wastewater Renovation; Phoenix, Arizona, U.S. Water Conservation Laboratory, Interim Report, p. 28.

9. Hvorslev, M.J.; "Time Lag and Soil Permeability in Groundwater Observation", U.S. Army Corps P.Engineers, Waterways Exp. Sta. Bull. 36, 1951.

10. Freeze, R.A.; Cherry, J.A.; "Groundwater", Prentice-Hall Ltd., Toronto, 1979.

APPENDIX A

HISTORICAL AERIAL PHOTOGRAPHS

figure A.1

OBLIQUE AERIAL PHOTO
(10/29/56)
SUN BANK SITE
Ft. Lauderdale, Florida

3050-16/08/91-8-0

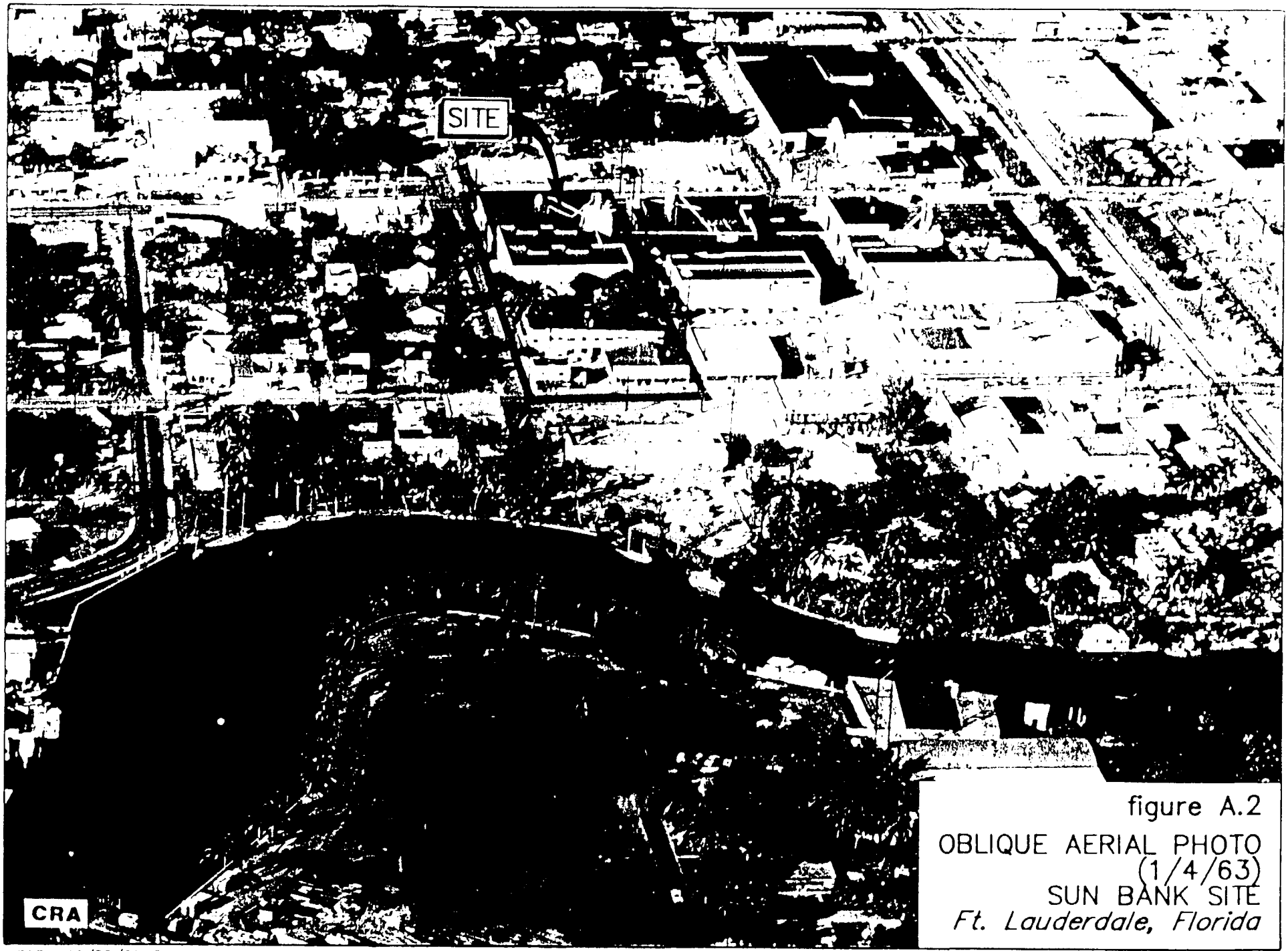


figure A.2
OBLIQUE AERIAL PHOTO
(1/4/63)
SUN BANK SITE
Ft. Lauderdale, Florida

3050-16/08/91-8-0

figure A.3
OBLIQUE AERIAL PHOTO
(1/29/79)
SUN BANK SITE
Ft. Lauderdale, Florida

3050-16/08/91-8-0

figure A.4

OBLIQUE AERIAL PHOTO
(1/10/90)
SUN BANK SITE
Ft. Lauderdale, Florida

3050-16/08/91-8-0

APPENDIX B

WELL INVENTORY/WELL COMPLETION FORMS

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

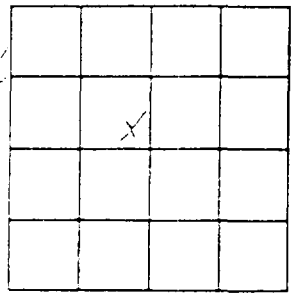
Owner _____ Address _____ City _____ State _____ Zip _____

Contractor's Signature _____ License No. _____ Completion Date _____ Casing Depth _____ Total Depth _____ Well #

Driller's Name _____ Registration No. _____

TYPE OF WORK: Construct ( ) Repair (✓) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD (✓) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL _____ Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION
Located Near _____
County _____
_____ Section Township Range
Latitude-Longitude



LOCATE IN SECTION

Cuttings sent to District? ( ) Yes (✓) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones
Number of bags				

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type _____ Slot size _____
Screened from _____ (ft.) to _____ (ft.)
Type of grout with % additives _____
Water: Clear (✓) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

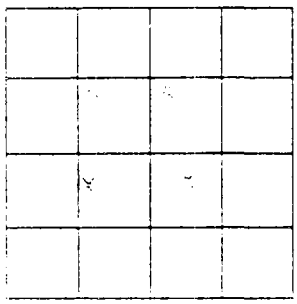
Owner _____ Address _____ City _____ State _____ Zip _____

Contractor's Signature _____ License No. _____ Completion Date _____ Casing Depth _____ Total Depth _____ Well #

Driller's Name _____ Registration No. _____

TYPE OF WORK: Construct ( ) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor ( ) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL _____ Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION
Located Near _____
County _____
_____ Section Township Range
Latitude-Longitude



Cuttings sent to District? ( ) Yes ( ) No

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones
Number of bags				

Casing: Black Steel ( ) Galv. ( ) PVC ( ) Fiberglass ( )
Screen: Type _____ Slot size _____
Screened from _____ (ft.) to _____ (ft.)

Owner: Kidco | Address: 3000 SW 4th Ave | City: Ft Lauderdale | State: FL | Zip: 33315

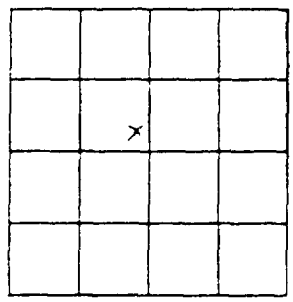
Contractor's Signature: Bud C Dondi | License No.: 11040 | Completion Date: 9-6-90 | Casing Depth: 4' | Total Depth: 14.0' | Well #: 15-15, 16

Driller's Name: George Gauselmann | Registration No.:

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other Hollow Stem Auger
STATIC WATER LEVEL 6.0 Ft. below top of casing
PUMPING WATER LEVEL 14.0 Ft. after 0.5 Hrs. at 2 GPM
PUMP SIZE 3 H.P. CAPACITY 15.0 GPM
PUMP TYPE Moyno INTAKE DEPTH 14.0 (From top of ground)

LOCATION
Located Near SW 27th St. & SW 4th Ave
County Broward
SE NW 22 50S 42E
¼ ¼ Section Township Range
Latitude-Longitude

	X		



LOCATE IN SECTION

Cuttings sent to District? ( ) Yes (✓) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones
3'	2'		0	6.0	Brown Fine To
	Casing				medium Sand
	0	4.0			
			6.0	14.0	Tan White
	2"				Marly Limestone
	Screen				
	4.0	14.0			
	.010				
	Slot				
Number of bags					
1					

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type PVC Slot size .010
Screened from 4.0' (ft.) to 14.0 (ft.)
Type of grout with % additives Portland
Water: Clear (✓) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

WELL COMPLETION REPORT FORM 0124 Rev. 4/85 **WELL PERMIT NO.** _____

Owner: Kidco | Address: 3000 SW 4th Ave | City: Ft Lauderdale | State: FL | Zip: 33315

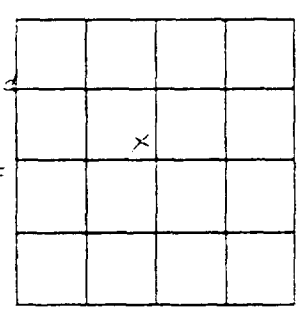
Contractor's Signature: Bud C Dondi | License No.: 11040 | Completion Date: 9-6-90 | Casing Depth: 2.0' | Total Depth: 12.0' | Well #: 16+17

Driller's Name: George Gauselmann | Registration No.:

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other Hollow Stem Auger
STATIC WATER LEVEL 4.0 Ft. below top of casing
PUMPING WATER LEVEL 12.0 Ft. after 0.5 Hrs. at 2.0 GPM
PUMP SIZE 3 H.P. CAPACITY 15.0 GPM
PUMP TYPE Moyno INTAKE DEPTH 12.0 (From top of ground)

LOCATION
Located Near SW 27th St & SW 4th Ave FT Laud
County Broward
SE NW 22 50S 42E
¼ ¼ Section Township Range
Latitude-Longitude

	X		



LOCATE IN SECTION

Cuttings sent to District? ( ) Yes (✓) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones
2'	2"		0	4.0	Brown Fine To
	Casing				medium Sand
	0	2.0			
			4.0	12.0	Tan White
	2"				Marly Limestone
	Screen				
	2.0	12.0			
Number of bags					
1					

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type PVC Slot size .010
Screened from 2.0 (ft.) to 12.0 (ft.)
Type of grout with % additives Portland
Water: Clear (✓) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

Form 6124
Rev. 12/84

WELL COMPLETION REPORT

CONSTRUCTION PERMIT NO. _____

CARD-DISTRICT
SHEET-DRILLER

Owner _____ Address _____ City _____ State _____ Zip _____

Contractor's Name _____ License No. _____

Driller's Name _____ Registration No. _____

Completion Date _____ Well No. _____ Total Depth _____

TYPE OF WORK: Construct ( ) Repair ( ) Abandon ( )

WELL USE: Private Well ( ) Public ( ) Monitor ( ) Test ( )

Irrigation ( ) Fire Well ( ) Other _____

METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )

Casing Driven ( ), Other _____

STATIC WATER LEVEL _____ Ft. below top of casing

PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM

PUMP SIZE _____ H.P. CAPACITY _____ GPM

PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION

Located Near _____

County _____

¼ ¼ Section Township Range

Latitude - Longitude

Cuttings sent to District? ( ) Yes
( ) No

No cuttings sent "COLLECT" will be accepted

LOCATE IN SECTION

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing Screen Diam. & Depth	Depth From	Depth To	DRILL CUTTING LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones.

Casing: Black Steel ( ) Galv. ( ) PVC ( ) Fiberglass ( )

Screen: Type _____ Slot size _____

Gravel pack from _____ (ft.) to _____ (ft.)

Type of grout with % Additives _____

# of bags of cement _____

WELL COMPLETION REPORT

FORM 6124
Rev. 4/85

WELL PERMIT NO. _____

Owner _____ Address _____ City _____ State _____ Zip _____

Contractor's Name _____ License No. _____ Completion Date _____ Casing Depth _____ Total Depth _____ Well # _____

Driller's Name _____ Registration No. _____

TYPE OF WORK: Construct ( ) Repair ( ) Abandon ( )

WELL USE: Domestic Well ( ) Public ( ) Monitor ( ) Test ( )

Irrigation ( ) Fire Well ( ) Other _____

METHOD: Rotary with MUD ( ) or Air ( ) Cable Tool ( ) Jet ( )

Casing Driven ( ) Other _____

STATIC WATER LEVEL _____ Ft. below top of casing

PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM

PUMP SIZE _____ H.P. CAPACITY _____ GPM

PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION

Located Near _____

County _____

Section Township Range

Latitude Longitude

Cuttings sent to District? ( ) Yes
( ) No

LOCATE IN SECTION

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones
Number of bags				

Casing: Black Steel ( ) Galv. ( ) PVC ( ) Fiberglass ( )

Screen: Type _____ Slot size _____

Screened from _____ (ft.) to _____ (ft.)

Type of grout with % additives _____

WELL COMPLETION ... CONSTRUCTION PERMIT NO. _____ SHEET-DRILLER

City of Ft. Lauderdale, P.O. Drawer 14250, Fort Lauderdale, Fl. 33302-4250
Owner (Address) City State Zip

Fire Location: Fire Station #1-301 North Andrews Ave.

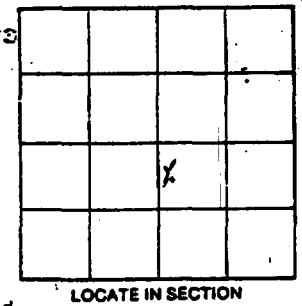
Layne Drilling Inc. 1039 6-21-88
Contractors Name License No. Completion Date Well No. Total Depth

Duane Losh 40251
Drillers Name Registration No.

TYPE OF WORK: Construct (X) Repair ( ) Abandon ( )
WELL USE: Private Well ( ) Public ( ) Monitor (X) Test ( ).
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD (X) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL 3'3" Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at 15 GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

Fire Station #1
LOCATION
Located Near 301 North Andrews Ave.
County Broward
NW SE 2 50 42
1/4 1/4 Section Township Range
Latitude - Longitude

Cuttings sent to District? ( ) Yes ( ) No
No cuttings sent "COLLECT" will be accepted
Note: PWS Wells attach a site map if well location is different from site location on permit application.



Grout Thickness & Depth	Casing Screen Diam. & Depth	Depth From	Depth To	DRILL CUTTING LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones.
2"	8"	0	10	Sand Sand
		10	11'6"	Limestone
	1"6"			Sand Sand
				Rock
	11'6"	Bot.	Lochrale cap	
				6" manifold pvc
				24"x24"x12"
				Cement Pad

Casing: Black Steel ( ) Galv. ( ) PVC (X) Fiberglass ( )
Screen: Type PVC #80 Slot size 10
Gravel pack from 1' (ft.) to 11'6" (ft.)
Type of grout with % Additives Neat Cement
# of bags of cement Pad 5 bags

WELL COMPLETION REPORT FORM 0124 Rev. 4/85 WELL PERMIT NO. _____

Owner Address City State Zip

Contractor's Name License No. Completion Date Casing Depth Total Depth Well #

Driller's Name Registration No.

98-11-7

TYPE OF WORK: Construct (X) Repair ( ) Abandon ( )
WELL USE: Domestic Well (X) Public ( ) Monitor ( ) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other _____
STATIC WATER LEVEL _____ Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY 40 GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

LOCATION
Located Near _____
County _____
Section Township Range
Latitude-Longitude

Cuttings sent to District? ( ) Yes ( ) No
Note: PWS Wells attach a site map if well location is different from site location on permit application.

LOCATE IN SECTION

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
2"	8"	0	14	SAND
11'6"		14	84	SAND ROCK
2"		84	96	SMALL SAND
	4"	96	42	LIME ROCK
		42	46	LIME ROCK
Number of bags				
10				

Casing: Black Steel ( ) Galv. (X) PVC ( ) Fiberglass ( )
Screen: Type _____ Slot size _____
Screened from _____ (ft.) to _____ (ft.)
Type of grout with % additives _____
Water: Clear ( ) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

BROWARD COUNTY - 115 S ANDREWS AVE — FT LAUD — FLA — 33301
Owner — Address — City — State — Zip

[illegible] — [illegible] — 9-7-90 — 3.0 — 15.0 — 7
Contractor's Signature — License No. — Completion Date — Casing Depth — Total Depth — Well #

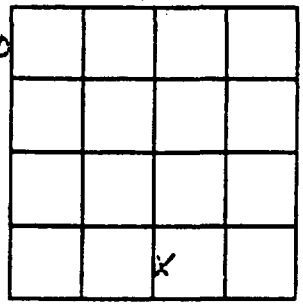
[illegible]
Driller's Name — Registration No.

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other HOLLOW AUGER
STATIC WATER LEVEL 5.0 Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION
Located Near BROWARD BLVD & ANDREWS AVE
County BROWARD

SW SE — 50 — 42
Section — Township — Range

Latitude-Longitude



LOCATE IN SECTION

Cuttings sent to District? ( ) Yes ( ) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
	1		0	2.5	SP MED SAND
	1		2.5	5	TAN MED
	1		5	5.0	SP MED
	1		5.0	10.0	SP MED SAND
	4	13.0	10.0	13.0	TAN MED SAND
Number of bags					

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type PVC Slot size .020
Screened from 3.0 (ft.) to 13.0 (ft.)
Type of grout with % additives _____
Water: Clear ( ) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

BROWARD COUNTY — 115 S ANDREWS AVE — FT LAUD — FLA — 33301
Owner — Address — City — State — Zip

[illegible] — [illegible] — 9-7-90 — 5.0 — 15.0 — 5
Contractor's Signature — License No. — Completion Date — Casing Depth — Total Depth — Well #

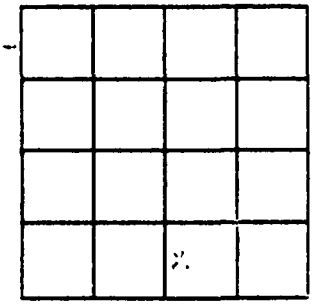
LEWSOME
Driller's Name — Registration No.

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other HOLLOW AUGER
STATIC WATER LEVEL 7.0 Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____
From top of ground

LOCATION
Located Near BROWARD BLVD & ANDREWS AVE
County BROWARD

SW SE — 50 — 42
Section — Township — Range

Latitude-Longitude



LOCATE IN SECTION

Cuttings sent to District? ( ) Yes ( ) No

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
	1		0	1.5	TAN MED SAND TR SHELL & ROOT
	1		1.5	6.0	TAN MED SAND
	1		6.0	12.0	TAN MED SAND W/LR
	4	15.0	12.0	15.0	RP MED SAND LR
Number of bags					

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type _____ Slot size .020
Screened from _____ (ft.) to 15.0 (ft.)
Type of grout with % additives _____

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

Owner	Address	City	State	Zip
BROWARD COUNTY	115 ANDREWS AVE	FT LAUD	FLA	33301

Contractor's Signature	License No.	Completion Date	Casing Depth	Total Depth	Well #
[illegible]	[illegible]	9-7-90	2.5'	12.5'	1 thru 4

Driller's Name	Registration No.
JOHNS	

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (✓) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet ( )
Casing Driven ( ), Other HOLLOW AUGER
STATIC WATER LEVEL 4.5' Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
	1		0	8.0	TAN HEIS
	↳	12.5'	8.0	12.5	TAN HEIS [illegible]
Number of bags					

LOCATION

Located Near BROWARD BLVD & ANDREWS AVE
County BROWARD

SW	SE	3	50	42
¼	¼	Section	Township	Range

Latitude-Longitude

		X	

LOCATE IN SECTION

Cuttings sent to District? ( ) Yes
( ) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )
Screen: Type PVC Slot size 0.020
Screened from 2.5 (ft.) to 12.5 (ft.)
Type of grout with % additives _____
Water: Clear ( ) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )
Conductivity _____ Chlorides _____ mg/l

WELL COMPLETION REPORT

FORM 0124
Rev. 4/85

WELL PERMIT NO. _____

Owner	Address	City	State	Zip
Broward City Court house c/o Slotten Corp	201 SE 6th Street	Ft. LDL	Florida	

Contractor's Signature	License No.	Completion Date	Casing Depth	Total Depth	Well #
[illegible]	[illegible]	9-24-90	14'	14'	

Driller's Name	Registration No.
[illegible]	

TYPE OF WORK: Construct (X) Repair ( ) Abandon ( )
WELL USE: Domestic Well ( ) Public ( ) Monitor (X) Test ( )
Irrigation ( ) Fire Well ( ) Other _____
METHOD: Rotary with MUD ( ) or Air ( ), Cable Tool ( ), Jet (X)
Casing Driven ( ), Other HSA
STATIC WATER LEVEL 7' Ft. below top of casing
PUMPING WATER LEVEL _____ Ft. after _____ Hrs. at _____ GPM
PUMP SIZE _____ H.P. CAPACITY _____ GPM
PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

Grout Thickness & Depth	Casing & Screen Diameter & Depth		Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes Give color, grain size, and type of material Note cavities, depth to producing zones.
0'	4"		0	0.2	ASPHALT
1	1		0.2	3.0	LIGHT gray SAND
[illegible]	[illegible]	4'	3.0	14	TAN SAND & traces
[illegible]					of LIMESTONE
	4"				
		14'			
Number of bags					
1					

LOCATION

Located Near _____
County _____

SW	SE	[illegible]	[illegible]	[illegible]
		Section	Township	Range

Latitude-Longitude

		(X)	

Casing: Black Steel ( ) Galv. ( ) PVC (X) Fiberglass ( )
Screen: Type [illegible] Slot size 0.01
[illegible] (ft.) to [illegible] (ft.)

Rev. 4/86

NATIONAL LINEN SERVICE 307 N.W. 1 AVE FT LAUDERDALE

Owner Address City State Zip

LOUIS HALL 2977 9-3-89 15 15

Contractor's Signature License No. Completion Date Casing Depth Total Depth Well #

HARRY Dudley —

Driller's Name Registration No.

TYPE OF WORK: Construct (✓) Repair ( ) Abandon ( )

WELL USE: Domestic Well ( ) Public ( ) Monitor ( ) Test ( )

Irrigation ( ) Fire Well ( ) Other _____

METHOD: Rotary with MUD ( ) or Air ( ) Cable Tool ( ) Jet ( )

Casing Driven ( ) Other Hollow Auger

STATIC WATER LEVEL 5 Ft. below top of casing

PUMPING WATER LEVEL 7 Ft. after _____ Hrs. at _____ GPM

PUMP SIZE _____ H.P. CAPACITY _____ GPM

PUMP TYPE _____ INTAKE DEPTH _____ From top of ground

LOCATION

Located Near _____

County BROWARD

3 50S 42E

¼ ¼ Section Township Range

Latitude-Longitude

X	Y	X	X
X	X	X	X
X	X	X	X
X	X	X	X

LOCATE IN SECTION

Cuttings sent to District? ( ) Yes (✓) No

Note: PWS Wells attach a site map if well location is different from site location on permit application.

Grout Thickness & Depth	Casing & Screen Diameter & Depth	Depth (ft) From	Depth (ft) To	DRILL CUTTINGS LOG Examine cuttings every 20 ft. or at formation changes. Give color, grain size, and type of material. Note cavities, depth to producing zones.
2'	2" x 15'	0	0.1	ASPHALT
		0.1	1.0	TAN SAND (FILL)
				ROCK FRAGMENTS
		1.0	7.0	LIGHT GRAY LIMESTONE
				ROCK FRAGMENTS
		7.0	9.0	LIGHT GRAY LIMESTONE
				SAND
		9.0	13.0	BROWN SAND & LIMESTONE
				ROCK FRAGMENTS
Number of bags				

Casing: Black Steel ( ) Galv. ( ) PVC (✓) Fiberglass ( )

Screen: Type PVC Slot size .020

Screened from 5 (ft.) to 15 (ft.)

Type of grout with % additives CEMENT

Water: Clear (✓) Colored ( ) Sulphur ( ) Salty ( ) Iron ( )

Conductivity _____ Chlorides _____ mg/l

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL [illegible]ULATION

WELL COMPLETION REPORT

OWNER: [illegible] Last Name [illegible] First Name [illegible] Initial

[illegible] Number [illegible] Street

[illegible] City [illegible] State

[illegible] Area Code [illegible] Phone Number [illegible] Zip Code

WELL LOCATION: ___ % ___ % ___ % of Section [illegible]

[illegible] Township [illegible] (N-S) [illegible] Range [illegible] (E-W)

Latitude [illegible] Deg. [illegible] Min. [illegible] Sec. N

Longitude [illegible] Deg. [illegible] Min. [illegible] Sec. W

Locate in Section

[illegible] Number [illegible] Street/Road

Lot No. Subdivision

[illegible] City [illegible] County

OWNER WELL NUMBER OR NAME: [illegible]

DRILL METHOD: [ ] Rotary [✓] Cable Tool [ ] Jet [ ] Auger [ ] Other: ___

SURFACE CASING, CASING, AND LINER MATERIAL:

Steel Dia. (In.) Black	Galv.	S. Steel	Steel Wt. (lb./ft.)	Dia. (In.) PVC	Other†	From (Ft.)	To (Ft.)	Schedule No.	Joints*
[illegible]			786			0	59	40	

† Describe Material: ___

* TC = Threaded and Coupled, TCW = Threaded, Coupled, and Welded, W = Welded, B = Bonded (PVC), O = Other: ___

GROUT: [ ] None [✓] Neat Cement [ ] Other: ___

Type and Percent of Additives and Grout Volume or Number of 94 lb. Sacks

	From (Ft.)	To (Ft.)
[illegible] Sacks Portland	0	20
5 " "	56	59

FINISH: [✓] Open Hole [ ] Perforated or Slotted Casing [ ] Gravel Pack [ ] Sandpoint or Screen Attached to Well Casing [ ] Sandpoint or Screen Telescoped with Packer Inside Casing (Packer Material: ___)

Sandpoint/Screen Material	Dia. (In.)	Slot Size (In.)	From (Ft.)	To (Ft.)

[ ] Other Finish: ___

QUALITY TEST: [ ] None [✓] Bacteria [illegible] Date [ ] Chemical ___ Date

By: [✓] Health Dept. [ ] USGS [✓] Other [illegible] of Hollywood

[✓] Clear [ ] Colored [ ] Sulphur [ ] Salty [ ] Iron [ ] Other ___

Conductance (Micromhos) [illegible] Chloride [illegible] ppm

Hardness [illegible] ppm as calcium carbonate pH [illegible] Temp [illegible] °F

Well Disinfected: [ ] No [✓] Yes 10/16/81 (Date)

WELL TEST, by: [ ] Natural Flow [illegible] G.P.M. [ ] Airlift [ ] Bailer [ ] Permanent Pump [✓] Test Pump [ ] None

Discharge Measured By: [ ] Bailer [ ] Estimated [✓] Current Meter [ ] Orifice [ ] Trajectory [ ] Venturi [ ] Volumetric [ ] Other ___

Measured Static Water Level [ ] + [✓] - [illegible] Ft.

Measured Pumping Water Level [ ] + [✓] - [illegible] Ft.

After [illegible] Hours At [illegible] G.P.M.

Specific Capacity [illegible] G.P.M./Ft. of Drawdown

Measuring Pt. (Describe): [illegible]

Which is [illegible] Ft. [✓] Above [ ] Below Land Surface

Elevation of Measuring Pt. = [illegible] Ft. [✓] Above [ ] Below MSL

WELL EQUIPMENT: [ ] Open [✓] Capped [ ] Valved [ ] Permanent Pump [ ] Temporary Pump

Type Pump: [ ] Centrifugal [ ] Cylinder [ ] Jet [ ] Submersible [ ] Turbine [ ] Other: ___

Power: [ ] Diesel [ ] Electric [ ] Gasoline [ ] Other: ___

Horsepower [illegible] Capacity [illegible] G.P.M.

Intake/Injection Depth [illegible] Ft.

DER FORM 17-1.122 (38)

TYPE OF WORK: [ ] New Construction [ ] Repair [ ] Deepening [ ] Plugging [ ] Other: [illegible]

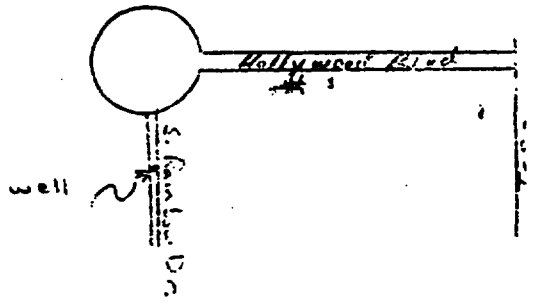
PERMIT NUMBER:

WELL NUMBER

TYPE OF WELL: [✓] Water Well [ ] Test Well [ ] Recharge [ ] Drainage [ ] Waste Disposal [ ] Observation [ ] Other ___

USE: [ ] Domestic [ ] Irrigation [ ] Industrial [ ] Livestock [✓] Public [ ] Other: ___

SKETCH LOCATION OF WELL in relation to local landmarks, giving distance [illegible] tion from nearest town, road, or other reference point.



GEOPHYSICAL LOGS: Type: By:

WELL LOG Bore Hole (In.)	Casing Size (In.)	Depth (Ft.) From	To	Examine cuttings at 20 ft. or smaller interval changes. Give color, grain-size and type of. Note any cavities. Indicate producing zone additional sheets if necessary.
		0	3	[illegible]
		3	40	Sand
		40	42	[illegible]
		42	55	Sand
		55	70	[illegible]

Total Depth [illegible] Ft. Producing Zone Material: [ ] Sand [ ] Shell [ ] Broken Shell [✓] Limestone [✓] Other: [illegible]

Top of Producing Zone [illegible] Ft., Bottom of Producing Zone [illegible] Ft.

[ ] Drill Cuttings Sent to Bureau of Geology

License No. [illegible] Water Well Contractor's Signature [illegible] Position

Completion Date [illegible] Driller Signature

OF FLORIDA

TION

TYPE OF WORK:

(11)

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION FOR PERMIT TO DRILL WATER WELL

INSTRUCTIONS: All applicable portions of the permit application form must be completed. Besides filling out the form, a plat or sketch showing the location of the proposed well relative to existing building, pipes or other structures, as well as the location of all known sources of contamination in the vicinity, must be submitted as part of the application. Submission of any false statement or representation in this application is a violation of the law.

Name of Well Contractor: Harold G. Jaffer, Inc.

Address: 2141 S.W. 3rd Street Miami, Fl. 33135 P.O. Box 350518 Miami, Fl. 33135

Water Well Contractor Certificate No. 1106

Section 17 Township 51S Range 42E Latitude 26°00'25"N Longitude 80°10'58"W

Street/Rural Route: Rainbow Drive City: Hollywood County: Broward

Type of Construction: Cable tool Depth: 70 ft

Diameter: 20 in. Casing: 60 ft of steel material

Type of casing seal: grout Proposed yield: 2400 GPM

To serve: Municipal Supply
(Subdivision, trailer park, other water system)

If rotary drilled, how will annular space be sealed? grout
(Cement, grout, other)

Consulting Engineer: Name E.F. Kellerman, Bar L. Hart Assoc.

Address 132 Aragon Avenue Coral Gables, Fl.

If well is abandoned, how will it be plugged? concrete

Estimated cost of construction $23,000. Unit costs: (1) per foot of cased depth $175., (2) per foot open hole $45.,

(3) screen or other None.

Date: August 25, 1981

Taylor P. Calhoun
(Water Utility Representative)

Harold G. Jaffer, Inc.
(Water Well Contractor)

Taylor P. Calhoun, Utilities Director
(Typed name and title)

Harold G. Jaffer, President
(Typed name and title)

2600 Hollywood Blvd., Hollywood, Fl.
(Address)

2141 S.W. 3rd Street Miami, Florida 33135
(Address)

Water Management District Concurrence: X Yes ___ No

Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes and Chapter 22F-2, Florida Administrative Code? ___ Yes X No

DER Form 17-1.122(11)

STATE OF FLORIDA

WATER WELL CONTRACTOR'S NOTIFICATION OF CONSTRUCTION OR REPAIR OF A WATER WELL

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
505 Larson Building, Tallahassee, Florida 32304
Telephone: (904) 488-4476

Permit No. _____

Owner's Well Identification _____

No 24565

ONE)

1. OWNER: City of Dania (Well "G")
Name
100 W. Dania Beach Blvd., Dania, Florida
Address City State

2. LOCATION OF WELL: FPL Substation
Street Address/Road
Stirling Rd. & S.W. 23 rd Avenue, Fort
City County
Lauderdale, Broward County, Florida
Subdivision Lot No.
12 50S 42E
Section Township Range

3. PURPOSE OF WELL:
☐ Domestic ☐ Irrigation ☒ Public Supply
☐ Industrial ☐ Stock ☐ Other _____

4. TYPE OF WORK:
☒ New Well ☐ Plugging ☐ Other _____
☐ Deepening ☐ Reconditioning

5. QUALITY:
☒ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other _____

CHECK TEST MADE
☐ None
☐ Bacteria
☒ Chemical
Chloride _____ PPM
(Check ☐ if test was for medium chloride)
Temperature _____ °F
Well Disinfected ☐ Yes ☐ No

Test By:
☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☒ Other Broward Testing
Name
Lab., P.O. Bx 23541
Ft. Lauderdale, Fla.

6. EQUIPMENT:
☐ Rotary ☒ Cable Tool ☐ Other _____
☐ Jet ☐ Reverse Rotary

7. GROUT: ☒ None ☐ Cement ☐ Other
Describe and give number of bags (94 lb.) | From (ft) | To (ft)

8. CASING AND LINER PIPE:

Diameter (inches)	Kind	From (ft)	To (ft)
18"	Blk. Stl.	L.S.	58
18"	Open Hole	58	65

(Check One) ☐ Threaded & Coupled ☒ Welded Only
☐ T & C & Welded ☐ Other

9. WATER LEVEL:
Water level after well completed 8'4" feet
☐ Above ☐ Below land surface
Well Flowing: ☐ Yes ☐ No Flow below TOC gal/min

10. SCREENS: N/A

Make	Material	Diameter (in)	Slot Size	Location (ft) Below Surface From (ft)	To (ft)

11. UPPER END OF WELL:
☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:
Date 10/13/76 ☒ Test Pump ☐ Permanent Pump
Measure point is T.O.C.
which is _____ feet ☐ above ☐ below land surface
Static water level 8'4" feet ☐ above ☐ below measure point
Maximum Drawdown 14' feet below measure point
Discharge at maximum drawdown 2700 gal/min
After 6 hours

13. PUMP INSTALLED: By Others
Type _____ Make _____ Model No. _____
Motor Power _____ Make _____ H.P. _____
Capacity _____ Gal/min at _____ ft. of total dynamic head
No. of bowls or stages _____
Pump setting _____ feet

14. WELL LOG:

Well bore (in)	Depth (feet) From	To	Note each type of material, producing zones, & ties if any. Give description at not less than 20 f. intervals and at changes.
18	L.S.	5	Fill
18	5	10	Muck & Dark brown sand
18	10	33	Fine dark brown sand
18	33	41	Fine sand - brown to tan
18	41	45	Fine white sand
18	45	58	Fine white sand, unconsolidated white limest
18	58	65	Permeable white limestone

15. CONTRACTOR'S CERTIFICATION:
This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on _____ and was completed on 10-13-76

Morton Pump & Supply 1044
Contractor License Number

201 NW 20
Signature of Representative P.O. Box or Sta

Fort Lauderdale Broward F
City County State

Mark Tiley
Phone Number Driller

EXHIBIT (

STATE OF FLORIDA

WATER WELL CONTRACTOR'S NOTIFICATION OF CONSTRUCTION OR REPAIR OF A WATER WELL

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
505 Larson Building, Tallahassee, Florida 32304
Telephone: (904) 488-4476

Permit No. _____

Owner's Well Identification _____

No. 31242

Department Use ONLY

OWNER: City of Dania (Well "B")
Name
W. Dania Bch. Blvd., Dania, Fla.
Address City State

LOCATION OF WELL: PPI Substation
Street Address/Road
Stirling Rd. & S.W. 23rd Ave., Ft.
City County
Lauderdale, Broward County, Fla.
Subdivision Lot No.
32 50S 42E
Section Township Range

PURPOSE OF WELL:
☐ Domestic ☐ Industrial ☐ Irrigation ☐ Stock ☒ Public Supply ☐ Other _____

TYPE OF WORK:
☒ New Well ☐ Deepening ☐ Plugging ☐ Reconditioning ☐ Other _____

QUALITY:
☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other _____

CHECK TEST MADE
☐ None ☐ Bacteria ☒ Chemical
Chloride 416 PPM (Check ☐ if test was for medium chloride)
Temperature _____
Well Disinfected ☐ Yes ☐ No
Test By: ☐ County Health Dept. ☐ State Health Dept. ☐ U.S.G.S. ☒ Other Broward Testing Name
Lab., P.O. Box 23541
Ft. Lauderdale, Fla. Address

EQUIPMENT:
☐ Rotary ☐ Jet ☒ Cable Tool ☐ Reverse Rotary ☐ Other _____

GROUT: ☒ None ☐ Cement ☐ Other

Describe and give number of bags (94 lb.)	From (ft)	To (ft)

CASING AND LINER PIPE:

Diameter (inches)	Kind	From (ft)	To (ft)
18	Blk. Stl.	L.S.	66±
15	Open Hole	60±	69±

(Check One) ☐ Threaded & Coupled ☒ Welded Only ☐ T & C & Welded ☐ Other _____

WATER LEVEL:
Water level after well completed 3 feet
☐ Above ☒ Below land surface
Well Flowing: ☐ Yes ☒ No Flow _____ gal/min

SCREENS: N/A

Make	Materials	Diameter (in)	Slot Size	Location (ft) Below Surface From (ft)	To (ft)

UPPER END OF WELL:
☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

PUMPING TEST
Date 6-29-76 ☒ Test Pump ☐ Permanent Pump
Measure point is L.S.
which is _____ feet ☐ above ☐ below land surface
Static water level 3 feet ☐ above ☐ below measure point
Maximum Drawdown 31.2ft feet below measure point
Discharge at maximum drawdown 2625 gal/min
After 6 hours

PUMP INSTALLED:
Type _____ Make _____ Model No. _____
Motor Power _____ Make _____ H.P. _____
Capacity _____ Gal/min at _____ ft. of total dynamic head
No. of bowls or stages _____

14. WELL LOG:

Well bore (in)	Depth (feet) From	To	Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.
18	L.S.	10	Muck, sand and leached top soil
18	10	30	Dark brown sand
18	30	40	Fine tan sand
18	40	45	Fine white sand
18	45	59	Fine white sand and white limestone
18	59	69	Permeable white limestone

15. CONTRACTOR'S CERTIFICATION:

This work was done under my jurisdiction and this report is true to best of my knowledge and belief. The work commenced on 6-17 and was completed on 6-29-76

Morton Pump & Supply 1011
Contractor License Number

201 N.W. 29th A
Signature of Representative P.O. Box or Street

Ft. Lauderdale Broward Flori
City County State

Hank Miller
Phone Number Driller

EXHIBIT C-7

APPENDIX C

STRATIGRAPHIC AND INSTRUMENTATION LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-01)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
HOLE DESIGNATION: MW1A

PROJECT NO.: 3050
DATE COMPLETED: NOVEMBER 28, 1990

CLIENT: SUN BANK
DRILLING METHOD: 6 3/4" ID HSA

LOCATION: BROWARD & 4th AVENUE
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNU (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Casing)	4.8 5.42					
2.5	SP–SAND, medium grained, rounded, trace shell fragments, dark brown	1.8 0.8	ROAD BOX	1AC			0
5.0			10.5"ø BOREHOLE				
7.5		-3.2	CONCRETE SEAL	2AC			0
10.0	SP–SAND, fine grained, some lime mud, some shell fragments, tan, saturated						
12.5			2"ø PVC PIPE	3AC			0
15.0							
17.5			BENTONITE PELLET SEAL	4AC			0
20.0			SAND PACK				
22.5			WELL SCREEN				
25.0	END OF HOLE @ 25.0 FT. BGS	-20.2	WOOD PLUG				
27.5							
30.0							
32.5							

SCREEN DETAILS:
Screened Interval:
20.0 to 25.0' BGS
Length -5.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
17.5 to 25.0' BGS
Material -# A-20 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

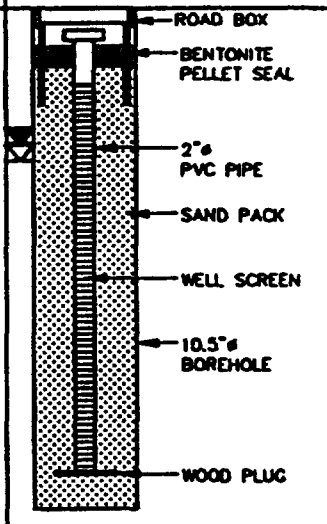
(L-02)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
PROJECT NO.: 3050
CLIENT: SUN BANK
LOCATION: BROWARD & 4th AVENUE

HOLE DESIGNATION: MW2
DATE COMPLETED: NOVEMBER 28, 1990
DRILLING METHOD: 6 3/4" ID HSA
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL
	GROUND SURFACE	5.0
	REFERENCE POINT (Top of Casing)	5.11
2.5	SP-SAND(FILL), medium to fine grained, little silt, dark brown	
	- petroleum odor at water level	
5.0		
7.5	- petroleum odor becomes non existant beyond water table	
	SP-SAND, fine grained, some lime mud, some shell and coral fragments, tan, saturated	-5.0
10.0		
12.5		
	END OF HOLE @ 13.0 FT. BGS	-8.0
15.0		
17.5		
20.0		
22.5		
25.0		
27.5		
30.0		
32.5		

MONITOR INSTALLATION



SCREEN DETAILS:
Screened Interval:
2.0 to 12.0' BGS
Length -10.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
1.5 to 13.0' BGS
Material -# A-20 Sand

SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	HNU (ppm)
1SS	X		0
			15
	X		0
2AC	X		0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-03)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
HOLE DESIGNATION: MW3

PROJECT NO.: 3050
DATE COMPLETED: NOVEMBER 27, 1990

CLIENT: SUN BANK
DRILLING METHOD: 6 3/4" ID HSA

LOCATION: BROWARD & 4th AVENUE
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNU (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Casing)	4.9 4.89					
	Road base sand, calcareous gravel, shells, etc; buff colored, dry	3.4	ROAD BOX BENTONITE PELLET SEAL 2"ø PVC PIPE	1AC			0
2.5	SP-SAND(FILL), medium grained, rounded, calcareous fragments, rounded grains, very light gray, dry	1.6		2AC			0
	SP-SAND, fine to medium grained, silty, trace calcareous shell fragments, very dark brown, appearing organic rich, saturated	0.4	SAND PACK	3AC			0
5.0							
7.5			WELL SCREEN				
	SP-SAND, fine grained, some lime mud, some shell and coral fragments	-4.1	10.5"ø BOREHOLE NATURAL SAND				
10.0							
12.5	END OF HOLE @ 13.0 FT. BGS	-8.1	WOOD PLUG	(4AC)			0
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

SCREEN DETAILS:
Screened Interval:
2.5 to 12.5' BGS
Length -10.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
1.5 to 7.0' BGS
Material -# A-20 Sand/
Natural Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-04)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
HOLE DESIGNATION: MW4

PROJECT NO.: 3050
DATE COMPLETED: NOVEMBER 29, 1990

CLIENT: SUN BANK
DRILLING METHOD: 6 3/4" ID HSA

LOCATION: BROWARD & 4th AVENUE
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNu (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Casing)	5.6 5.56					
2.5	Gravel base, with shells, corals, etc.	4.1	ROAD BOX BENTONITE PELLET SEAL 2"ø PVC PIPE	1AC	X		0
5.0	SP-SAND(FILL), medium to fine grained, little silt, dark brown	1.3					
7.5			WELL SCREEN SAND PACK				
10.0	SP-SAND, fine grained, some lime mud, some shell fragments, tan, saturated	-2.9	10.5"ø BOREHOLE	2AC	X		0
12.5			WOOD PLUG	(3AC)	X		0
15.0	END OF HOLE @ 14.0 FT. BGS	-8.4					
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

SCREEN DETAILS:
Screened interval:
2.0 to 12.0' BGS
Length -10.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
1.5 to 14.0' BGS
Material -# A-20 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS (○) WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-05)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
HOLE DESIGNATION: MW5

PROJECT NO.: 3050
DATE COMPLETED: NOVEMBER 29, 1990

CLIENT: SUN BANK
DRILLING METHOD: 6 3/4" ID HSA

LOCATION: BROWARD & 4th AVENUE
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNU (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Casing)	4.7 4.40					
	Asphalt	4.4	ROAD BOX				
	Concrete	3.8	BENTONITE PELLET SEAL	1AC			0
2.5	SP-SAND(FILL), medium to fine grained, brown to dark brown, dry SP-SAND, fine grained, trace shell fragments, light tan, moist	1.1 0.7	2"ø PVC PIPE 10.5"ø BOREHOLE				
5.0	SP-SAND, medium to fine grained, some silt, brown, moist to saturated		SAND PACK	2AC			0
7.5			WELL SCREEN				
	SP-SAND, fine grained, some lime mud, some shell fragments, tan, saturated	-3.3					
10.0							
12.5	END OF HOLE @ 12.5 FT. BGS	-7.8	WOOD PLUG	3AC			0
15.0			SCREEN DETAILS: Screened Interval: 2.3 to 12.3' BGS Length -10.0' Diameter -2.0" Slot # 10 Material -Plastic Sand pack interval: 1.3 to 12.5' BGS Material -# A-20 Sand				
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ⬭ WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(L-06)

PROJECT NAME: SUN BANK, FT. LAUDERDALE, FLORIDA
HOLE DESIGNATION: MW6

PROJECT NO.: 3050
DATE COMPLETED: NOVEMBER 27, 1990

CLIENT: SUN BANK
DRILLING METHOD: 6 3/4" ID HSA

LOCATION: BROWARD & 4th AVENUE
CRA SUPERVISOR: P. STORLIE

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEVATION ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE HNU (ppm)
	GROUND SURFACE REFERENCE POINT (Top of Casing)	4.7 4.60					
2.5	SP-SAND(FILL), medium grained, rounded, some calcareous shell fragments, very light gray, dry SP-SAND, fine to medium grained, silty, dark brown, saturated	1.1 0.7	ROAD BOX BENTONITE PELLET SEAL 10.5"ø BOREHOLE SAND PACK WELL SCREEN 2"ø PVC PIPE NATURAL SAND	1SS	☒		0
5.0				2SS	☒		0
7.5							
10.0	SP-SAND, fine grained, some lime mud, some shell and coral fragments, tan, saturated	-4.8					
12.5	END OF HOLE @ 13.0 FT. BGS	-8.3		(3SS)	☒		0
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

SCREEN DETAILS:
Screened Interval:
1.5 to 11.5' BGS
Length -10.0'
Diameter -2.0"
Slot # 10
Material -Plastic
Sand pack interval:
1.0 to 7.0' BGS
Material -# A-20 Sand/
Natural Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

GRAIN SIZE ANALYSIS ◯ WATER FOUND ▽ STATIC WATER LEVEL ▼ (11/30/90)

APPENDIX D

WELL STABILIZATION LOGS

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW1A

Date 11-29-90

Water level before pumping (nearest 0.01 ft. below top of casing) 4.20

Well Depth 25' Casing Diameter 2" Well Volume 3.3 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (°F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
07:40	7.25	445	80.5	Silty	Same	20	Bail
17:40	7.39	386	81.5	Slightly Silty	Same	25	Bail
17:45	7.28	401	80.4	Slightly Silty	Same	30	Bail
18:00	7.20	409	80.7	Slightly Silty	Same	35	Bail
18:05	7.21	418	80.2	Slightly Silty	Same	40	Bail

Comments: Fuel-like odor - froth on purged water

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW2

Date 11-29-90

Water level before pumping (nearest 0.01 ft. below top of casing) 3.95

Well Depth 12' Casing Diameter 2" Well Volume 1.3 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
06:30	--	--	--	--	--	10	Bail
18:20	8.00	373	77.5	Very Silty	--	15	Bail
18:30	7.62	455	78.6	Very Silty	--	20	Bail
18:40	7.59	487	78.4	Very Silty	--	25	Bail
18:50	7.40	496	78.8	Very Silty	--	30	Bail

Comments: Developing an odor with 30 gallon reading

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW3

Date 11-27-90

Water level before pumping (nearest 0.01 ft. below top of casing) 3.37

Well Depth 12.5' Casing Diameter 2" Well Volume 1.5 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
16:30	--	--	--	Very Silty	Dry	10	Bail
17:40	7.46	393	83.3	Very Silty	Dry	15	Bail
17:45	7.51	384	81.0	Very Silty	Dry	19	Bail
18:10	7.40	392	80.0	Very Silty	Dry	24	Bail
18:15	7.30	387	80.4	Silty	Dry	28	Bail

Comments:

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW5

Date 11-29-90

Water level before pumping (nearest 0.01 ft. below top of casing) 3.24

Well Depth 12.5' Casing Diameter 2" Well Volume 1.5 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (°F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
21:30	8.09	291	79.0	Very Silty	--	5	Bail
21:35	8.20	242	80.0	Very Silty	--	10	Bail
21:50	8.24	236	79.9	Very Silty	--	15	Bail
22:00	8.28	233	79.6	Very Silty	--	20	Bail
22:15	8.33	222	79.7	Very Silty	--	25	Bail
22:20	8.31	223	80.3	Very Silty	--	30	Bail

Comments:

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW6

Date 11-27-90

Water level before pumping (nearest 0.01 ft. below top of casing) 3.26

Well Depth 11.5' Casing Diameter 2" Well Volume 1.3 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
16:30	--	--	--	Very Silty	Dry	15	Bail
17:50	7.35	329	80.3	Very Silty	Dry	20	Bail
17:55	7.38	322	80.3	Silty	Dry	25	Bail
18:05	7.36	322	80.3	Silty	Dry	30	Bail

Comments:

STABILIZATION TEST

Site Sun Bank

Job. No. 3050

Well No. MW4

Date 11-29-90

Water level before pumping (nearest 0.01 ft. below top of casing) 4.38

Well Depth 12' Casing Diameter 2" Well Volume 1.2 gallons

Approximate Well Location

Weather Conditions

Time	pH	Conductivity (umhos)	Temp. (°F)	Water Clarity	Water Level Nearest 0.01 Ft.	Cumulative Volume of Water Removed from Well (gallons)	Pumping Rate G/Min
20:30	7.52	550	77.3	Very Silty	--	10	Bail
20:50	7.42	577	77.5	Very Silty	--	15	Bail
20:55	7.31	589	78.0	Very Silty	--	20	Bail
21:05	7.30	594	77.5	Very Silty	--	25	Bail

Comments:

CONESTOGA-ROVERS & ASSOCIATES

APPENDIX E

SINGLE WELL RESPONSE TEST DATA

SINGLE WELL RESPONSE TEST

WELL NO:	MW1A	DATE:	2-21-91	SLUG LT (	2.87
JOB #:	3050	SCREEN LT	5.0	SLUG DIA	1.25
CLIENT:	SUNBANK	SCREEN ID	2.0	SLUG VOL	0.021
SWL (FT):	4.72	HOLE DIA	9.0		

FALLING TIME (SEC)	W/L	dH	LOG dH
0.0	4.72	1.00	0
1.0	4.00	0.64	-0.19230
2.0	4.18	0.48	-0.31724
3.0	4.41	0.28	-0.55828
4.0	4.50	0.20	-0.70721
5.0	4.56	0.14	-0.84552
6.0	4.61	0.10	-1.00824
7.0	4.65	0.06	-1.20454
8.0	4.68	0.04	-1.44758
9.0	4.68	0.04	-1.44758
10.0	4.70	0.02	-1.74861

Regression Output: FALLING	
Constant	-0.00934
Std Err of Y Est	0.046894
R Squared	0.993844
No. of Observations	11
Degrees of Freedom	9
X Coefficient(s)	-0.1704
Std Err of Coef.	0.004471

HVORSLEV LAG TIME (SEC)= 2.533391

K= 2.16E-02 cm/sec

RISING TIME (SEC)	W/L	dH	LOG dH
0.0	4.83	1.00	0
1.0	4.90	0.16	-0.79436
2.0	5.06	0.30	-0.51816
3.0	5.49	0.69	-0.16315
4.0	5.33	0.54	-0.26431
5.0	5.17	0.40	-0.39642
6.0	5.01	0.26	-0.58724
7.0	4.95	0.21	-0.68791
8.0	4.90	0.16	-0.79436
9.0	4.88	0.14	-0.84552
10.0	4.86	0.12	-0.90351

Regression Output: RISING	
Constant	0.145764
Std Err of Y Est	0.051436
R Squared	0.970600
No. of Observations	8
Degrees of Freedom	6
X Coefficient(s)	-0.1117
Std Err of Coef.	0.007936

HVORSLEV LAG TIME (SEC)= 3.865581

K= 1.42E-02 cm/sec

K(AVERAGE) = 1.79E-02 cm/sec

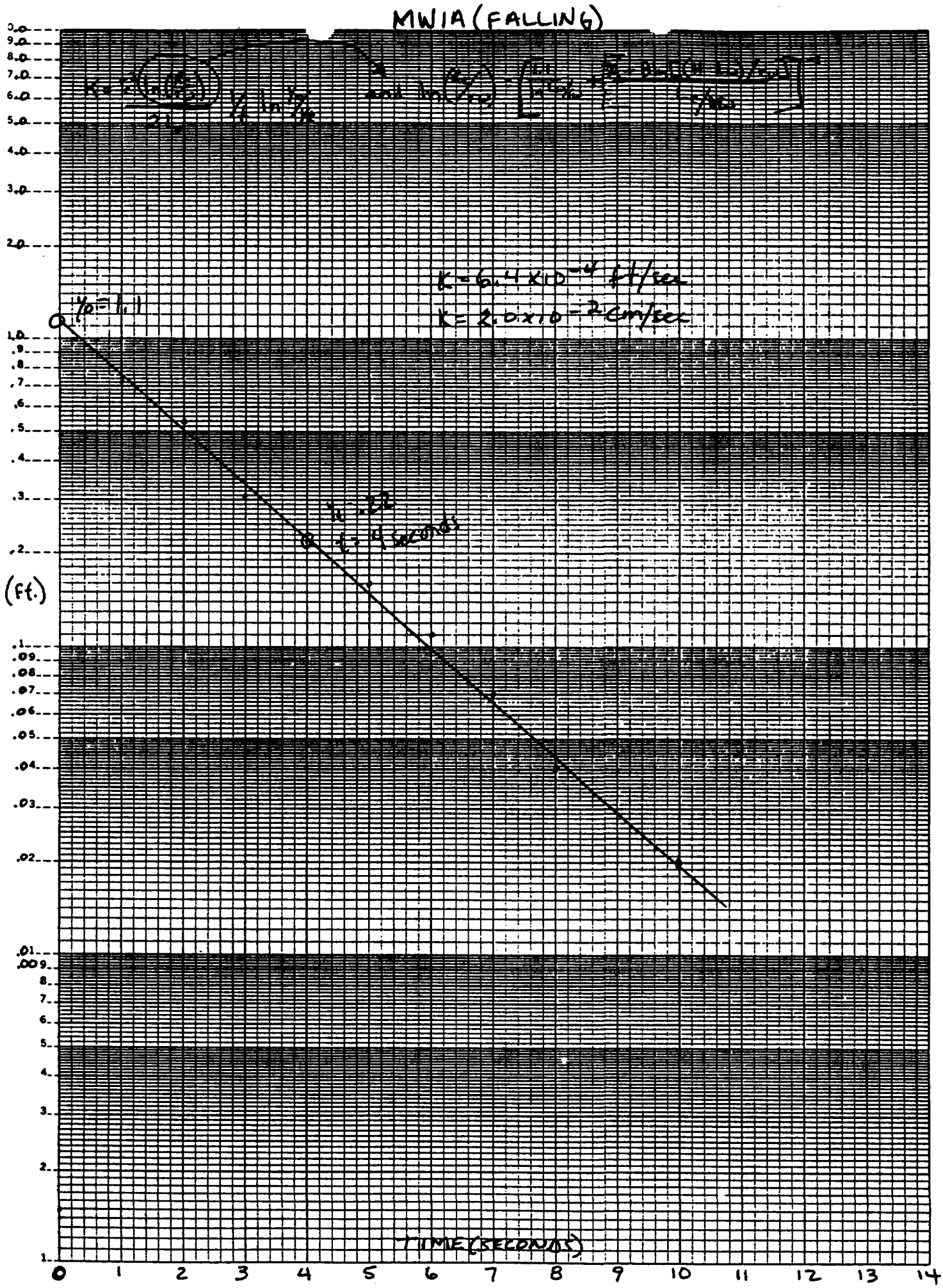
Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H2O Recorder ID: 417C
Time at Recorder: 02/21/91 14:59:53 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW1A

Date	Time	Avg	W.L.	dH	T(sec)
	FALLING HEAD				
02/21/91	14:46:39	2.816	4.72		0
02/21/91	14:46:40	3.072	4.00	0.72	1
02/21/91	14:46:41	3.008	4.18	0.54	2
02/21/91	14:46:42	2.928	4.41	0.31	3
02/21/91	14:46:43	2.896	4.50	0.22	4
02/21/91	14:46:44	2.872	4.56	0.16	5
02/21/91	14:46:45	2.856	4.61	0.11	6
02/21/91	14:46:46	2.84	4.65	0.07	7
02/21/91	14:46:47	2.832	4.68	0.04	8
02/21/91	14:46:48	2.832	4.68	0.04	9
02/21/91	14:46:49	2.824	4.70	0.02	10
	RISING HEAD				
02/21/91	14:49:02	2.776	4.83		0
02/21/91	14:49:03	2.752	4.90	-0.07	1
02/21/91	14:49:04	2.696	5.06	-0.23	2
02/21/91	14:49:05	2.544	5.49	-0.66	3
02/21/91	14:49:06	2.6	5.33	-0.50	4
02/21/91	14:49:07	2.656	5.17	-0.34	5
02/21/91	14:49:08	2.712	5.01	-0.18	6
02/21/91	14:49:09	2.736	4.95	-0.12	7
02/21/91	14:49:10	2.752	4.90	-0.07	8
02/21/91	14:49:11	2.76	4.88	-0.05	9
02/21/91	14:49:12	2.768	4.86	-0.03	10
02/21/91	14:49:13	2.768	4.86	-0.03	11
02/21/91	14:49:14	2.776	4.83	-0.00	12
02/21/91	14:49:15	2.776	4.83	-0.00	13
02/21/91	14:49:16	2.784	4.81	0.02	14


MW1A (FALLING)
K = 6.4 x 10^-4 ft/sec
K = 2.0 x 10^-2 cm/sec
Y0 = 1.1
Yt = .22
t = 4 seconds
(ft.)
TIME (SECONDS)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H20 Recorder ID: 417C
Time at Recorder: 02/21/91 14:59:53 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW2

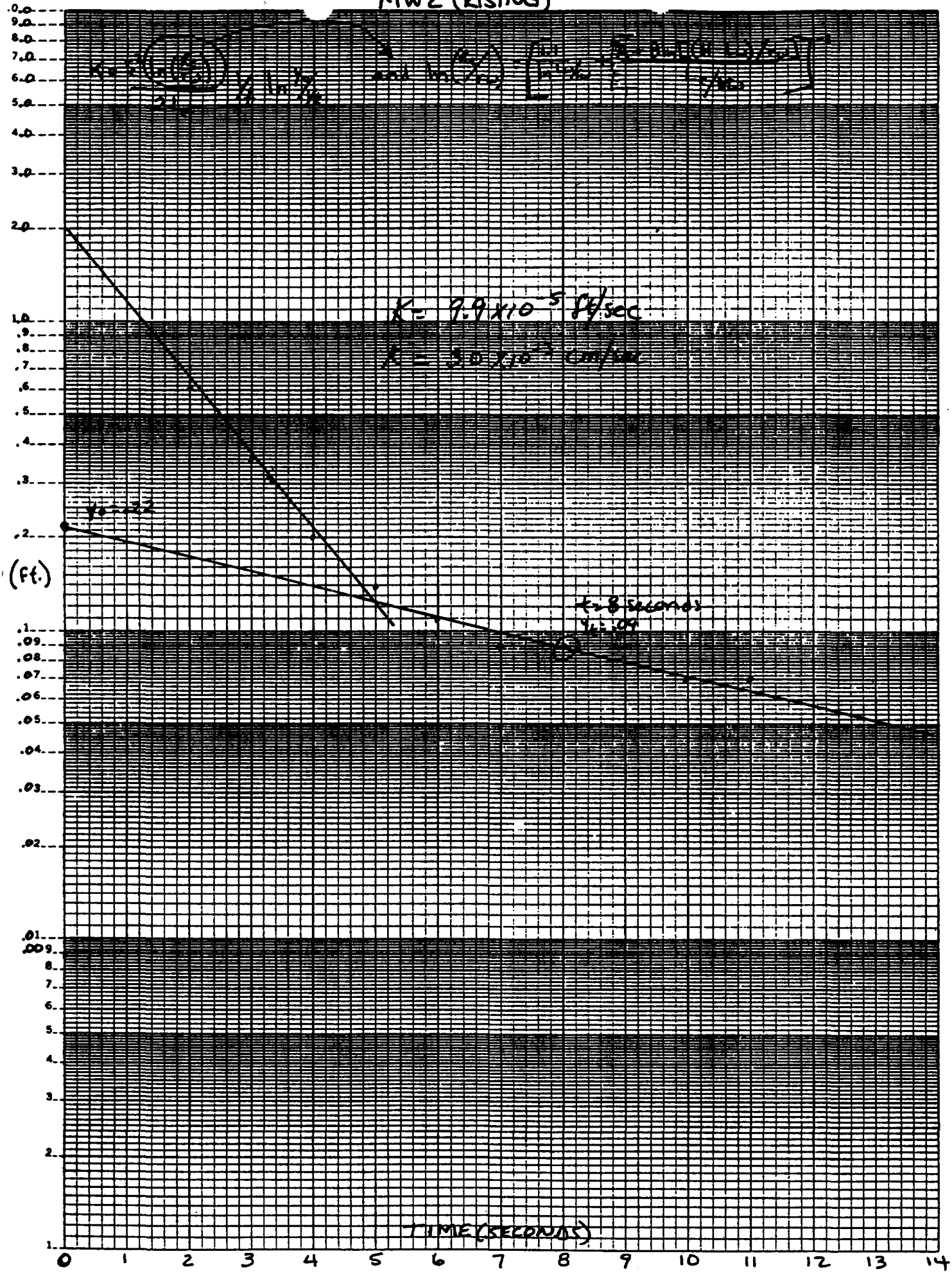
FALLING HEAD

Date	Time	Avg	W.L.	dH	T(sec)
02/21/91	14:37:09	2.16	4.41		0
02/21/91	14:37:10	2.256	4.14	0.27	1
02/21/91	14:37:11	2.408	3.71	0.70	2
02/21/91	14:37:12	2.184	4.34	0.07	3
02/21/91	14:37:13	2.224	4.23	0.18	4
02/21/91	14:37:14	2.2	4.30	0.11	5
02/21/91	14:37:15	2.2	4.30	0.11	6
02/21/91	14:37:16	2.2	4.30	0.11	7
02/21/91	14:37:17	2.192	4.32	0.09	8
02/21/91	14:37:18	2.192	4.32	0.09	9
02/21/91	14:37:19	2.184	4.34	0.07	10
02/21/91	14:37:20	2.192	4.32	0.09	11
02/21/91	14:37:21	2.184	4.34	0.07	12
02/21/91	14:37:22	2.176	4.37	0.05	13
02/21/91	14:37:23	2.184	4.34	0.07	14
02/21/91	14:37:24	2.176	4.37	0.05	15
02/21/91	14:37:25	2.176	4.37	0.05	16
02/21/91	14:37:26	2.176	4.37	0.05	17
02/21/91	14:37:27	2.168	4.39	0.02	18
02/21/91	14:37:34	2.16	4.41	0.00	25

RISING HEAD

02/21/91	14:38:05	2.152	4.43		0
02/21/91	14:38:06	1.992	4.88	-0.45	1
02/21/91	14:38:07	1.936	5.04	-0.61	2
02/21/91	14:38:08	2.024	4.79	-0.36	3
02/21/91	14:38:09	2.08	4.64	-0.20	4
02/21/91	14:38:10	2.104	4.57	-0.14	5
02/21/91	14:38:11	2.112	4.55	-0.11	6
02/21/91	14:38:12	2.12	4.52	-0.09	7
02/21/91	14:38:13	2.12	4.52	-0.09	8
02/21/91	14:38:14	2.12	4.52	-0.09	9
02/21/91	14:38:15	2.128	4.50	-0.07	10
02/21/91	14:38:16	2.128	4.50	-0.07	11
02/21/91	14:38:17	2.136	4.48	-0.05	12

MW2 (RISING)


K = 9.9 x 10^-5 ft/sec
K = 3.0 x 10^-2 cm/sec
y0 = .22
t = 8 seconds
y = .09
(ft.)
TIME (SECONDS)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
.0 9 8 7 6 5 4 3 2 1 .9 .8 .7 .6 .5 .4 .3 .2 .1 .09 .08 .07 .06 .05 .04 .03 .02 .01 .009 8 7 6 5 4 3 2 1

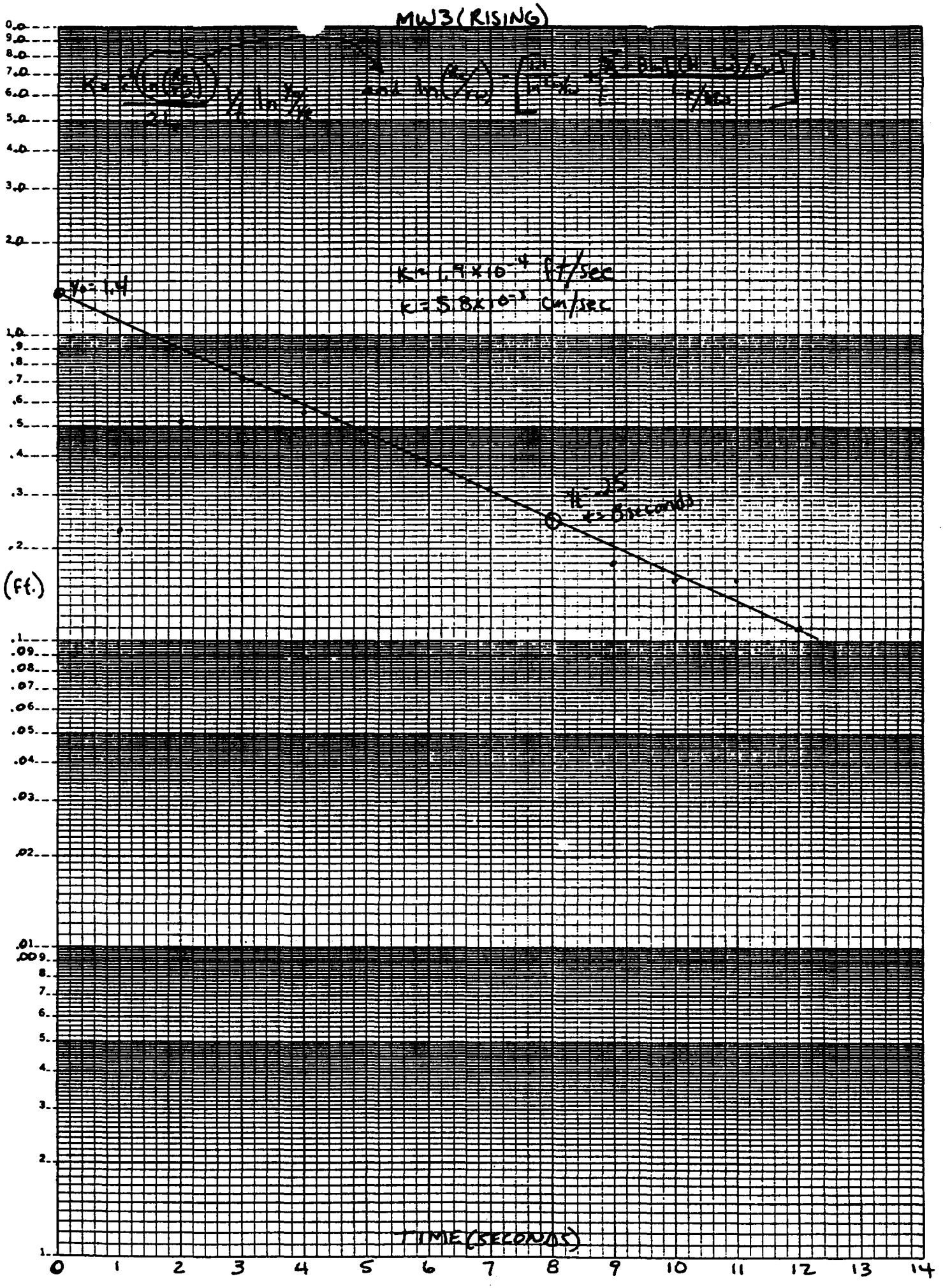
Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H20 Recorder ID: 417C
Time at Recorder: 02/21/91 13:50:00 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW3

Date	Time	Avg	W.L.	dH	T(sec)
	FALLING HEAD				
02/21/91	13:42:05	1.864	4.19	0.00	0
02/21/91	13:42:06	1.96	3.91	0.27	1
02/21/91	13:42:07	1.872	4.16	0.02	2
02/21/91	13:42:08	1.968	3.89	0.29	3
02/21/91	13:42:09	2.016	3.76	0.43	4
02/21/91	13:42:10	1.88	4.14	0.05	5
02/21/91	13:42:11	1.92	4.03	0.16	6
02/21/91	13:42:12	1.92	4.03	0.16	7
02/21/91	13:42:13	1.912	4.05	0.14	8
02/21/91	13:42:14	1.912	4.05	0.14	9
02/21/91	13:42:15	1.904	4.07	0.11	10
02/21/91	13:42:16	1.912	4.05	0.14	11
02/21/91	13:42:17	1.904	4.07	0.11	12
02/21/91	13:42:18	1.896	4.10	0.09	13
	RISING HEAD				
02/21/91	13:44:24	1.84	4.25	0.00	0
02/21/91	13:44:25	1.76	4.48	-0.23	1
02/21/91	13:44:26	1.656	4.77	-0.52	2
02/21/91	13:44:27	1.584	4.97	-0.72	3
02/21/91	13:44:28	1.64	4.82	-0.56	4
02/21/91	13:44:29	1.68	4.70	-0.45	5
02/21/91	13:44:30	1.704	4.64	-0.38	6
02/21/91	13:44:31	1.728	4.57	-0.32	7
02/21/91	13:44:32	1.752	4.50	-0.25	8
02/21/91	13:44:33	1.776	4.43	-0.18	9
02/21/91	13:44:34	1.784	4.41	-0.16	10
02/21/91	13:44:35	1.784	4.41	-0.16	11
02/21/91	13:44:36	1.8	4.37	-0.11	12


MW3 (RISING)
K = 1.9 x 10^-4 ft/sec
K = 5.8 x 10^-3 cm/sec
Y0 = 1.4
Yt = .25
t = 8 seconds
(ft.)
TIME (SECONDS)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

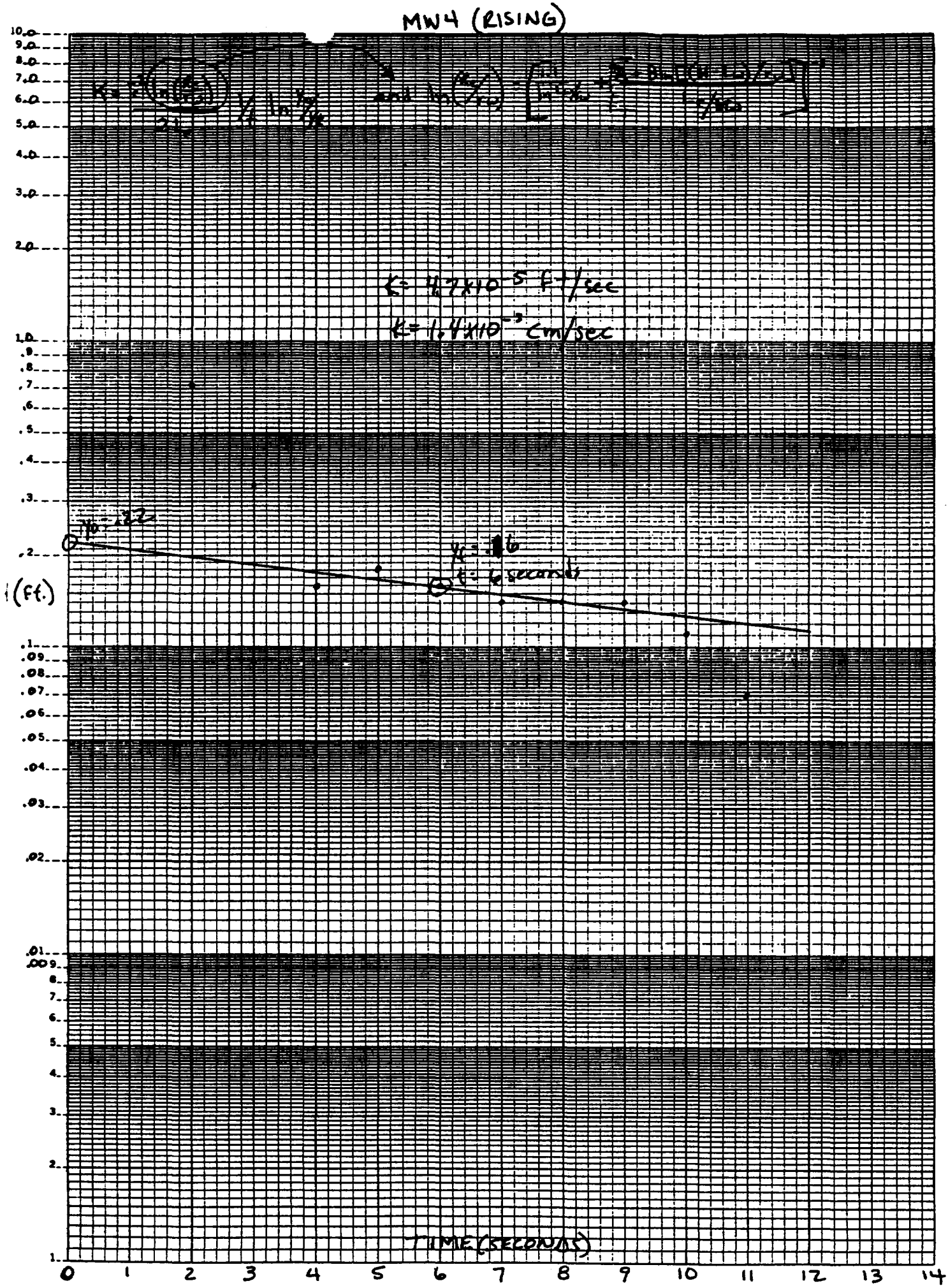
Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H2O Recorder ID: 417C
Time at Recorder: 02/21/91 13:02:15 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW4

Date	Time	Avg	W.L.	dH	T(sec)
	RISING HEAD				
02/21/91	12:54:59	1.432	4.86	0.00	0
02/21/91	12:55:00	1.232	5.43	-0.56	1
02/21/91	12:55:01	1.176	5.58	-0.72	2
02/21/91	12:55:02	1.312	5.20	-0.34	3
02/21/91	12:55:03	1.376	5.02	-0.16	4
02/21/91	12:55:04	1.368	5.04	-0.18	5
02/21/91	12:55:05	1.376	5.02	-0.16	6
02/21/91	12:55:06	1.384	5.00	-0.14	7
02/21/91	12:55:07	1.384	5.00	-0.14	8
02/21/91	12:55:08	1.384	5.00	-0.14	9
02/21/91	12:55:09	1.392	4.98	-0.11	10
02/21/91	12:55:10	1.408	4.93	-0.07	11


MW4 (RISING)
K = 4.7x10^-5 ft/sec
K = 1.4x10^-3 cm/sec
y0 = .22
yf = .16
t = 6 seconds
(ft.)
TIME (SECONDS)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14

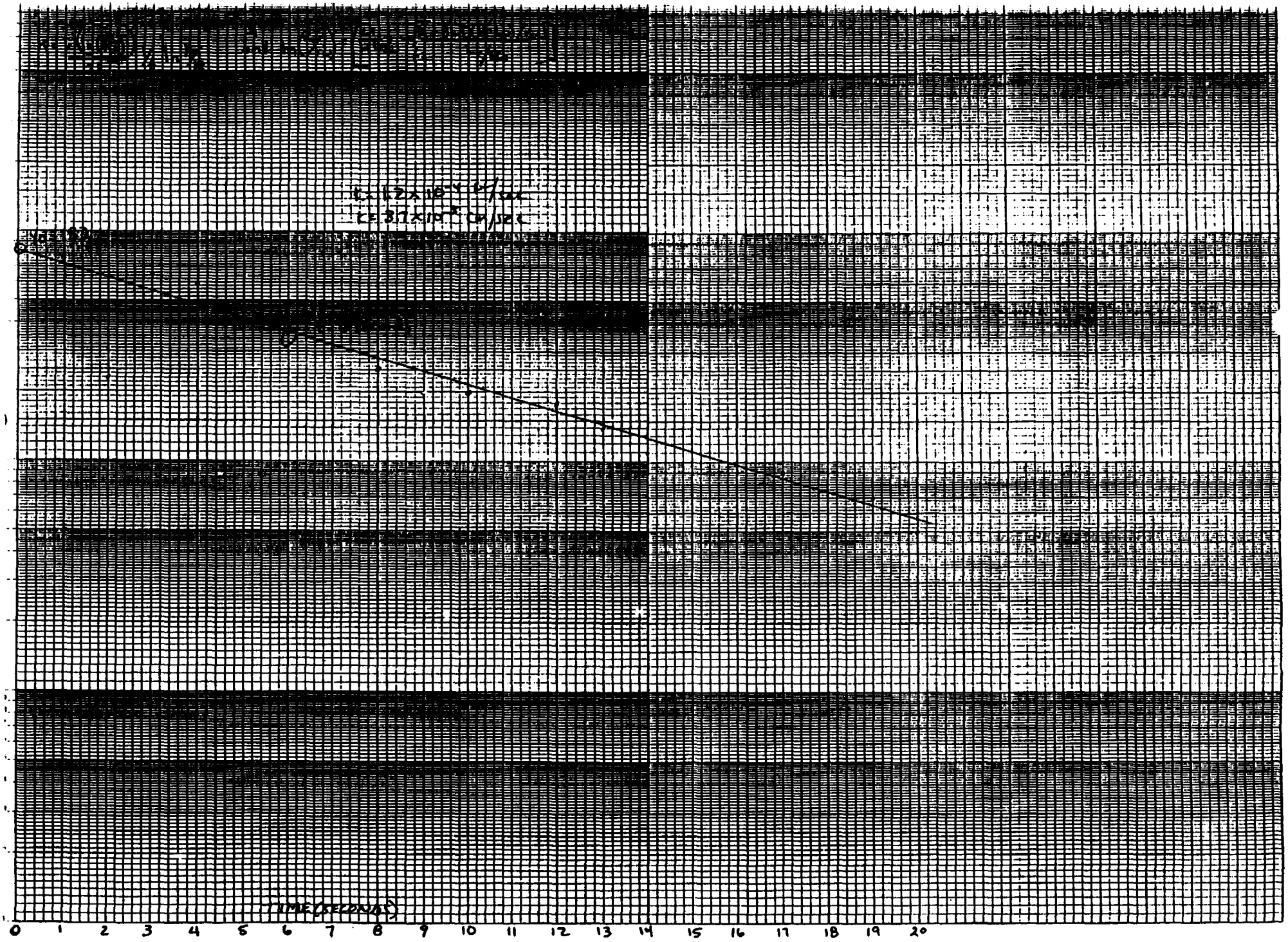
Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H2O Recorder ID: 417C
Time at Recorder: 02/21/91 14:18:57 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW5

Date	Time	Avg	W.L.	dH	T(sec)
	FALLING HEAD				
02/21/91	14:09:27	1.864	3.69	0.00	0
02/21/91	14:09:28	1.912	3.55	0.14	1
02/21/91	14:09:29	1.936	3.48	0.20	2
02/21/91	14:09:30	1.992	3.32	0.36	3
02/21/91	14:09:31	2.016	3.26	0.43	4
02/21/91	14:09:32	1.928	3.50	0.18	5
02/21/91	14:09:33	1.936	3.48	0.20	6
02/21/91	14:09:34	1.92	3.53	0.16	7
02/21/91	14:09:35	1.912	3.55	0.14	8
02/21/91	14:09:36	1.904	3.57	0.11	9
02/21/91	14:09:37	1.896	3.60	0.09	10
02/21/91	14:09:38	1.888	3.62	0.07	11
	RISING HEAD				
02/21/91	14:11:02	1.856	3.71	0.00	0
02/21/91	14:11:03	1.84	3.75	-0.05	1
02/21/91	14:11:04	1.776	3.93	-0.23	2
02/21/91	14:11:05	1.624	4.36	-0.65	3
02/21/91	14:11:06	1.648	4.29	-0.59	4
02/21/91	14:11:07	1.696	4.16	-0.45	5
02/21/91	14:11:08	1.728	4.07	-0.36	6
02/21/91	14:11:09	1.744	4.02	-0.32	7
02/21/91	14:11:10	1.768	3.96	-0.25	8
02/21/91	14:11:12	1.784	3.91	-0.20	10
02/21/91	14:11:14	1.792	3.89	-0.18	12
02/21/91	14:11:15	1.808	3.84	-0.14	13
02/21/91	14:11:16	1.816	3.82	-0.11	14
02/21/91	14:11:19	1.824	3.80	-0.09	17
02/21/91	14:11:21	1.832	3.78	-0.07	19
02/21/91	14:11:22	1.84	3.75	-0.05	20


TIME (SECONDS)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

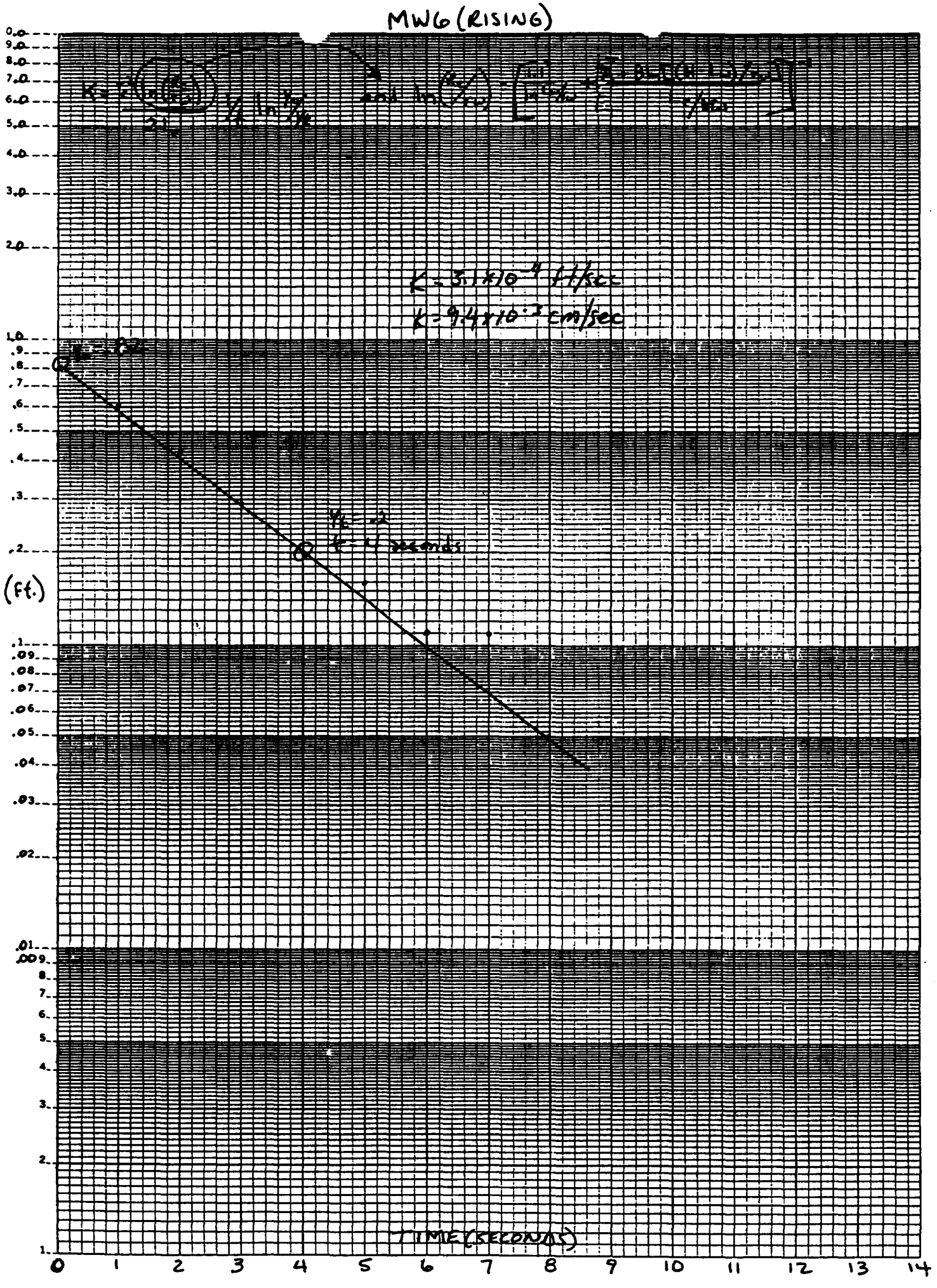
Saved Recorder Status

Type: 2109-10 Range:0.000 - 8.185 FT H2O Recorder ID: 417C
Time at Recorder: 02/21/91 13:50:00 Last Update: 11/30/90 16:02:05
Signal process: Not Applicable
Values being saved: minimums averages maximu
Alarm status: Low alarm @ 0.032 is OFF Upper alarm @ 0.320 is O

Averaging period: 00:00:01 Amount of data recorded: 00:36:08
Storage Capacity: 6512 values records: 00:36:10
Output compressed by a factor of 1

MW6

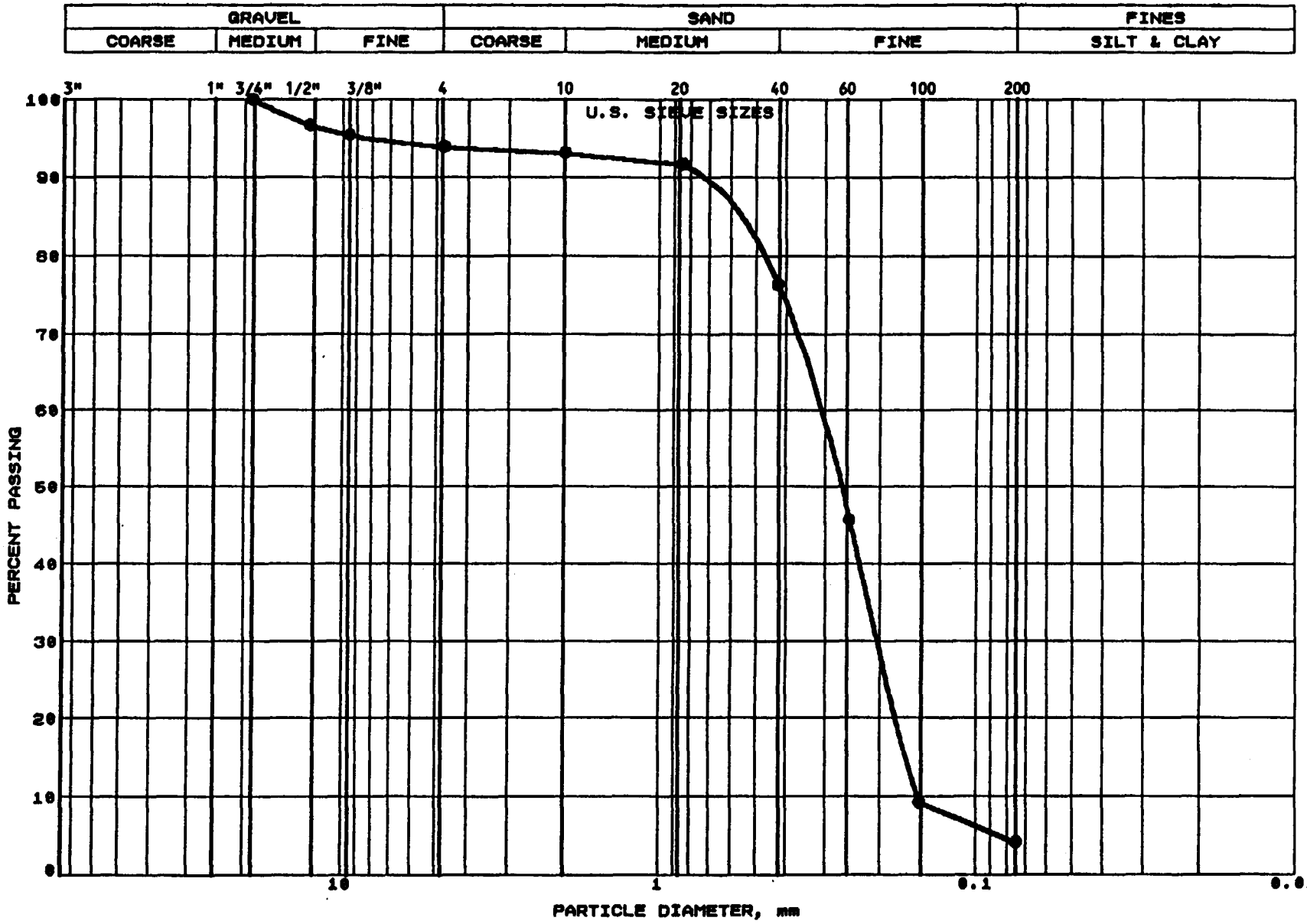
Date	Time	Avg	W.L.	dH	T(sec)	
	RISING HEAD					
02/21/91	13:28:10	1.904	4.63	3.95	0.00	0
02/21/91	13:28:11	1.688	5.24	4.56	-0.61	1
02/21/91	13:28:12	1.752	5.06	4.38	-0.43	2
02/21/91	13:28:13	1.8	4.93	4.25	-0.29	3
02/21/91	13:28:14	1.832	4.84	4.16	-0.20	4
02/21/91	13:28:15	1.848	4.79	4.11	-0.16	5
02/21/91	13:28:16	1.864	4.75	4.07	-0.11	6
02/21/91	13:28:17	1.864	4.75	4.07	-0.11	7
02/21/91	13:28:18	1.888	4.68	4.00	-0.05	8


MW6 (RISING)
$K = r^2 \frac{\ln(R/r_w)}{2L} \frac{1}{t} \ln \frac{y_0}{y_t}$
and $\ln(R/r_w) = \left[\frac{1.1}{\ln(L/r_w)} + \frac{A + B\ln[(n-L)/r_w]}{L/r_w}\right]^{-1}$
$K = 3.1 \times 10^{-4}$ ft/sec
$K = 9.4 \times 10^{-3}$ cm/sec
$y_0 = .82$
$y_t = .2$
$t = 4$ seconds
(Ft.)
TIME (SECONDS)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

APPENDIX F

GRAIN SIZE DISTRIBUTION CURVES

GRAIN SIZE ACCUMULATION CURVE



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

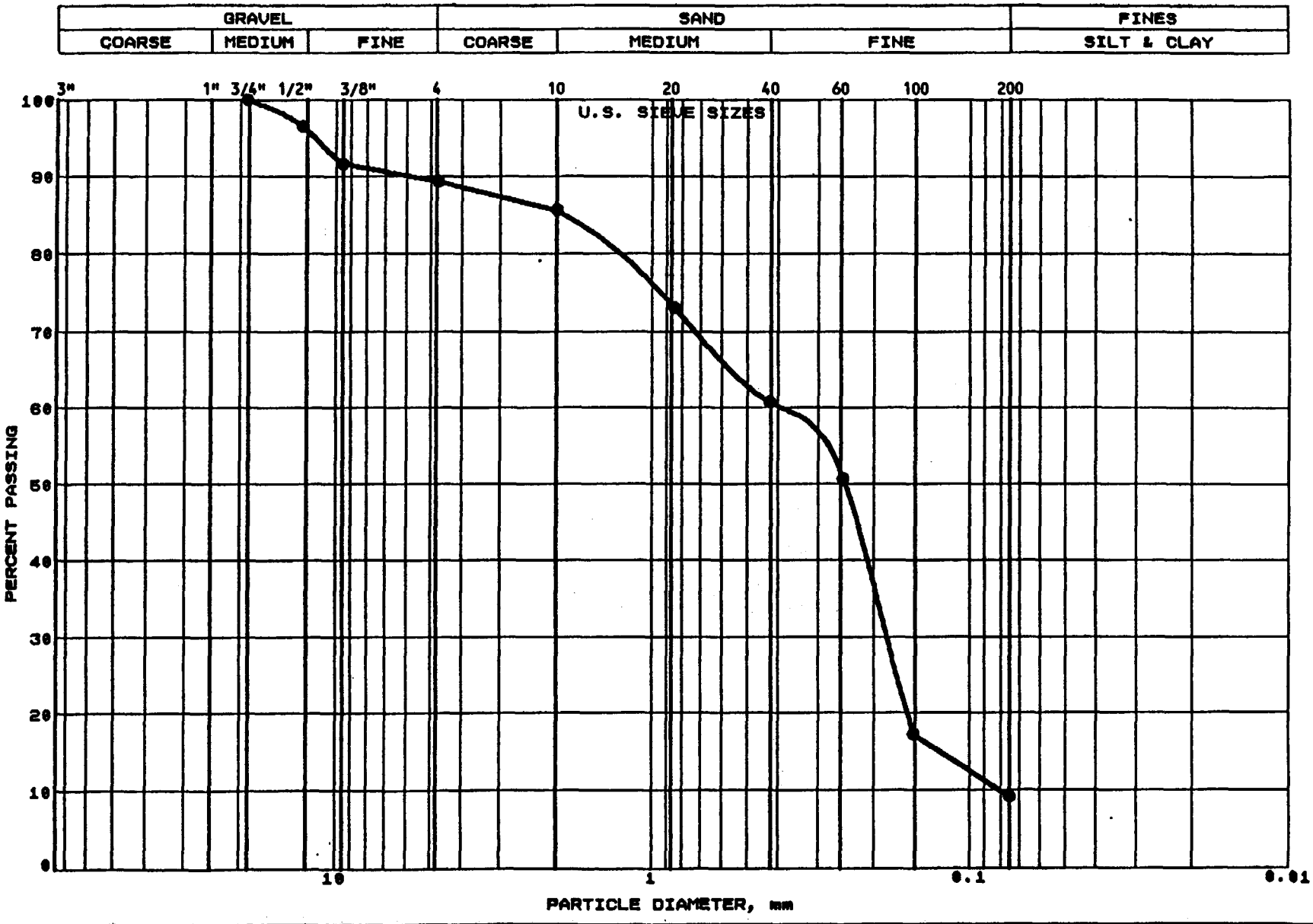
BORING: MW-1A
SAMPLE:
DEPTH: 20.0'

GRAVEL	6.1 %
SAND	89.7 %
SILT AND CLAY	4.2 %
Cu	2.1
Cc	0.8

CLASSIFICATION:
SP|Poorly Graded Sand, Trace Of Gravel, light brown

D60=0.32 D30=0.20 D10=0.15

GRAIN SIZE ACCUMULATION CURVE



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

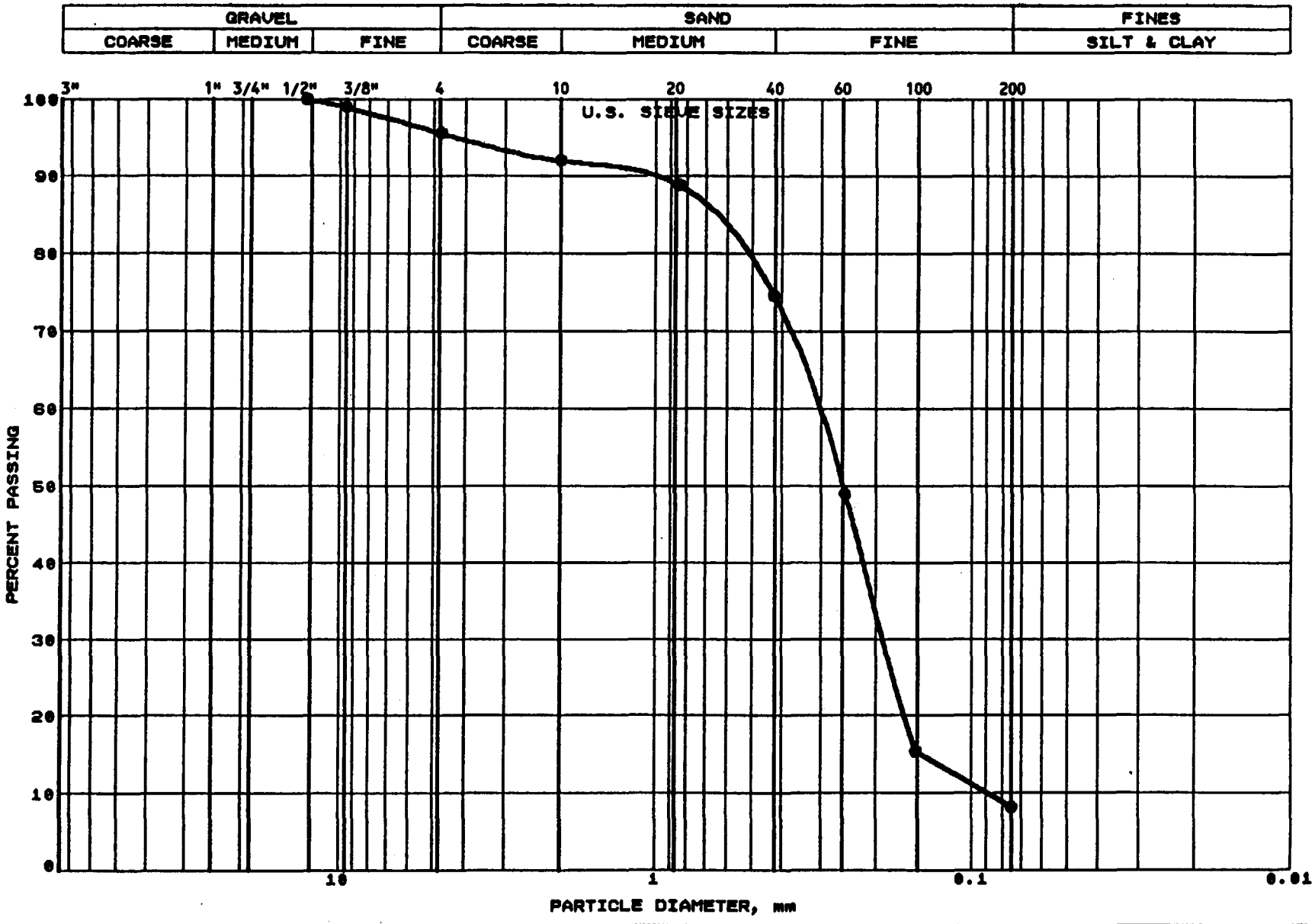
BORING: MW-2
SAMPLE:
DEPTH: 13.0'

GRAVEL	10.7 %
SAND	80.1 %
SILT AND CLAY	9.2 %
Cu	5.1
Cc	1.0

CLASSIFICATION:
SP-SM:Poorly Graded Sand With Silt, Trace Of Gravel, light brown

D60=0.41 D30=0.18 D10=0.08

GRAIN SIZE ACCUMULATION CURVE



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

BORING: MW-3
SAMPLE:
DEPTH: 12.5'

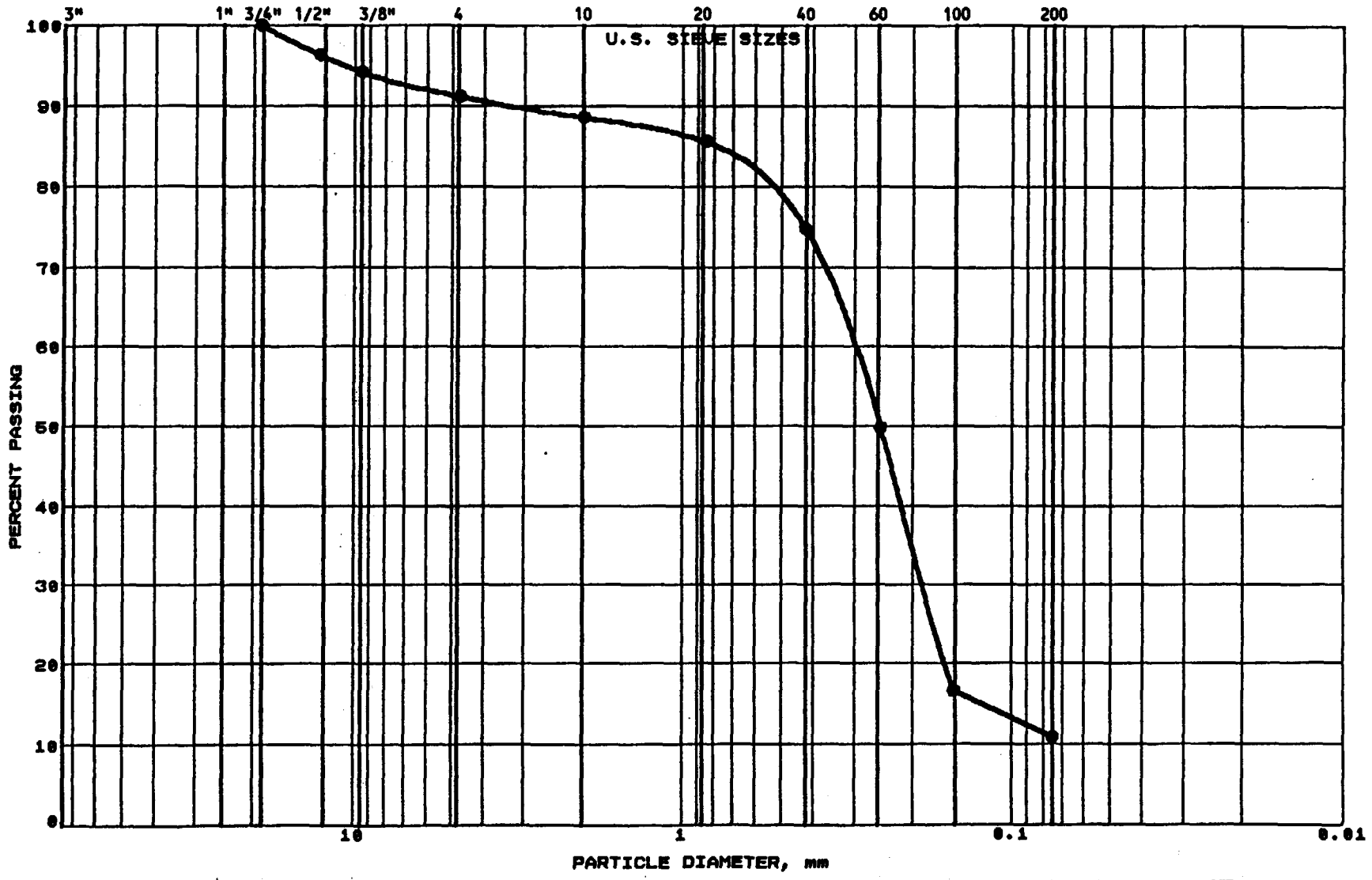
GRAVEL	4.4 %
SAND	87.4 %
SILT AND CLAY	8.2 %
Cu	3.5
Cc	1.3

CLASSIFICATION:
SP-SM:Poorly Graded Sand with Silt,brown

D60=0.31 D30=0.19 D10=0.09

GRAIN SIZE ACCUMULATION CURVE

GRAVEL			SAND			FINES
COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT & CLAY



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

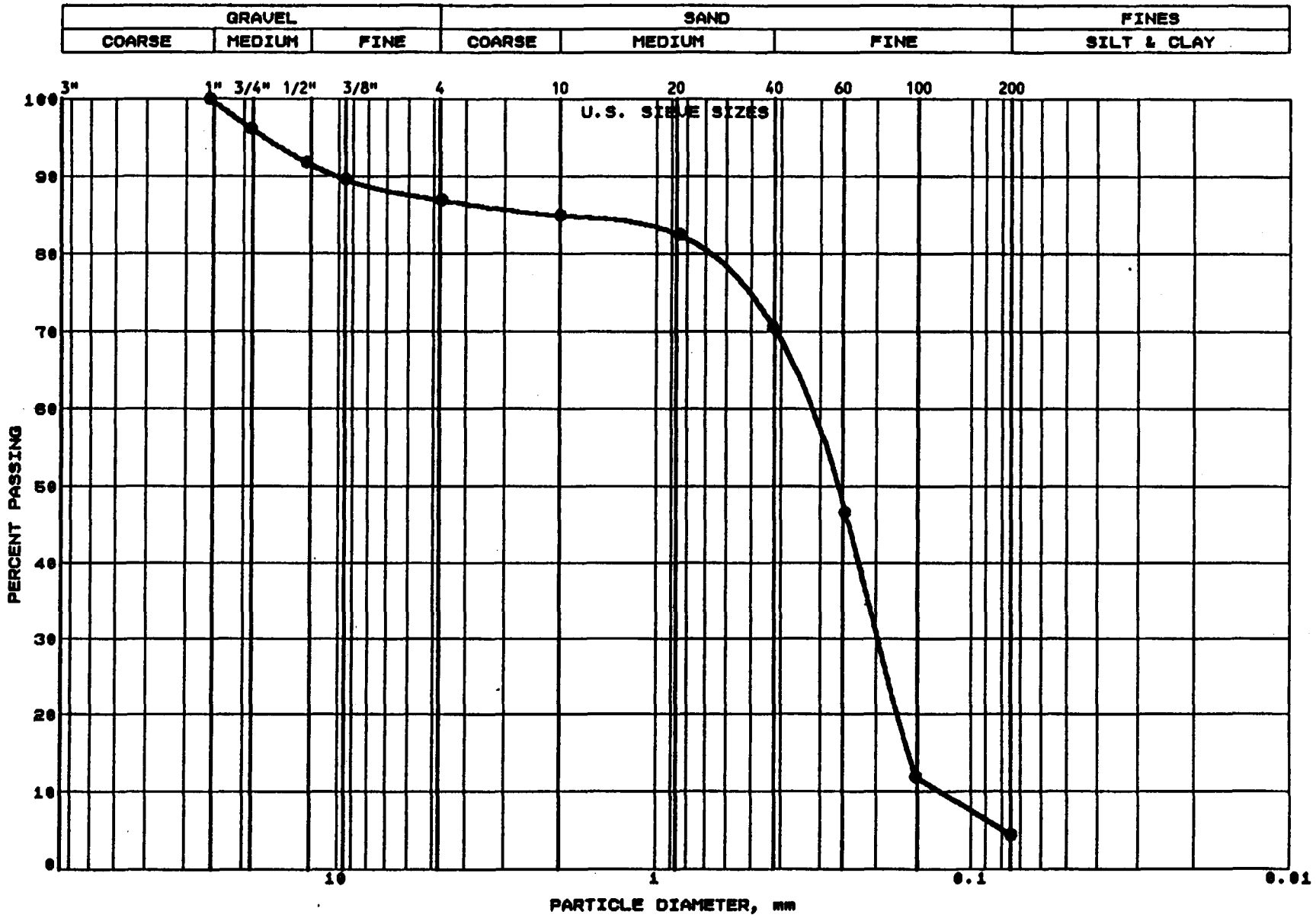
BORING: MW-4
SAMPLE:
DEPTH: 12.0'-13.0'

GRAVEL	8.8 %
SAND	80.3 %
SILT AND CLAY	10.9 %
Cu	4.4
Cc	1.6

CLASSIFICATION:
SP-SM:Poorly Graded Sand With Silt, Trace Of Gravel, light brown

D60=0.31 D30=0.18 D10=

GRAIN SIZE ACCUMULATION CURVE



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

BORING: MW-5
SAMPLE:
DEPTH: 12.0'

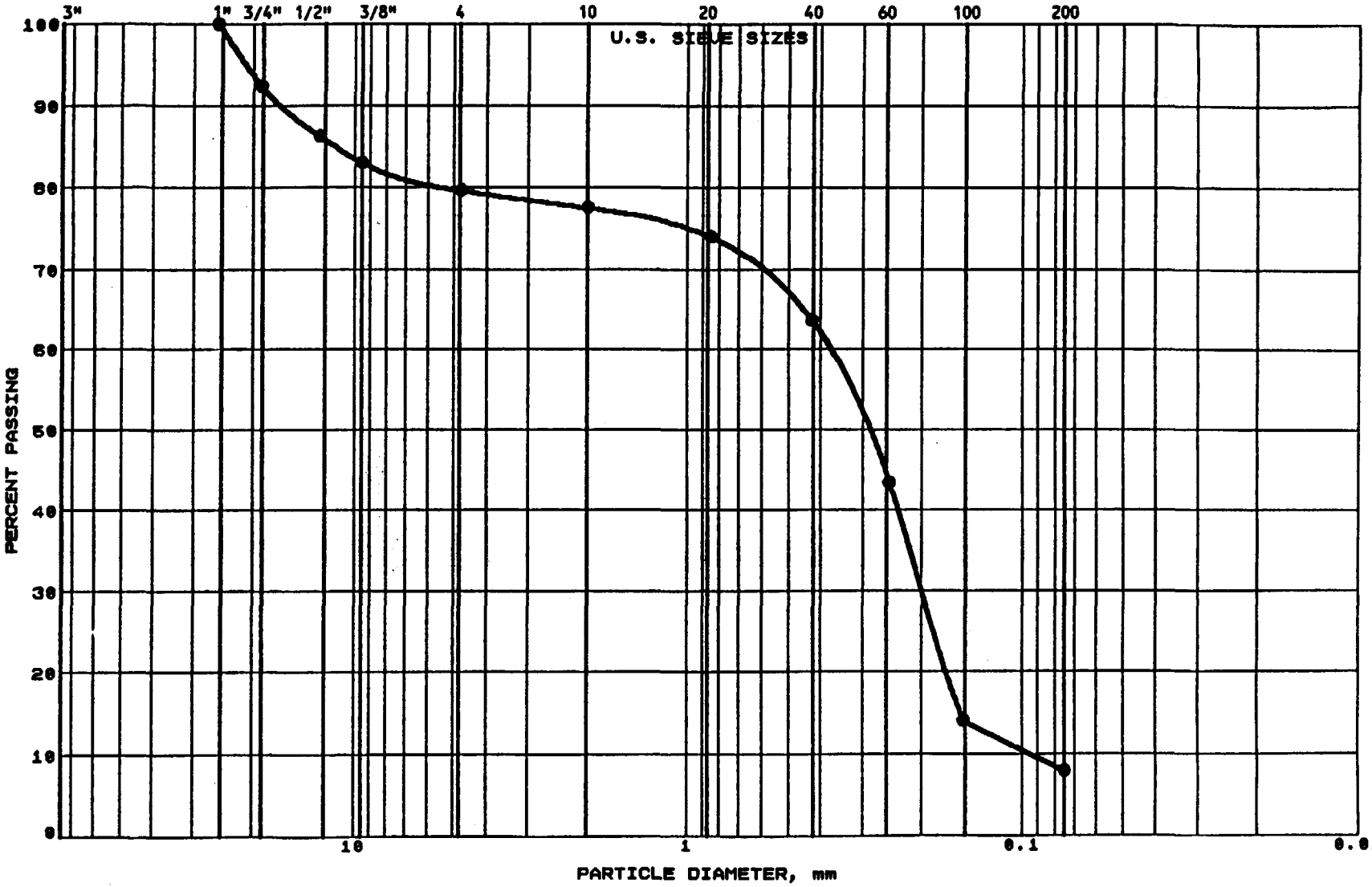
GRAVEL	13.1 %
SAND	82.5 %
SILT AND CLAY	4.4 %
Cu	2.7
Cc	0.9

CLASSIFICATION:
SP|Poorly Graded Sand, Trace Of Gravel, light brown

D60=0.34 D30=0.20 D10=0.13

GRAIN SIZE ACCUMULATION CURVE

GRAVEL			SAND			FINES
COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE	SILT & CLAY



BRAUN
ENGINEERING TESTING

PROJECT: 90-758
SUNBANK PROPERTY

BORING: MW-6
SAMPLE:
DEPTH: 13.0'

GRAVEL	20.4 %
SAND	71.6 %
SILT AND CLAY	8.0 %
Cu	4.1
Cc	1.1

CLASSIFICATION:
SP-SM:Poorly Graded Sand With Silt And Gravel, light brown

D60=0.39 D30=0.20 D10=0.09

APPENDIX G

DATA VALIDATION REPORTS

MEMORANDUM

TO: Steve Quigley — REFERENCE NO. 3050

FROM: David Dempsey — DATE: May 9, 1991

RE: Data Quality Assessment and Validation for Five Soil and Eleven Water Samples Collected during the 1991 Round 1 Sampling Event at the Sun Bank Site

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The following details a data quality assessment and validation for 5 soil and 11 water samples collected November 28 through November 30, 1990, at the Sun Bank site. Samples were analyzed for target compound list volatile organic compounds (TCL VOC), benzene-toluene-xylenes-ethylbenzene (BTXE), TCL base-neutral/acid extractable organic compounds (BN/A) and TCL pesticides/polychlorinated biphenyls (PEST/PCB) by Wadsworth/ALERT Laboratories (Wadsworth). Dioxin/furan analyses were performed by Triangle Laboratories. Table 1 summarizes the analytical methods used. Quality assurance criteria were established in the associated draft quality assurance project plan (QAPP).[1]

Holding Time Periods

Holding time periods are defined in the QAPP and are summarized on Table 1. Triangle did not extract dioxin/furan samples within the 30 day limit. However, a recent method allows for dioxin/furan extraction to take place one year from sample collection.[2] Thus, the dioxin/furan data are acceptable despite violating the QAPP holding time period.

Holding time periods for VOC and BTXE requires aqueous samples to be preserved with hydrochloric acid to a pH less than two. The pH of samples W-113090-PS-02; W-112890-PS-03; W-113090-PS-04; W-113090-PS-05 and W-112890-PS-06 was greater than two; therefore, the holding time period for aromatic analytes was reduced to seven days. Aqueous samples properly preserved have holding time periods near 60 days.[3] Holding time period for VOC and BTXE soil analyses was 14 days, as directed in the QAPP.

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[1]Application of quality assurance/quality control criteria was consistent with "Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses", July 1, 1988 and "CLP Dioxin (2,3,7,8-TCDD) Data Review", SOP NO. HW-5, revision 4, 1989.

[2]This holding time period is found in "Method 1613: Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS", Revision A, Office of Water Regulations and Standards, Industrial Technology Division, April 1990.

[3]"Stability of Volatile Organic Compounds in Environmental Water Samples during Transport and Storage", Maskarinec, M.P.; Johnson, L.H.; Holladay, S.K.; Moody, R.L. *Environ. Sci and Tech.*, 1990, 24, 1665-1670.

Table 2 lists VOC and BTXE analyses conducted after the holding time period had expired. The VOC and BTXE data from these samples are qualified as directed in Table 2. The remaining analyses were conducted within the holding time periods specified in the QAPP.

Method Blank Samples

Extent of lab contamination of samples was measured using method blank samples. The VOC, BN/A and PEST/PCB method blank samples were free of target analytes. Therefore, no lab contamination was observed.

The dioxin/furan method blank samples contained minute amounts of substances that may be dioxins (see Analyte Identification). As a result, dioxin data from several samples were qualified as non-detect (U). Table 3 summarizes the dioxin/furan method blank sample data. Only sample data which failed the analyte identification criteria are qualified.

Surrogate Compounds Percent Recoveries (Surrogate Recoveries)

Surrogate compounds were added to samples which underwent VOC, BTXE, BN/A and PEST/PCB analyses as a means to monitor sample performance. Table 4 summarizes the outlying surrogate recoveries.

The BN/A soil method blank samples had surrogate compounds out of control limits. However, as only a single surrogate compound per fraction was out and the percent recoveries were greater than ten, no action upon the data was necessary.

Of interest was the switch in surrogate compounds used for BTXE analyses. Several samples had surrogate compounds bromochloromethane and trifluorotoluene, while others had surrogate compound bromofluorobenzene. This discrepancy was due to using different instruments, one equipped with a HALL and PID detector. Samples analyzed on this instrument used bromochloromethane and trifluorotoluene as surrogate compounds. As all recoveries were within limits, the method was in control for both instruments.

For dioxin/furan analyses, surrogate compounds are $^{13}C_{12}$-1,2,3,4-TCDD and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD. Percent recoveries are calculated against internal standards. Samples S-113090-PS-12, S-112890-PS-09 and S-112890-PS-11 had outlying recoveries which are listed in Table 5.

As samples S-113090-PS-12 and S-112890-PS-11 had high $^{13}C_{12}$-OCDD recoveries and as the associated analytes were not detected in these samples, no action upon the data was taken. However, since the $^{13}C_{12}$-2,3,7,8-TDD and $^{13}C_{12}$-2,3,7,8-TCDF recoveries from sample S-112890-PS-09 are well below the lower limit of 40, the data for the associated analytes are rejected (R). The low $^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF recovery from this sample resulted with the associated data qualified as estimated (J).

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries

Matrix effects upon the data were looked for using MS/MSD analyses upon selected samples. The VOC and PEST/PCB MS/MSD analyses were performed on samples W-112990-PS-04 and S-112890-PS-10. As these recoveries were within limits specified in the QAPP, no significant matrix effects were observed.

The BN/A MS/MSD analyses, which were performed on the same samples, showed matrix effects for N-nitrosodi-*n*-propylamine and phenol. As a result, these data are qualified as estimated (J or UJ). Table 6 summarizes these outlying recoveries.

The dioxin/furan MS/MSD analyses were performed upon samples S-112890-PS-10 and W-113090-PS-04. Table 7 lists the outlying dioxin MS/MSD recoveries. Analytes OCDD; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF and OCDF had poor precision, and data for these analytes are qualified as estimated (J).

Laboratory Control Samples

Accuracy of each method was judged using control samples. Wadsworth reported control sample data for VOC, BTXE, BN/A and PEST/PCB. As these recoveries were within limits specified by Wadsworth, the methods were accurate while samples were analyzed..

No dioxin/furan control samples were reported by Triangle. Therefore, recovery standard recoveries and MS/MSD data were used to assess these data.

Analytical Identification

Dioxin/furans analytes are identified using two key ions. However, samples listed in Table 8 contained substances which could not be positively identified as dioxins/furans. As suggested in the dioxin/furan guidelines, estimated maximum possible concentrations were calculated. These values present the dioxin/furan concentrations if the substances were clearly identified as dioxin/furans.

Trip Blank Sample

A trip blank sample was included with the samples as a means to monitor VOC cross-contamination during shipment to Wadsworth. As no VOC were detected in this sample, no cross-contamination was observed.

Field Blank Samples

The QAPP specifies field blank samples to be collected once every 20 investigative samples. However, no field blanks were collected.

Rinsate Samples

Rinsate samples were used to monitor the cleanliness of sampling equipment. Table 9 summarizes the rinsate samples data. Overall, the equipment was properly cleaned prior to collecting samples.

Field Duplicate Samples

Overall precision for this event was measured using field duplicate sample sets S-112890-PS-09 and S-112890-PS-10, W-113090-PS-01 and W-113090-PS-08. Tables 10 and 11 summarize the field duplicate samples data. Overall, the level of precision was acceptable.

Overall Assessment

The data are accurate and precise, except where noted above. Qualified data may be used for qualitative purposes, except where the data are rejected.

TABLE 1

SUMMARY OF ANALYTICAL METHODS AND HOLDING TIME PERIODS

Analysis	Method[1]	Matrix	Holding Time Period[2]
VOC/BTXE	8240/8020	Water	14 days[3]
		Soil	14 days
BN/A	8270	Water	7 days to extraction 40 days from extraction
		Soil	14 days to extraction 40 days from extraction
Pest/PCB	8080	Water	7 days to extraction 40 days from extraction
		Soil	14 days to extraction 40 days from extraction
Dioxin/Furan[4]	8280A	Water	30 days to extraction 45 days to analysis
		Soil	30 days to extraction 45 days to analysis

[1]Analytical methods are from "Test Methods for Evaluating Solid Wastes", SW846, third edition, September 1986.
[2]Holding time periods are based from time of sample collection to completion of analysis.
[3]Assumes aqueous sample is preserved to pH<2.
[4]The dioxin/furan analyses were performed using a revised version of method 8280, namely, 8280A.

TABLE 2

SAMPLES ANALYZED AFTER QAPP
VOC/BTXE HOLDING PERIOD TIME HAD EXPIRED

Sample ID	Days[1] VOC	Days[1] BTXE
W-112890-PS-01	15	-
W-112890-PS-03	15	-
S-112890-PS-09	13	15
S-112890-PS-10	13	15
S-112890-PS-11	15	15
S-112890-PS-12	14	-
S-112890-PS-13	12	-

[1] Days to VOC or BTXE analysis. The aqueous data from sample W-112890-PS-01 are not qualified based upon violating holding time periods. The VOC and BTXE for the remaining samples listed are qualified as estimated (J or UJ).

TABLE 3

CONCENTRATIONS OF SUBTANCES DETECTED IN DIOXIN/FURAN METHOD BLANK SAMPLES

Matrix	Analyte	Concentration	Associated Samples[1]
Water	OCDD[2]	0.18 ng/l	W-113090-PS-04; W-113090-PS-05; W-112990-PS-07; W-113090-PS-08; W-112990-PS-14; W-112890-PS-03; W-112890-PS-06;
	Total TCDD[2]	4.78 ng/l	
	Total TCDF[2]	0.19 ng/l	W-113090-PS-01; W-113090-PS-02; W-113090-PS-04; W-113090-PS-05; W-112990-PS-07; W-113090-PS-08; W-112890-PS-03; W-112890-PS-06; W-112990-PS-14
Soil	OCDD	0.02 µg/kg	
	Total TCDD[2]	0.52 µg/kg	S-112890-PS-09 S-112890-PS-10 S-112890-PS-11
	OCDF	0.004 µg/kg	
	Total HxCDD[2]	0.01 µg/kg	
	Total TCDF[2]	0.03 µg/kg	S-112890-PS-09 S-112890-PS-10 S-112890-PS-11

[1]Associated samples have analyte results qualified as non-detect (U).

[2]Analyte identify was not confirmed. Value is estimated maximum possible concentration.

TABLE 4

OUTLYING SURROGATE RECOVERIES

Sample ID	Analysis	Compound	%R[1]	Limits[2]
W-112890-PS-03	BN/A	2-fluorophenol	12	17 - 95
W-112890-PS-06	BN/A	2-fluorophenol	10	17 - 95
W-112890-PS-07	BN/A	d_5-nitrobenzene	19	22 - 135
W-113090-PS-08	BN/A	d_5-nitrobenzene	17	22 - 135
S-112890-PS-09	BN/A	2-fluorophenol	16	24 - 118
S-112890-PS-10	BN/A	2-fluorophenol	13	24 - 118
S-112890-PS-11	BN/A	2-fluorophenol	14	24 - 118
S-112990-PS-12	BN/A	All compounds diluted		-
S-112990-PS-13	BN/A	2-fluorophenol	11	24 - 118
W-112990-PS-14	BN/A	2,4,6-tribromophenol	187	10 - 156
K300-4-BK[3]	BN/A	2-fluorophenol	14	24 - 118
L302-KB[3] (soil)	BN/A	d_5-nitrobenzene 2-fluorophenol	32 10	10 - 135 24 - 118
L302-BK[3] (water)	BN/A	d_5-nitrobenzene 2-fluorophenol	17 13	22 - 135 17 - 95

[1] %R = Percent Recovery
[2] Limits are specified in the QAPP.
[3] Sample is a method blank sample.

TABLE 5

OUTLYING RECOVERY STANDARD PERCENT RECOVERIES FROM DIOXIN/FURAN ANALYSES

Sample ID	Standard	%R[1]	Qualifier[2]
S-113J90-PS-12	$^{13}C_{12}$-OCDD	122	J
S-112890-PS-09	$^{13}C_{12}$-2,3,7,8-TCDF	10.7	R
	$^{13}C_{12}$-2,3,7,8-TCDD	22.5	R
	$^{13}C_{12}$-1,2,3,4,6,7,8-HpCDF	34.9	J
S-112890-PS-11	$^{13}C_{12}$-OCDD	124	J

[1] %R = Percent Recovery. Limits are 40-120.
[2] Analytes data are qualified as:
J - the associated value is an estimate, for detected analytes.
R - the data are unusable, for non-detected analytes.

TABLE 6

OUTLYING BN/A MS/MSD RECOVERIES

Sample ID	Analyte	Percent Recovery MS	Percent Recovery MSD	Limits[1]	Qualifier[2]
W-113090-PS-04	N-nitrosodi-*n*-proylamine	24	28	41 - 116	UJ
S-112890-PS-10	N-nitrosodi-*n*-propylamine	25	27	41 - 126	UJ
	Phenol	19	24	26 - 90	UJ

[1]Limits are specified in the QAPP.
[2]Analyte datum for the sample is qualified as estimated (UJ).

TABLE 7

OUTLYING DIOXIN MS/MSD RECOVERIES

Sample ID	Analyte	*Percent Recovery* MS	MSD	Qualifier[1]
S-112890-PS-10	1,2,3,4,6,7,8-HpCDD	242	137	J
	OCDD	11,485	84	J
	OCDF	172	73	J

[1]Analyte datum is qualified as estimated.

TABLE 8

TENTATIVE DIOXIN/FURAN IDENTIFICATION

Sample ID	Analyte[1]	Concentration[2]
W-113090-PS-01	total TCDF	0.33 ng/*l* U[3]
W-113090-PS-02	total TCDF	0.36 ng/*l* U
W-113090-PS-04	total TCDD	5.5 ng/*l* U
	total TCDF	0.30 ng/*l* U
W-113090-PS-05	1,2,3,4,7,8,9-HpCDF	0.33 ng/*l*
	total TCDD	4.9 ng/*l* U
	total PeCDD	0.65 ng/*l*
	total TCDF	0.23 ng/*l* U
	total PeCDF	0.05 ng/*l*
W-112990-PS-07	total TCDD	6.5 ng/*l* U
	total TCDF	0.44 ng/*l* U
W-113090-PS-08	total TCDD	5.6 ng/*l* U
	total TCDF	0.36 ng/*l* U
	total PeCDF	0.12 ng/*l*
	total HxCDF	0.07 ng/*l*
W-112990-PS-14	total TCDD	6.3 ng/*l* U
	total TCDF	0.29 ng/*l* U
W-112890-PS-03	1,2,3,4,6,7,8-HpCDF	0.04 ng/*l*
	total TCDD	5.6 ng/*l* U
	total HxCDD	0.18 ng/*l*
	total TCDF	0.27 ng/*l* U
W-112890-PS-06	total TCDD	6.0 ng/*l* U
	total TCDF	0.37 ng/*l* U
S-112990-PS-12	total PeCDD	0.014 ng/*l*
S-112990-PS-13	1,2,3,6,7,8-HxCDD	0.002 ng/*l*
S-112890-PS-09	total TCDD	0.46 µg/kg U
	total TCDF	0.04 µg/kg U
S-112890-PS-10	total TCDD	0.53 µg/kg U
	total TCDF	0.05 µg/kg U
S-112890-PS-11	total TCDD	0.24 µg/kg U
	total TCDF	0.17 µg/kg U

[1] Analyte identification did not meet specified criteria; therefore, an exact identification is not possible.
[2] Assuming the instrument signal was due to the analyte, the value given is the concentration of the analyte.
[3] Result was qualified as non-detect based upon the method blank sample.

TABLE 9

ANALYTES DETECTED WITHIN RINSATE SAMPLES

Sample ID	Analysis	Analyte	Concentration	Associated Samples[1]
W-112990-PS-14	VOC	Bromodichloromethane	2.0 µg/l	
		Chloroform	7.0 µg/l	
	Dioxin/ Furan	OCDD	0.58 ng/l	
		total TCPD[2]	6.3 ng/l U[3]	
		total TCDF[2]	0.29 ng/l U	
W-112990-PS-07	VOC	Bromodichloromethane	2.0 µg/l	
		Chloroform	8.0 µg/l	W-113090-PS-08
	Dioxin/ Furan	OCDD	1.2 ng/l	
		total TCDD[2]	6.3 ng/l U	
		total TCDF[2]	0.2 ng/l U	

[1]Associated samples had analyte datum qualified as estimated (J).
[2]Confirmation of analyte was not possible.
[3]Analyte datum was qualified as non-detect.

TABLE 10

COMPARING SOIL FIELD DUPLICATE SAMPLE DATA

Analysis	Analyte	Concentration S-112890-PS-10	Concentration S-112890-PS-09	RPD[1]	Qualifier[2]
BN/A	Acenaphthylene	0.03 mg/kg J[3]	0.02 mg/kg J	-	NR
	Anthracene	0.01 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Benzo(b)fluoranthene	0.26 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Benzo(k)fluoranthene	0.30 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Benzo(a)pyrene	0.14 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Chrysene	0.08 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Dibenzofuran	0.02 mg/kg J	ND (<0.35 mg/kg)	-	NR
	Fluoranthene	0.07 mg/kg J	0.04 mg/kg J	-	NR
	Phenanthrene	0.02 mg/kg J	0.02 mg/kg J	-	NR
	Pyrene	0.09 mg/kg J	0.08 mg/kg J	-	NR
	Pentachlorophenol	0.28 mg/kg J	ND (<1.8 mg/kg)	-	NR
Dioxins/Furan	1,2,3,6,7,8-HxCDD	1.2 µg/kg	1.5 µg/kg	22	NR
	1,2,3,7,8,9-HxCDD	0.14 µg/kg	70.15 µg/kg	.0	NR
	1,2,3,4,6,7,8-HpCDD	38.2 µg/kg	72.3 µg/kg	62	J
	OCDD	684 µg/kg	852 µg/kg	22	NR
	1,2,3,4,7,8-HxCDF	0.16 µg/kg	0.17 µg/kg	6	NR
	1,2,3,6,7,8-HxCDF	0.06 µg/kg	0.04 µg/kg	40	NR
	2,3,4,6,7,8-HxCDF	0.03 µg/kg	0.04 µg/kg	28	NR
	1,2,3,4,6,7,8-HpCDF	13.6 µg/kg	16.1 µg/kg	16	NR
	1,2,3,4,7,8,9-HpCDF	0.50 µg/kg	0.60 µg/kg	18	NR
	OCDF	64.1 µg/kg	79.6 µg/kg	21	NR
	total TCDD	0.46 µg/kg U[4]	0.53 µg/kg U	-	NR
	total HxCPD	ND	0.15 µg/kg	-	
	total HpCDD	131 µg/kg	70.9 µg/kg	59	J
	total TCDF	0.04 µg/kg U	0.05 µg/kg U	-	J
	total PeCDF	0.08 µg/kg	70.45 µg/kg	24	J
	total HxCDF	11.2 µg/kg	10.1 µg/kg	10	NR
	total HpCDF	124 µg/kg	70.3 µg/kg	55	J

[1] RPD = relative percent difference
[2] Analyte data were qualified as:
J - the associated values are estimated quantities.
NR - no additional qualifiers were required.
[3] The associated value is an estimate.
[4] The associated datum is qualified as non-detect.

TABLE 11

COMPARING GROUNDWATER
FIELD DUPLICATE SAMPLE DATA

Analysis	Analyte	Concentration S-113090-PS-01	Concentration S-113090-PS-08	RPD[1]	Qualifier[2]
VOC	Benzene	2.0 µg/l J[3]	ND (<1 µg/l)	-	NR
	Chloroform	ND (<2.5 µg/l)	8.0 µg/l J	-	NR
	Ethylbenzene	62 µg/l	12 µg/l	135	J
	Xylenes	51 µg/l	8.0 µg/l	125	J
BTXE	Xylenes	19 µg/l	18 µg/l	0.5	NR
	Benzene	2 µg/l J	2 µg/l J	-	NR
	Ethylbenzene	73 µg/l	68 µg/l	7	NR
Dioxin/Furan	1,2,3,4,6,7,8-HpCDD	0.17 ng/l	0.37 ng/l J	74	
	OCDD	17.0 ng/l	26.7 ng/l	45	
	OCDF	0.06 ng/l	0.28 ng/l	129	J
	total TCDD	0.1 ng/l	5.6 ng/l U[4]	-	
	total PeCDD	0.23 ng/l	ND	-	
	total HxCDD	2.0 ng/l	3.2 ng/l	46	J
	total HpCDD	1.7 ng/l	3.1 ng/l	58	J
	total TCDF	0.33 ng/l U	0.36 ng/l U	-	
	total PeCDF	0.1 ng/l	0.12 ng/l U	-	
	total HxCDF	ND (<0.03 ng/l)	0.07 ng/l U	-	
	total HpCDF	0.05 ng/l	0.16 ng/l	105	

---

[1] RPD = relative percent difference
[2] Analyte data were qualified as:
J - the associated values are estimated quantities
NR - no additional qualifiers were required.
[3] The associated value is an estimate.
[4] The associated datum was qualified as non-detect.

Waterloo File Copy

MEMORANDUM

TO: Steve Quigley

REFERENCE NO. 3050

FROM: David Dempsey

DATE: May 1, 1991

RE: Data Quality Assessment and Validation for Ten Groundwater Samples Collected during the 1991 Round 2 Sampling Event at the Sun Bank Site

---

The following details a data quality assessment and validation for ten groundwater samples collected on February 20, 1991 at the Sun Bank site. Samples were analyzed for target compound list (TCL) volatile organic compounds (VOC), benzene-toluene-xylenes-ethylbenzene (BTXE), TCL base-neutral/acid extractable organic compounds (BN/A), TCL pesticides/polychlorinated biphenyls (PEST/PCB) by Wadsworth/ALERT Laboratories (Wadsworth). Samples were also analyzed for polychlorinated dibenzodioxins/dibenzofurans (dioxins/furans) by Triangle Laboratories. A summary of analytical methods is given in Table 1. Quality assurance/quality control criteria are defined in the associated quality assurance project plan (QAPP).[1]

Holding Time Periods

Holding time periods are defined in the QAPP and are given in Table 1. As the pH of samples W-022091-PS-002 through W-022091-PS-005, W-022091-PS-008 and W-022091-PS-009 was greater than two, the holding time periods for VOC and BTXE analyses were seven days. All VOC analyses were completed within the seven day time period. However, samples W-022091-PS-008 and W-022091-PS-009 had BTXE analyses completed eight days from sample collection. Therefore, these data are qualified as estimated (UJ).

For dioxins/furans analyses, the holding time period from method 1613 was used in place of the holding time period listed in the QAPP. Method 1613 is latest dioxins/furans method and , as such, contains the latest data regarding dioxins/furans stability in environmental matrices.

The remaining analyses were completed within holding time periods.

Method Blank Samples

Lab contamination of samples was checked for using method blanks samples. The dioxins/furans method blank sample contained OCDD at 0.2 ng/*l*. As a result, OCDD data from samples W-022091-PS-001, W0022091-PS-003, W-022091-PS-004, W-022091-PS-006, and W-022091-PS-007 were qualified as non-detect (U).

The remaining method blank samples were free of target analytes. Thus, no significant lab contamination was observed.

---

[1]Application of quality assurance/quality control criteria was consistent with "Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses", February 1, 1988 and "CLP Dioxin (2,3,7,8 TCDD) Data Review), Monitoring Management Branch SOP NO. HW-5, revision 4, June 1989.

Surrogate Compounds Percent Recoveries

Sample performance for VOC, BN/A and PEST/PCB analyses was judged on individual basis using surrogate compounds. Table 2 lists outlying surrogate compound recoveries. No data were qualified based upon these surrogate compounds' outlying recoveries.

For dioxins/furans analyses, recovery standards of $^{13}C_{12}$-1,2,3,4-TCDD and $^{13}C_{12}$-1,2,3,7,8,9-HxCDD are used to assess individual sample data. Percent recoveries are calculated against internal standards. As these recoveries are within limits set in QAPP, the dioxins/furans method was in control of all samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries

Matrix effects with respect to the data were checked for using MS/MSD analyses upon samples W-022091-PS-001 and W-022091-PS-004. Sample W-022091-PS-001 underwent MS/MSD analyses for VOC, BTXE, BN/A and PEST/PCB. Outlying MS/MSD recoveries are summarized in Table 3. Lindane and aldrin data for this sample are qualified as estimated (UJ) door to poor precision.

Sample W-022091-PS-004 underwent dioxins/furans MS/MSD analyses. The OCDD recoveries are listed in Table 3. Although one recovery is out of control limits, no action upon the OCDD datum was necessary. Thus, no significant matrix effects were observed.

Control Samples

Analytical accuracy for each method was measured using control samples. Percent recoveries are within specified limits; therefore, these methods were accurate during sample analyses.

Trip Blank Sample

A trip blank sample was shipped with the VOC vials to check for cross contamination. Only 1,2-dichloropropane was detected in this sample. As this analyte was not detected in investigative samples, no cross contamination was observed.

Rinsate Sample

Sample W-022091-PS-007 was collected as a rinsate sample. This sample was free of VOC, BTXE, BN/A and PEST/PCB. Thus, the bailers were properly cleaned with respect to these analytes.

However, Table 4 lists dioxins/furans detected in this sample. Samples listed in Table 4 had the associated dioxins/furans data qualified as estimated (J).

Field Duplicate Samples

Overall precision for this event was measured using duplicate samples W-022091-PS-001 and W-022091-PS-008. Based on reviewing these data, the overall precision for this round is acceptable.

Overall Assessment

Based on the data package, the data are accurate and precise. Exceptions have been discussed and documented. Qualified data may be used for qualitative assessment of analyte concentrations.

TABLE 1

SUMMARY OF ANALYTICAL METHODS AND HOLDING TIME PERIODS

Analysis	Method[1]	Holding Time Periods[2,3]
VOC/BXTE	8240/8020	14 days (pH<2) 7 days (pH>2)
BN/A	8270	7 days to extraction 40 days from extraction
PEST/PCB	8080	7 days to extraction 40 days from extraction
Dioxins/Furans	8280	365 days to extraction 40 days from extraction

1 Methods are from "Test Methods for Evaluating Solid Wastes", SW-846, third edition, September 1986.
2 Holding time periods are based from time of sample collection to completion of analysis.
3 Holding time period for dioxins/furans is from "Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS", method 1613, revision A, April 1990.

TABLE 2

OUTLYING BN/A AND PEST/PCB SURROGATE COMPOUND RECOVERIES

Sample ID	Analysis	Compound	%R[1]	Limits[2]
W-022091-PS-001	Pest/PCB	Dibutylchlordate Tetrachloro-*m*-xylene	Diluted[3] Diluted	18-129 33-122
W-022091-PS-005	BN/A	2-fluorophenol	11	17-95
W-022091-PS-006	BN/A	2-fluorophenol	12	17-95
W-022091-PS-007	BN/A	2-fluorophenol	12	17-95
W-022091-PS-008	BN/A	d_{14}-terphenyl 2-fluorophenol	145 15	10-132 17-95
W-022091-PS-010	BN/A Pest/PCB	d_5-nitrobenzene Tetrachloro-*m*-xylene	143 19 (20)[4]	22-135 33-122
IB2206BK[5]	BN/A	2-fluorophenol	15	17-95

[1] %R = percent recovery
[2] Limits are established in the QAPP
[3] Diluted = diluted beyond measuring
[4] Value in paranthesis is the recovery for the pesticide analysis.
[5] Sample is a method blank sample.

TABLE 3

OUTLYING MS/MSD RECOVERIES

Sample ID	Analysis	Analyte	Percent Recovery MS	Percent Recovery MSD	Limits[1]	Qualifier[2]
W-022091-PS-001	PEST/PCB	Lindane	81	015	56-123 (15)	UJ
		Aldrin	31	56	40-120 (22)	UJ
W-022091-PS-004	Dioxins/ Furans	OCDD	155	144	50-150 (50)	NR

[1] Limits are established in the QAPP.

[2] Analyte datum for the listed sample is qualified as:

UJ - The analyte was checked for, but not detected. The associated value is an estimate.

NR - no qualifiers are required.

TABLE 4

DIOXINS/FURANS DETECTED IN RINSATE SAMPLE W-022091-PS-007

Dioxins/Furans[1]	Concentration (ng/l)	Associated Samples[2]
1,2,3,4,6,7,8-HpCDD	0.16	W-022091-PS-001
OCDD	4.0 U[3]	
1,2,3,4,6,7,8-HpCDF	0.04	
OCDF	2.6	W-022091-PS-001; W-022091-PS-006
total HpCDD	0.32	
total HpCDF	0.23	W-022091-PS-001

1 Only analytes postively identifed as dioxin/furans are listed
2 Associated samples analyte datum qualified is as estimated (J).
3 The datum is qualified as non-detect.

ATTACHMENT TO Ref 6

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee
To _____ Location _____
To _____ Location _____
To _____ Location _____
From _____ Date _____

Interoffice Memorandum

TO: Saadi Motamedi, Southeast District Office

THROUGH: Jim Crane, Bureau of Waste Cleanup JJC

FROM: John Armstrong, Bureau of Waste Cleanup

DATE: October 4, 1991

SUBJECT: Sun Bank Properties, Fort Lauderdale, Broward County, CAR Review

---

I have reviewed the CAR prepared by Conestoga-Rovers & Associates for the Sun Bank property and have the following comments.

This property came to the attention of the Department in February 1989 when during removal of four old underground storage tanks some product was spilled. The tanks were apparently left from an old lumber operation. The tanks contained pentachlorophenol (PCP) and mineral spirits used in a wood preservative process. The spilled product was quickly removed but groundwater sampling detected the presence of benzene, ethylbenzene, pentachlorophenol, styrene, toluene and xylene.

Subsequent sampling for the CAR detected contaminants related to the tank spill in wells closest to the old tank area, with the highest concentrations being in the deep, (20 foot), well below the old tank area. The fact that the deeper well, MW-1A is more contaminated than the shallow well MW-2 suggests that the vertical distribution of contamination at this site has not been fully defined. At least one new well screened below MW-1A is needed. Additional information on the deeper site geology should also be collected during drilling of this well.

Additional testing for the CAR detected a number of dioxin/dibenzofuran isomers. The distribution of these compounds does not seem related to the location of the tanks. The CAR should be revised to provide information concerning the origin of these compounds. A discussion of the concentration levels can be found in the attached memo of July 24th, prepared by Ligia Mora-Applegate.

In conclusion I recommend the installation of at least one new deep monitoring well near MW-1A and quarterly monitoring for at least one year for the parameters of concern, including PCP and styrene. A discussion of the possible origins of the dioxin compounds should also be provided. A monitoring plan should be proposed by the responsible party for Department approval.

/sr

Attachment

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee
To _____ Location _____
To _____ Location _____
To _____ Location _____
From _____ Date _____

Interoffice Memorandum

TO: Saadi Motamedi, South Florida District Office

THROUGH: Jim Crane, Bureau of Waste Cleanup for JC

FROM: Ligia Mora-Applegate, Bureau of Waste Cleanup

DATE: July 24, 1991

SUBJECT: Sunbank--West Broward Boulevard Branch, Analytical Data for Groundwater and Soils

---

Dr. Christopher Teaf and I have reviewed the subject document prepared for this site by Conestoga Rovers Associates (CRA). I am including Dr. Teaf's comments for your information.

I recommend that quarterly monitoring be conducted for a year at this site for all the parameters of concern including PCP and mineral spirits. If the contaminant concentrations do not decrease below the toxicity equivalent concentrations for any dioxin or dibenzofurans and/or criteria for all other contaminants after the duration of the monitoring period, then supplemental contamination assessment and/or remediation may be required.

A monitoring plan should be proposed by the responsible party for your evaluation and approval.

/sr

The Florida State University
Tallahassee, Florida 32306-4016

Institute of Science and Public Affairs
361 Bellamy Building

July 22, 1991

Ms. Ligia Mora-Applegate
Contract Manager - FDER Contract WM-331
Florida Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Ligia:

As you requested, I have reviewed the brief summary materials you sent regarding the Sun Bank site in Ft. Lauderdale. At some point it may be useful to check several of the items presented in Table 6 and Table 7 regarding the units for the dioxins. One area of concern is that MW-5, off-site, exhibits the greatest concentrations for several of the analytes. This raises a question regarding whether site characterization is complete.

The detected values for dioxins and furans in groundwater and soils are low in comparison with health-based guidance concentrations. Although the documentation provided in the package was limited, it is assumed that there are not drinking water uses of groundwater nearby and that the site development activities (e.g., paving and construction) will make such uses even less likely in the future. This interpretation coupled with the low concentrations supports the suggestion that "no-further-action" is appropriate at this site. It is worth noting that the MCL value provided for TCDD is a proposed value and may or may not be ultimately adopted. Thus, the limited exceedances of this proposed value appear to be of limited concern at this point. Exceedances of Florida Groundwater Guidance Concentrations for other analytes likewise appear to be of limited concern at this site. In several cases these are exceedances of secondary, rather than primary standards.

Please call me when you have had an opportunity to review these conclusions so that we can finalize the comments.

Regards,

Chris

Christopher M. Teaf, Ph.D.
Associate Director

CMT/lk

CONTAMINATION ASSESSMENT REPORT
VOLUME II

Sun Bank Property
Fort Lauderdale, Florida

AUGUST 1991
Reference No. 3050 (8)

CONESTOGA-ROVERS & ASSOCIATES

CHAIN-OF-CUSTODY RECORDS,INTEGRATION CURVES,
LABORATORY CALIBRATION DATA AND LABORATORY
QA/QC ANALYTICAL RESULTS ARE
AVAILABLE UPON REQUEST

WADSWORTH/ALERT
LABORATORIES, INC.

INVOLVEMENT

This report summarizes the analytical results of the Sun Bank site submitted by Conestoga-Rovers & Associates, Inc. to Wadsworth/ALERT Laboratories, Inc. who provided independent, analytical services for this project under the direction of David Dempsey. The samples were accepted into Wadsworth's Florida facility on 22 February 1991, in accordance with documented sample acceptance procedures. The associated analytical methods and sample results are outlined sequentially in this report.

Analytical results included in this report have been reviewed for compliance with the Laboratory QA/QC Plan as summarized in the Quality Control Section at the rear of the report. Sample custody documentation describing the number of samples and sample matrices is also included. Any qualifications and/or non-compliant items have been noted below.

Laboratory ID #	Narrative
1B2206-4,5,8,4MS,4MSD	These samples were analyzed outside of the EPA recommended holding time for the BTEX analysis of samples not preserved to a pH of less than 2.
1B2206-1 to 10	Severe matrix interferences, which necessitated dilution, resulted in elevated detection limits and inadequate matrix spike/spike duplicate accuracy and precision data for certain pesticide compounds. This effect was confirmed by re-analysis of the samples. Laboratory blank and control sample data indicate adequate method performance. Results should be interpreted accordingly.
1B2206-1,8,9,10	The matrix effects also interfered with the PCB analysis resulting in elevated detection limits of these samples. The surrogate associated with sample number 10 was outside of established laboratory control limits. However, there was insufficient sample to initiate corrective action and the pesticide surrogate for the same extraction was in control. All other QC paraameters indicated acceptable method performance.

WADSWORTH/ALERT
LABORATORIES, INC.

ANALYTICAL METHODS

Wadsworth/ALERT Laboratories utilizes only USEPA approved analytical methods and instrumentation. The analytical methods utilized for the analysis of these samples are listed below.

PARAMETER	METHOD
ORGANICS	
Volatile Organics	** SW846 Method 8020
Extraction	** SW846 Method 5030
Volatile Organics	** SW846 Method 8240
Extraction	** SW846 Method 5030
Base/Neutral Acid Extractables	** SW846 Method 8270
Extraction	** SW846 Method 3520
Pesticides/PCB's	** SW846 Method 8080
Extraction	** SW846 Method 3520

NOTE: ** Indicates usage of this method to obtain results for this report.

EPA Methods -Methods for Chemical Analysis of Water and Wastes, USEPA, 600/4-79-020, March, 1983. July, 1982.

Std. Methods -Standard Methods for the Examination of Water and Wastewater, APHA, 16th edition, 1985.

USEPA Methods -From 40CFR Part 136, published in Federal Register on October 26, 1984.

SW846 Methods -Test Methods for Evaluating Solid Waste Physical/Chemical Methods, 3rd Edition, USEPA, 1986.

ASTM Methods -American Society for Testing and Materials.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/22/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	3	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	51 J
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	4
1,2-Dichloroethene (Total)	1		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	117	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	100	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/22/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Methylethyl benzene	22	ug/L
Propyl benzene	71	ug/L
Methylpropyl benzene	8.8	ug/L
Diethyl benzene isomer	11	ug/L
Substituted benzene	21	ug/L
Methyl-methylethyl benzene isomer	11	ug/L
Methyl-methylethyl benzene isomer	22	ug/L
Tetramethyl benzene	8.3	ug/L
Diethyl benzene isomer	13	ug/L
Naphthalene	38	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	2	1
Benzene	3	1
Toluene	ND	1
Ethylbenzene	51 J	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	98
Trifluorotoluene	(73-131)	(70-123)	100

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	85
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	102	(22-135)	(10-155)
Fluorobiphenyl	98	(34-140)	(12-153)
Terphenyl-d14	78	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	22	(17-95)	(24-118)
Phenol-d5	12	(11-89)	(17-124)
2,4,6-Tribromophenol	44	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	10	ug/L
Diethyl benzene	6.0	ug/L
Tetramethyl benzene	14	ug/L
Tetramethyl benzene	20	ug/L
Unknown ketone	42	ug/L
Unknown	63	ug/L
Unknown	16	ug/L
Unknown	38	ug/L
Unknown	26	ug/L
Unknown aromatic	11	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/12/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	0.2
Beta-BHC	ND	0.2
Delta-BHC	ND	0.2
Lindane	ND	0.2
Heptachlor	ND	0.2
Aldrin	ND	0.2
Heptachlor Epoxide	ND	0.2
Endosulfan I	ND	0.2
Dieldrin	ND	0.2
4,4'-DDE	ND	0.2
Endrin	ND	0.2
Endosulfan II	ND	0.2
4,4'-DDD	ND	0.2
Endosulfan Sulfate	ND	0.2
4,4'-DDT	ND	0.2
Methoxychlor	ND	0.5
Endrin-Ketone	ND	2.0
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	9.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	DIL	(33-122)	(32-154)
Dibutylchlorendate	DIL	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-1
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/12/91

SAMPLE ID: W-022091-PS-001 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 2 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	49	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/22/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	103	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	101	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/22/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Dimethylethyl benzene	2.2	ug/L
Methyl propyl benzene	2.3	ug/L
Diethyl benzene isomer	3.4	ug/L
Unknown	8.2	ug/L
Diethyl benzene isomer	2.3	ug/L
Methyl-methylethyl benzene isomer	5.8	ug/L
Unknown	2.5	ug/L
Tetramethyl benzene	2.2	ug/L
Naphthalene	3.4	ug/L
Methyl-methylethyl benzene isomer	2.3	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	102
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	11
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	97	(22-135)	(10-155)
Fluorobiphenyl	102	(34-140)	(12-153)
Terphenyl-d14	76	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	22	(17-95)	(24-118)
Phenol-d5	65	(11-89)	(17-124)
2,4,6-Tribromophenol	66	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-2
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 7/91

SAMPLE ID: W-022091-PS-002 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = .50 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	73	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	100	(75-123)	(85-126)	(85-138)
Toluene-d8	103	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	99	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	95
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	108	(22-135)	(10-155)
Fluorobiphenyl	110	(34-140)	(12-153)
Terphenyl-d14	75	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	21	(17-95)	(24-118)
Phenol-d5	63	(11-89)	(17-124)
2,4,6-Tribromophenol	36	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Chlorobenzofuran	5.0	ug/L
Unknown ketone	140	ug/L

WADSWORTH/ALPHA
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 2/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.02
Beta-BHC	ND	.02
Delta-BHC	ND	.02
Lindane	ND	.02
Heptachlor	ND	.02
Aldrin	ND	.02
Heptachlor Epoxide	ND	.02
Endosulfan I	ND	.02
Dieldrin	ND	.02
4,4'-DDE	ND	.02
Endrin	ND	.02
Endosulfan II	ND	.02
4,4'-DDD	ND	.02
Endosulfan Sulfate	ND	.02
4,4'-DDT	ND	.02
Methoxychlor	ND	.04
Endrin-Ketone	ND	0.2
Alpha-Chlordane	ND	0.1
Gamma-Chlordane	ND	0.1
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	48	(33-122)	(32-154)
Dibutylchlorendate	23	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-3
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 7/91

SAMPLE ID: W-022091-PS-003 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 0.5 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	59	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 2/22/91
LAB #: 1B2206-4 **DATE EXTRACTED:** NA
MATRIX: WATER **DATE ANALYZED:** 2/23/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	100	(75-123)	(85-126)	(85-138)
Toluene-d8	101	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	100	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	112
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
- ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
- ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
- J (Detected, but below quantitation limit; estimated value)
- B (Compound detected in method blank associated with this sample)
- -- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 2/22/91
LAB #: 1B2206-4 **DATE EXTRACTED:** 2/22/91
MATRIX: WATER **DATE ANALYZED:** 2/27/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	99	(22-135)	(10-155)
Fluorobiphenyl	111	(34-140)	(12-153)
Terphenyl-d14	74	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	63	(17-95)	(24-118)
Phenol-d5	16	(11-89)	(17-124)
2,4,6-Tribromophenol	64	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	3.0 ug/L
Unknown ketone	59 ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 2/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.02
Beta-BHC	ND	.02
Delta-BHC	ND	.02
Lindane	ND	.02
Heptachlor	ND	.02
Aldrin	ND	.02
Heptachlor Epoxide	ND	.02
Endosulfan I	ND	.02
Dieldrin	ND	.02
4,4'-DDE	ND	.02
Endrin	ND	.02
Endosulfan II	ND	.02
4,4'-DDD	ND	.02
Endosulfan Sulfate	ND	.02
4,4'-DDT	ND	.02
Methoxychlor	ND	.04
Endrin-Ketone	ND	0.2
Alpha-Chlordane	ND	0.1
Gamma-Chlordane	ND	0.1
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	66	(33-122)	(32-154)
Dibutylchlorendate	37	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-4
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 7/91

SAMPLE ID: W-022091-PS-004 SUN BANK

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221.	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 0.5 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	45	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	97	(75-123)	(85-126)	(85-138)
Toluene-d8	101	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	100	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	106
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 2/22/91
LAB #: 1B2206-5 **DATE EXTRACTED:** 2/22/91
MATRIX: WATER **DATE ANALYZED:** 2/28/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	77	(22-135)	(10-155)
Fluorobiphenyl	93	(34-140)	(12-153)
Terphenyl-d14	69	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	11	(17-95)	(24-118)
Phenol-d5	47	(11-89)	(17-124)
2,4,6-Tribromophenol	71	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	19 J	ug/L
1-Octanol	9.0 J	ug/L
Unknown	140 J	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/11/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - 3C

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.06
Beta-BHC	ND	.06
Delta-BHC	ND	.06
Lindane	ND	.06
Heptachlor	ND	.06
Aldrin	ND	.06
Heptachlor Epoxide	ND	.06
Endosulfan I	ND	.06
Dieldrin	ND	.06
4,4'-DDE	ND	.06
Endrin	ND	.06
Endosulfan II	ND	.06
4,4'-DDD	ND	.06
Endosulfan Sulfate	ND	.06
4,4'-DDT	ND	.06
Methoxychlor	ND	.12
Endrin-Ketone	ND	0.6
Alpha-Chlordane	ND	.25
Gamma-Chlordane	ND	.25
Toxaphene	ND	2.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	47	(33-122)	(32-154)
Dibutylchlorendate	63	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-5
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 7/91

SAMPLE ID: W-022091-PS-005 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = .50 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	59	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	104	(75-123)	(85-126)	(85-138)
Toluene-d8	99	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	99	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	102
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	90	(22-135)	(10-155)
Fluorobiphenyl	103	(34-140)	(12-153)
Terphenyl-d14	66	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	12	(17-95)	(24-118)
Phenol-d5	47	(11-89)	(17-124)
2,4,6-Tribromophenol	48	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	140	ug/L
Unknown aromatic	8.0	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 2/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.02
Beta-BHC	ND	.02
Delta-BHC	ND	.02
Lindane	ND	.02
Heptachlor	ND	.02
Aldrin	ND	.02
Heptachlor Epoxide	ND	.02
Endosulfan I	ND	.02
Dieldrin	ND	.02
4,4'-DDE	ND	.02
Endrin	ND	.02
Endosulfan II	ND	.02
4,4'-DDD	ND	.02
Endosulfan Sulfate	ND	.02
4,4'-DDT	ND	.02
Methoxychlor	ND	.04
Endrin-Ketone	ND	0.2
Alpha-Chlordane	ND	0.1
Gamma-Chlordane	ND	0.1
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	36	(33-122)	(32-154)
Dibutylchlorendate	22	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-6
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/12/91

SAMPLE ID: W-022091-PS-006 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 0.5 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	49	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	97	(75-123)	(85-126)	(85-138)
Toluene-d8	102	(92-107)	(89-124)	(89-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	105
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	105	(22-135)	(10-155)
Fluorobiphenyl	108	(34-140)	(12-153)
Terphenyl-d14	71	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	12	(17-95)	(24-118)
Phenol-d5	51	(11-89)	(17-124)
2,4,6-Tribromophenol	48	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 2/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.02
Beta-BHC	ND	.02
Delta-BHC	ND	.02
Lindane	ND	.02
Heptachlor	ND	.02
Aldrin	ND	.02
Heptachlor Epoxide	ND	.02
Endosulfan I	ND	.02
Dieldrin	ND	.02
4,4'-DDE	ND	.02
Endrin	ND	.02
Endosulfan II	ND	.02
4,4'-DDD	ND	.02
Endosulfan Sulfate	ND	.02
4,4'-DDT	ND	.02
Methoxychlor	ND	.04
Endrin-Ketone	ND	0.2
Alpha-Chlordane	ND	0.1
Gamma-Chlordane	ND	0.1
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	66	(33-122)	(32-154)
Dibutylchlorendate	76	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-7
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 7/91

SAMPLE ID: W-022091-PS-007 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = .50 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	57	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	98	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Methylethyl benzene	1.9	ug/L
Propyl benzene	9.9	ug/L
Dimethylethyl benzene isomer	1.7	ug/L
Methylpropyl benzene isomer	1.3	ug/L
Diethyl benzene isomer	2.3	ug/L
Unknown	4.2	ug/L
Methyl-methylethyl benzene isomer	1.4	ug/L
Methyl-methylethyl benzene isomer	4.1	ug/L
Tetramethyl benzene	1.4	ug/L
Naphthalene	1.0	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	100
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	11
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	103	(22-135)	(10-155)
Fluorobiphenyl	113	(34-140)	(12-153)
Terphenyl-d14	145	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	15	(17-95)	(24-118)
Phenol-d5	63	(11-89)	(17-124)
2,4,6-Tribromophenol	73	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/28/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown ketone	2	ug/L
Unknown	56	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/11/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.06
Beta-BHC	ND	.06
Delta-BHC	ND	.06
Lindane	ND	.06
Heptachlor	ND	.06
Aldrin	ND	.06
Heptachlor Epoxide	ND	.06
Endosulfan I	ND	.06
Dieldrin	ND	.06
4,4'-DDE	ND	.06
Endrin	ND	.06
Endosulfan II	ND	.06
4,4'-DDD	ND	.06
Endosulfan Sulfate	ND	.06
4,4'-DDT	ND	.06
Methoxychlor	ND	.12
Endrin-Ketone	ND	0.6
Alpha-Chlordane	ND	.25
Gamma-Chlordane	ND	.25
Toxaphene	ND	2.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	155	(33-122)	(32-154)
Dibutylchlorendate	31	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-8
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/13/91

SAMPLE ID: W-022091-PS-008 SUN BANK

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 2 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	109	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/23/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	0.4 J
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	0.8 J
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	95	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	101
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	113	(22-135)	(10-155)
Fluorobiphenyl	121	(34-140)	(12-153)
Terphenyl-d14	53	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	15	(17-95)	(24-118)
Phenol-d5	65	(11-89)	(17-124)
2,4,6-Tribromophenol	67	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/11/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.08
Beta-BHC	ND	.08
Delta-BHC	ND	.08
Lindane	ND	.08
Heptachlor	ND	.08
Aldrin	ND	.08
Heptachlor Epoxide	ND	.08
Endosulfan I	ND	.08
Dieldrin	ND	.08
4,4'-DDE	ND	.08
Endrin	ND	.08
Endosulfan II	ND	.08
4,4'-DDD	ND	.08
Endosulfan Sulfate	ND	.08
4,4'-DDT	ND	.08
Methoxychlor	ND	.15
Endrin-Ketone	ND	0.8
Alpha-Chlordane	ND	0.3
Gamma-Chlordane	ND	0.3
Toxaphene	ND	3.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	89	(33-122)	(32-154)
Dibutylchlorendate	41	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-9
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 8/91

SAMPLE ID: 009 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .30 ug/L) as rec'd
ND* (None Detected, lower detectable limit = .60 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	74	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	100,000	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	460
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 250 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 2,500 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	103	(75-123)	(85-126)	(85-138)
Toluene-d8	107	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	101	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	105
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	143	(22-135)	(10-155)
Fluorobiphenyl	119	(34-140)	(12-153)
Terphenyl-d14	65	(10-132)	(13-140)

WADSWORTH/ALPHA
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	28	(17-95)	(24-118)
Phenol-d5	137	(11-89)	(17-124)
2,4,6-Tribromophenol	26	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 3/ 1/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	20	ug/L
2-Ethyl 1-hexanol	7.0	ug/L
Ethyl benzenamine	21	ug/L
Unknown	10	ug/L
Unknown	37	ug/L

WADSWORTH/ALEPH
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.03
Beta-BHC	ND	.03
Delta-BHC	ND	.03
Lindane	ND	.03
Heptachlor	ND	.03
Aldrin	ND	.03
Heptachlor Epoxide	ND	.03
Endosulfan I	ND	.03
Dieldrin	ND	.03
4,4'-DDE	ND	.03
Endrin	ND	.03
Endosulfan II	ND	.03
4,4'-DDD	ND	.03
Endosulfan Sulfate	ND	.03
4,4'-DDT	ND	.03
Methoxychlor	ND	.06
Endrin-Ketone	ND	0.3
Alpha-Chlordane	ND	.25
Gamma-Chlordane	ND	.25
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	20	(33-122)	(32-154)
Dibutylchlorendate	28	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-10
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 8/91

SAMPLE ID: 010 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .35 ug/L) as rec'd
ND* (None Detected, lower detectable limit = .70 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	19	(33-122)	(32-154)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 2/22/91
LAB #: 1B2206-11 **DATE EXTRACTED:** NA
MATRIX: WATER **DATE ANALYZED:** 2/25/91

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059

VOLATILE ORGANICS HRS82497
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	0.5 J		

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	104	(75-123)	(85-126)	(85-138)
Toluene-d8	106	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	106	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-11
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 3/ 1/91

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	101
Trifluorotoluene	(73-131)	(70-123)	98

QUALITY CONTROL SECTION

- Quality Control Summary
- Laboratory Blanks
- Laboratory Control Sample
- Matrix Spike/Matrix Spike Duplicate Results
- Sample Custody Documentation

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY ASSURANCE / QUALITY CONTROL PROGRAM SUMMARY

Wadsworth/ALERT Laboratories considers continuous analytical method performance evaluations to be an integral portion of the data package, and routinely includes the pertinent QA/QC data associated with various analytical result reports. Brief discussions of the various QA/QC procedures utilized to measure acceptable method and matrix performance follow.

Surrogate Spike Recovery Evaluations

Known concentrations of designated surrogate spikes, consisting of a number of similar, non-method compounds or method compound analogues, are added, as appropriate, to routine GC and GC/MS sample fractions prior to extraction and analysis. The percent recovery determinations calculated from the subsequent analysis is an indication of the overall method efficiency for the individual sample. This surrogate spike recovery data is displayed alongside acceptable analytical method performance limits at the bottom of each applicable analytical result report sheet.

NOTE: Acceptable method performance for Base/Neutral Acid extractables is indicated by two (2) of three (3) surrogates for each fraction with a minimum recovery of ten (10) percent each. For Pesticides one (1) of two (2) surrogates meeting performance criteria is acceptable.

Laboratory Analytical Method Blank Evaluations

Laboratory analytical method blanks are systematically prepared and analyzed in order to continuously evaluate the system interferences and background contamination levels associated with each analytical method. These method blanks include all aspects of actual laboratory method analysis (chemical reagents, glassware, etc.), substituting laboratory reagent water or solid for actual sample. The method blank must not contain any analytes above the reported detection limit. The following common laboratory contaminants are exceptions to this rule provided they are not present at greater than five times the detection limit.

Volatiles	Semi-volatiles	Metals
Methylene chloride	Dimethyl phthalate	Calcium
Toluene	Diethly phthalate	Magnesium
2-Butanone	Di-n-butyl phthalate	Sodium
Acetone	Butyl benzyl phthalate	
	Bis (2-ethylhexyl) phthalate	

A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method blanks.

Laboratory Analytical Method Check Sample Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to a laboratory reagent blank prior to extraction and analysis. Percent recovery determinations demonstrate the performance of the analytical method. Failure of a check sample to meet established laboratory recovery criteria is cause to stop the analysis until the problem is resolved.

At that time all associated samples must be re-analyzed. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method check samples.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Recovery Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to two of three separate aliquots of a sequentially predetermined sample prior to extraction and analysis. Percent recovery determinations are calculated from both of the spiked samples by comparison to the actual values generated from the unspiked sample. These percent recovery determinations indicate the accuracy of the analysis at recovering actual analytical method compounds from the matrix. Relative percent difference determinations calculated from a comparison of the MS/MSD recoveries demonstrate the precision of the analytical method. Actual percent recovery and relative percent difference data is displayed alongside their respective acceptable analytical method performance limits in the QA/QC section of the report. The MS/MSD are considered in control when the precision is within established control limits and the associated check sample has been found to be acceptable. A minimum of ten percent (10%) of all analyses are MS/MSD quality control samples.

**********EXAMPLE**********

COMPOUND	SAMPLE CONC.	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
4,4'-DDT	0	95	112	16	22	66-119
Benzene	10	86	93	8	20	39-150

(cmpd. name)	sample result	1st% recov.	2nd% recov.	Rel.% diff.	accep. method perform range

Analytical Result Qualifiers

The following qualifiers, as defined below, may be appended to analytical results in order to allow proper interpretation of the results presented:

J - indicates an estimated concentration (typically used when a dilution, matrix interference or instrumental limitation prevents accurate quantitation of a particular analyte).

B - indicates the presence of a particular analyte in the laboratory blank analyzed concurrently with the samples. Results must be interpreted accordingly.

DIL - indicates that because of matrix interferences and/or high analyte concentrations, it was necessary to dilute the sample to a point where the surrogate or spike concentrations fell below a quantifiable amount and could not be reported.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/22/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	117	(75-123)	(85-126)	(85-138)
Toluene-d8	102	(92-107)	(89-124)	(89-128)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

WADSWORTH/ALPHA
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	112	(75-123)	(85-126)	(85-138)
Toluene-d8	102	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	110	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/25/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	106
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 2/28/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	101
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: NA
DATE ANALYZED: 3/ 1/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	112
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 2/22/91
LAB #: 1B2206-BK **DATE EXTRACTED:** 2/22/91
MATRIX: WATER **DATE ANALYZED:** 2/27/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	116	(22-135)	(10-155)
Fluorobiphenyl	109	(34-140)	(12-153)
Terphenyl-d14	89	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/22/91
DATE ANALYZED: 2/27/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
2-Fluorophenol	15	(17-95)	(24-118)
Phenol-d5	32	(11-89)	(17-124)
2,4,6-Tribromophenol	53	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Nitrobenzene-d5	170	(22-135)	(10-155)
Fluorobiphenyl	112	(34-140)	(12-153)
Terphenyl-d14	67	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 2/28/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	75	(17-95)	(24-118)
Phenol-d5	18	(11-89)	(17-124)
2,4,6-Tribromophenol	43	(10-134)	(10-156)

WADSWORTH/ALBERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 4/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.01
Beta-BHC	ND	.01
Delta-BHC	ND	.01
Lindane	ND	.01
Heptachlor	ND	.01
Aldrin	ND	.01
Heptachlor Epoxide	ND	.01
Endosulfan I	ND	.01
Dieldrin	ND	.01
4,4'-DDE	ND	.01
Endrin	ND	.01
Endosulfan II	ND	.01
4,4'-DDD	ND	.01
Endosulfan Sulfate	ND	.01
4,4'-DDT	ND	.01
Methoxychlor	ND	.02
Endrin-Ketone	ND	0.1
Alpha-Chlordane	ND	.05
Gamma-Chlordane	ND	.05
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	93	(33-122)	(32-154)
Dibutylchlorendate	84	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 1B2206-BK
MATRIX: WATER

DATE RECEIVED: 2/22/91
DATE EXTRACTED: 2/25/91
DATE ANALYZED: 3/ 4/91

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = .25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 0.5 ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	93	(33-122)	(32-154)

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)
03/16/91

FILE NAME....: E002672	CLIENT ID....: WADSWORTH	TLI NUMBER....: 4-37-2A	
CONCAL.....: E002669	SAMPLE ID....: 1B2206-2		
ANALYST.....: XL	ANALYSIS DATE: 03/11/91	PROJECT NUMBER: 263-W	
SAMPLE SIZE..: 970.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 02/26/91	
CAL DATE....: 03/08/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 02/20/91	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL 3247	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.1				
12378-PeCDD	ND		0.3				
123478-HxCDD	ND		0.1				
123678-HxCDD	3.7				1.32	30:10	L
123789-HxCDD	0.21				1.30	30:45	L
1234678-HpCDD	126				1.05	36:15	
OCDD	1810				0.89	42:17	BL,H
2378-TCDF	ND		0.09				
12378-PeCDF	ND		0.1				
23478-PeCDF	ND		0.1				
123478-HxCDF	EMPC			0.21			
123678-HxCDF	0.11				1.14	28:44	L
234678-HxCDF	0.13				1.18	29:36	L
123789-HxCDF	ND		0.1				
1234678-HpCDF	40.2				1.08	34:15	
1234789-HpCDF	EMPC			0.91			
OCDF	165				0.87	42:26	
TOTAL TCDD	EMPC			4.6			
TOTAL PeCDD	EMPC			1.5			
TOTAL HxCDD	13.5	4		13.7	1.29		
TOTAL HpCDD	216	2			1.05		
TOTAL TCDF	EMPC			0.19			
TOTAL PeCDF	0.85	1			1.71		
TOTAL HxCDF	35.3	5		36.1	1.24		
TOTAL HpCDF	205	2		205	1.07		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	24.8	48.1	0.79	18:21	
13C12-2378-TCDD	24.8	48.1	0.79	19:03	
13C12-HxCDD 678	45.2	87.6	1.28	30:08	
13C12-HpCDF 678	62.6	60.7	1.06	34:14	
13C12-OCDD	97.1	94.2	0.93	42:16	

SURROGATE STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	15.5	60.3		19:03	

% RECOVERY LIMITS: 40 - 120%.
FLAGS: BL = FOUND IN BLANK AT CONCENTRATION < 2%.
H = CONCENTRATION ABOVE CALIBRATION RANGE.
L = CONCENTRATION BELOW CALIBRATION RANGE.

8280_RPT rev:3.02

Listing of E002672B.dbf

Matched GC Peaks / Ratio / Ret. Time

M_Z	Omit	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	Who/ Why
304		2.47	18:53	32.16	F	F	1.029	
304		*** Total ***		32.16	# of Peaks:		1	
316		0.79	18:21	3222.37	T	T	1.000	
316		*** Total ***		3222.37	# of Peaks:		1	
320		5.32	18:21	875.49	F	F	0.963	
320		*** Total ***		875.49	# of Peaks:		1	
328		0.00	19:03	1523.56	T	T	1.000	
328		*** Total ***		1523.56	# of Peaks:		1	
332		0.79	18:52	3555.41	T	T	0.990	
		0.79	19:03	2169.49	T	T	1.000	
332		*** Total ***		5724.90	# of Peaks:		2	
340	DC	14.60	20:07	139.16	F	F	1.096	SP 31391 O/W
		1.71	20:25	38.30	T	F	1.113	
340		*** Total ***		177.46	# of Peaks:		2	
356		2.09	21:56	44.97	F	F	1.151	
356		*** Total ***		44.97	# of Peaks:		1	
374		1.33	26:50	25.38	T	F	0.784	
		1.32	27:04	290.18	T	F	0.791	
		10.50	27:17	161.87	F	F	0.797	
		1.25	27:52	2544.02	T	F	0.814	
		1.59	28:34	18.77	F	T	0.834	
	D	1.42	34:16	184.69	T	F	1.001	SP 31391 O/W
		1.26	35:01	653.14	T	F	1.023	
374		*** Total ***		3878.05	# of Peaks:		7	
390		1.25	27:45	423.45	T	F	0.921	
		1.98	28:34	21.14	F	F	0.948	
		1.28	29:00	186.31	T	F	0.962	
		1.32	30:10	245.01	T	T	1.001	
		6.09	34:15	58.05	F	F	1.137	
	D	1.32	34:52	235.91	T	F	1.157	SP 31391 O/W
		1.29	36:16	408.30	T	F	1.204	
390		*** Total ***		1578.17	# of Peaks:		7	
402		1.28	30:08	2713.83	T	T	1.000	
		1.26	30:43	3231.54	T	T	1.019	
402		*** Total ***		5945.37	# of Peaks:		2	
408		1.08	34:15	2731.61	T	T	1.000	
		5.48	34:25	156.26	F	F	1.005	
		1.06	35:01	9593.59	T	F	1.023	
		1.25	36:59	53.26	F	T	1.080	
408		*** Total ***		12534.72	# of Peaks:		4	
420		1.06	34:14	4880.69	T	T	1.000.	
420		*** Total ***		4880.69	# of Peaks:		1	

Triangle [illegible]oratories of Houston, Inc.
PCDD../.CDF 8280 ANALYSIS (b)
03/15/91

[illegible]LE NAME....: E002674	CLIENT ID....: WADSWORTH	TLI NUMBER....: 4-37-4A	
[illegible]NCAL.....: E002669	SAMPLE ID....: 1B2206-4		
[illegible]NALYST.....: XL	ANALYSIS DATE: 03/11/91	PROJECT NUMBER: 263-W	
SAMPLE SIZE..: 500.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 02/26/91	
[illegible]AL DATE....: 03/08/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 02/20/91	
[illegible]IKE FILE...: SP82805W		SHIPMENT NO...: FL 3247	

[illegible]ME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.09				___
[illegible]378-PeCDD	ND		0.2				___
[illegible]3478-HxCDD	ND		0.09				___
[illegible]23678-HxCDD	EMPC			0.38			___
123789-HxCDD	ND		0.09				___
[illegible]34678-HpCDD	16.8				1.06	36:14	_L_
[illegible]DD	319				0.89	42:13	_BL
[illegible]78-TCDF	ND		0.06				___
[illegible]378-PeCDF	ND		0.10				___
23478-PeCDF	ND		0.10				___
[illegible]3478-HxCDF	ND		0.07				___
[illegible]3678-HxCDF	ND		0.06				___
[illegible]34678-HxCDF	ND		0.06				___
123789-HxCDF	ND		0.08				___
[illegible]34678-HpCDF	6.1				1.07	34:12	_L_
[illegible]34789-HpCDF	ND		0.1				___
[illegible]CDF	26.3				0.95	42:22	_L_
[illegible]TAL TCDD	EMPC			12.36			___
[illegible]OTAL PeCDD	ND		0.2				___
[illegible]TAL HxCDD	0.15	1		0.76	1.38		___
[illegible]TAL HpCDD	29.3	2			1.06		___
[illegible]OTAL TCDF	EMPC			0.40			___
[illegible]TAL PeCDF	ND		0.10				___
[illegible]TAL HxCDF	4.4	3			1.24		___
[illegible]OTAL HpCDF	26.9	2		27.29	1.06		___

[illegible]TERNAL STANDARDS RECOVERY SUMMARY

[illegible]AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
[illegible]C12-2378-TCDF	73.2	73.2	0.81	18:19	___
13C12-2378-TCDD	71.9	71.9	0.81	19:01	___
[illegible]12-HxCDD 678	102	102	1.29	30:06	___
[illegible]12-HpCDF 678	148	74.0	1.08	34:12	___
13C12-OCDD	178	89.0	0.91	42:11	___

[illegible]ROGATE STANDARDS RECOVERY SUMMARY

[illegible]AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
[illegible]C1-TCDD	36.6	73.3		19:01	___

[illegible]RECOVERY LIMITS : 40 = 120%. 8280_RPT rev:3.02
[illegible]GS: BL = FOUND IN BLANK AT CONCENTRATION < 2%.
L = CONCENTRATION BELOW CALIBRATION RANGE.

Matched GC Peaks / Ratio / Ret. Time

M_Z	Omit	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	Who/ Why
304		2.39	18:50	61.12	F	F	1.028	
304		*** Total ***		61.12	# of Peaks:		1	
316		0.81	18:19	7173.42	T	T	1.000	
316		*** Total ***		7173.42	# of Peaks:		1	
320		5.00	18:19	2461.13	F	F	0.963	
320		*** Total ***		2461.13	# of Peaks:		1	
328		0.00	19:01	2672.71	T	T	1.000	
328		*** Total ***		2672.71	# of Peaks:		1	
332		0.80	18:50	5168.83	T	T	0.990	
		0.81	19:01	4737.16	T	T	1.000	
332		*** Total ***		9905.99	# of Peaks:		2	
340	D C	19.34	20:05	848.84	F	F	1.096	] SP 31391 0/w
340		*** Total ***		848.84	# of Peaks:		1	
374		1.30	27:02	52.80	T	F	0.790	
		1.32	27:50	322.12	T	F	0.814	
	D C	1.46	34:59	70.10	F	F	1.023	] SP 31391 0/w
374		*** Total ***		445.02	# of Peaks:		3	
390		1.50	28:58	15.88	F	F	0.962	
		1.54	30:07	29.91	F	T	1.001	
	D	6.41	34:13	156.80	F	F	1.137	] SP 31391 0/w
	D	1.49	34:51	22.73	F	F	1.158	] SP 31391 0/w
	D	1.26	36:14	42.85	T	F	1.204	] SP 31391 0/w
390		*** Total ***		268.17	# of Peaks:		5	
402		1.29	30:06	5338.63	T	T	1.000	
		1.28	30:41	5499.09	T	T	1.019	
402		*** Total ***		10837.72	# of Peaks:		2	
408	D	1.08	34:13	458.82	T	T	1.000	] MV 3/15/91 MI
		1.05	34:58	1278.39	T	F	1.022	
408		*** Total ***		1737.21	# of Peaks:		2	
420		1.08	34:12	9946.06	T	T	1.000	
420		*** Total ***		9946.06	# of Peaks:		1	
424	D C	3.31	34:12	3788.72	F	F	1.136	] SP 31391 0/w
		1.05	34:50	564.06	T	F	1.157	
		1.06	36:14	759.74	T	T	1.204	
424		*** Total ***		5112.52	# of Peaks:		3	
442		0.95	42:22	2181.29	T	T	1.004	
442		*** Total ***		2181.29	# of Peaks:		1	
458		0.89	42:13	15818.17	T	T	1.001	
458		*** Total ***		15818.17	# of Peaks:		1	

FILE NAME....: E002677 CLIENT ID....: WADSWORTH TLI NUMBER....: 4-37-SA
CONCAL.....: E002669 SAMPLE ID....: 182206-5
ANALYST.....: XL ANALYSIS DATE: 03/11/91 PROJECT NUMBER: 263-W
SAMPLE SIZE..: 965.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 02/26/91
ICAL DATE....: 03/08/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 02/20/91
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3247

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.09				
12378-PeCDD	ND		0.2				
123478-HxCDD	ND		0.1				
123678-HxCDD	9.3				1.26	30:06	L
123789-HxCDD	0.31				1.24	30:40	L
1234678-HpCDD	319				1.05	36:13	
OCDD	7530				0.89	42:21	BL,H
2378-TCDF	ND		0.06				
12378-PeCDF	ND		0.10				
23478-PeCDF	ND		0.10				
123478-HxCDF	1.1				1.29	28:31	
123678-HxCDF	EMPC			0.22			
234678-HxCDF	ND		0.06				
123789-HxCDF	ND		0.09				
1234678-HpCDF	133				1.10	34:12	
1234789-HpCDF	EMPC			4.78			
OCDF	719				0.90	42:27	
TOTAL TCDD	0.46	2		6.47	0.80		
TOTAL PeCDD	5.0	1		5.94	1.76		
TOTAL HxCDD	56.4	4		56.76	1.26		
TOTAL HpCDD	647	2			1.05		
TOTAL TCDF	0.12	2		0.27	0.71		
TOTAL PeCDF	2.1	1			1.61		
TOTAL HxCDF	108	5		111.13	1.30		
TOTAL HpCDF	787	2		803.17	1.07		

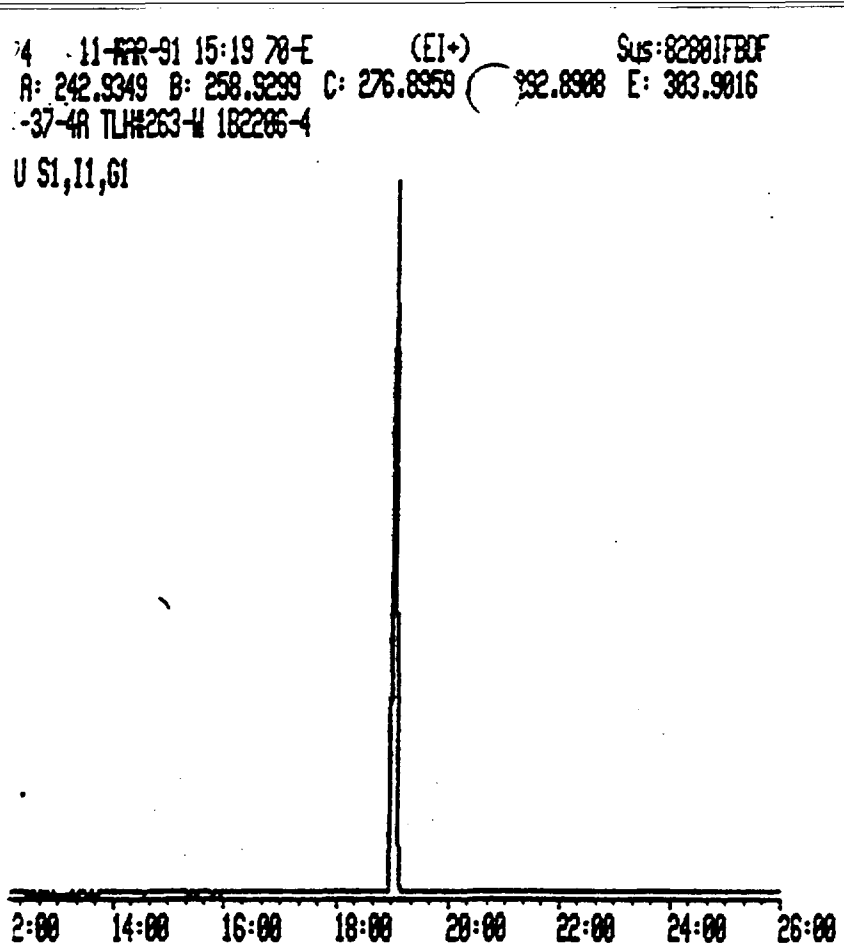
INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	34.7	67.1	0.80	18:19	
13C12-2378-TCDD	34.5	66.6	0.80	19:01	
13C12-HxCDD 678	51.6	99.5	1.29	30:05	
13C12-HpCDF 678	80.9	78.1	1.07	34:11	
13C12-OCDD	108	104	1.01	42:19	

SURROGATE STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	18.0	69.6		19:01	

QC RECOVERY LIMITS : 40 = 120 %. 8280_RPT rev:3.02
FLAGS: BL = FOUND IN BLANK AT CONCENTRATION < 2%.
H = CONCENTRATION ABOVE CALIBRATION RANGE.
L = CONCENTRATION BELOW CALIBRATION RANGE.


4 11-MAR-91 15:19 70-E (EI+) Sus:82881FBDF
A: 242.9349 B: 258.9299 C: 276.8959 332.8908 E: 383.9016
-37-4R TLH#263-H 1822B6-4
U S1,I1,G1
1.00
729
2:00
14:00
16:00
18:00
20:00
22:00
24:00
26:00

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)
03/15/91

FILE NAME....:	E002678	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	4-37-6A
CONCAL.....:	E002669	SAMPLE ID....:	1B2206-6		
ANALYST.....:	XL	ANALYSIS DATE:	03/11/91	PROJECT NUMBER:	263-W
SAMPLE SIZE..:	950.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	02/26/91
CAL DATE....:	03/08/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	02/20/91
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL 3247

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.10				___
1378-PeCDD	ND		0.2				___
3478-HxCDD	ND		0.10				___
23678-HxCDD	ND		0.09				___
23789-HxCDD	ND		0.09				___
34678-HpCDD	4.1				1.05	36:12	_L_
OCDD	77.3				0.89	42:10	_BL
2378-TCDF	ND		0.06				___
1378-PeCDF	ND		0.1				___
23478-PeCDF	ND		0.1				___
13478-HxCDF	ND		0.06				___
13678-HxCDF	ND		0.06				___
234678-HxCDF	ND		0.05				___
123789-HxCDF	ND		0.07				___
134678-HpCDF	1.6				1.13	34:11	_L_
1234789-HpCDF	ND		0.1				___
OCDF	7.3				0.96	42:19	_L_
TOTAL TCDD	EMPC			6.1			___
TOTAL PeCDD	ND		0.2				___
TOTAL HxCDD	EMPC			0.09			___
TOTAL HpCDD	7.3	2			1.05		___
TOTAL TCDF	EMPC			0.20			___
TOTAL PeCDF	ND		0.1				___
TOTAL HxCDF	0.95	2			1.36		___
TOTAL HpCDF	7.5	2			1.09		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	37.0	70.4	0.81	18:17	___
13C12-2378-TCDD	36.6	69.6	0.81	19:00	___
13C12-HxCDD 678	52.7	100	1.28	30:04	___
13C12-HpCDF 678	91.1	86.5	1.07	34:09	___
13C12-OCDD	98.4	93.4	0.90	42:09	___

SURROGATE STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
37Cl-TCDD	17.2	65.4		19:00	___

RECOVERY LIMITS : 40 - 120 %. 8280_RPT rev:3.02

FLAGS: BL = FOUND IN BLANK AT CONCENTRATION < 2%.
L = CONCENTRATION BELOW CALIBRATION RANGE.

Matched GC Peaks / Ratio / Ret. Time

M_Z	Omit	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	Who/ Why
304		2.59	18:49	50.12	F	F	1.029	
304		*** Total ***		50.12	# of Peaks:		1	
316		0.81	18:17	5973.04	T	T	1.000	
316		*** Total ***		5973.04	# of Peaks:		1	
320		5.06	18:17	1988.00	F	F	0.962	
320		*** Total ***		1988.00	# of Peaks:		1	
328		0.00	19:00	2074.91	T	T	1.000	
328		*** Total ***		2074.91	# of Peaks:		1	
332		0.81	18:48	4503.14	T	T	0.989	
		0.81	19:00	3973.34	T	T	1.000	
332		*** Total ***		8476.48	# of Peaks:		2	
340	D	14.70	20:04	175.51	F	F	1.098	SP 31391 o/w
340		*** Total ***		175.51	# of Peaks:		1	
374		1.31	27:00	18.42	T	F	0.791	
		1.40	27:49	121.96	T	F	0.815	
	D	1.17	34:57	40.29	T	F	1.023	SP 31391 o/w
374		*** Total ***		180.67	# of Peaks:		3	
390	D	6.14	34:10	147.92	F	F	1.136	SP 31391 o/w
		1.36	36:13	17.50	T	F	1.205	
390		*** Total ***		165.42	# of Peaks:		2	
402		1.28	30:04	4211.53	T	T	1.000	
		1.28	30:38	4424.03	T	T	1.019	
402		*** Total ***		8635.56	# of Peaks:		2	
408		1.13	34:11	202.42	T	T	1.001	
		1.05	34:56	646.01	T	F	1.023	
408		*** Total ***		848.43	# of Peaks:		2	
420		1.07	34:09	9391.55	T	T	1.000	
420		*** Total ***		9391.55	# of Peaks:		1	
424	D	3.29	34:09	3120.94	F	F	1.136	SP 31391 o/w
		1.05	34:48	220.88	T	F	1.157	
		1.05	36:12	278.96	T	T	1.204	
424		*** Total ***		3620.78	# of Peaks:		3	
442		0.96	42:19	984.20	T	T	1.004	
442		*** Total ***		984.20	# of Peaks:		1	
458		0.89	42:10	6144.77	T	T	1.000	
458		*** Total ***		6144.77	# of Peaks:		1	
470		0.90	42:09	5725.09	T	T	1.000	
470		*** Total ***		5725.09	# of Peaks:		1	

Triangle Laboratories of Houston, Inc.
PCDD DF 8280 ANALYSIS (b)
03/15/91

ILE NAME....: E002679	CLIENT ID....: WADSWORTH	TLI NUMBER....: 4-37-7A	
CAL.....: E002669	SAMPLE ID....: 1B2206-7		
LYST.....: XL	ANALYSIS DATE: 03/11/91	PROJECT NUMBER: 263-W	
AMPLE SIZE..: 980.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 02/26/91	
L DATE....: 03/08/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 02/20/91	
KE FILE...: SP82805W		SHIPMENT NO...: FL 3247	

AME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
8-TCDD	ND		0.09				---
2378-PeCDD	ND		0.2				---
1478-HxCDD	ND		0.09				---
1678-HxCDD	ND		0.08				---
23789-HxCDD	ND		0.09				---
234678-HpCDD	0.16				0.99	36:10	_L_
D	4.0				0.90	42:12	BL,L
378-TCDF	ND		0.06				---
78-PeCDF	ND		0.09				---
78-PeCDF	ND		0.09				---
23478-HxCDF	ND		0.06				---
678-HxCDF	ND		0.05				---
678-HxCDF	ND		0.05				---
23789-HxCDF	ND		0.06				---
234678-HpCDF	0.04				0.91	34:13	_L_
4789-HpCDF	ND		0.09				---
DF	0.26				0.93	42:21	_L_
AL TCDD	EMPC			6.21			---
AL PeCDD	ND		0.2				---
TAL HxCDD	ND		0.09				---
AL HpCDD	0.32	2			0.99		---
TAL TCDF	EMPC			0.34			---
TAL PeCDF	EMPC			0.28			---
AL HxCDF	ND		0.05				---
AL HpCDF	0.23	2			0.99		---

ERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
12-2378-TCDF	33.1	64.8	0.81	18:20	---
3C12-2378-TCDD	34.3	67.2	0.80	19:02	---
3C12-HxCDD 678	51.7	101	1.29	30:06	---
12-HpCDF 678	97.1	95.2	1.07	34:12	---
12-OCDD	92.5	90.7	0.90	42:11	---

ROGATE STANDARDS RECOVERY SUMMARY

AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
1-TCDD	16.7	65.6		19:02	---

RECOVERY LIMITS : 40 - 120 %. 8280_RPT rev:3.02
GS: BL = FOUND IN BLANK AT CONCENTRATION < 2 %.
L = CONCENTRATION BELOW CALIBRATION RANGE.

Matched GC Peaks / Ratio / Ret. Time

M_Z	Omit	Ratio	RT.	Area	Match Rat	Match RT	REL_RT	Who/ Why
304		2.36	18:51	54.57	F	F	1.028	
304		*** Total ***		54.57	# of Peaks:		1	
316		0.81	18:20	6356.07	T	T	1.000	
316		*** Total ***		6356.07	# of Peaks:		1	
320		5.02	18:20	2211.96	F	F	0.963	
		0.28	20:08	44.56	F	F	1.058	
320		*** Total ***		2256.52	# of Peaks:		2	
328		0.00	19:02	2393.84	T	T	1.000	
	D [	0.00	19:42	493.87	T	F	1.035	] SP 31391 O/W
328		*** Total ***		2887.71	# of Peaks:		2	
332		0.79	18:51	5144.14	T	T	0.990	
		0.80	19:02	4405.51	T	T	1.000	
332		*** Total ***		9549.65	# of Peaks:		2	
340	D [	15.30	20:09	5546.22	F	F	1.099	] SP 31391 O/W
		0.01	21:48	1224.36	F	F	1.189	
340		*** Total ***		6770.58	# of Peaks:		2	
390	D [	5.63	34:13	144.28	F	F	1.137	] SP 31391 O/W
390		*** Total ***		144.28	# of Peaks:		1	
402		1.29	30:06	4398.22	T	T	1.000	
		1.28	30:41	4547.50	T	T	1.019	
402		*** Total ***		8945.72	# of Peaks:		2	
408		1.06	34:59	24.33	T	F	1.023	
408		*** Total ***		24.33	# of Peaks:		1	
420		1.07	34:12	10620.46	T	T	1.000	
420		*** Total ***		10620.46	# of Peaks:		1	
424	D [	3.30	34:12	3862.04	F	F	1.136	] SP 31391 O/W
424		*** Total ***		3862.04	# of Peaks:		1	
442		0.93	42:21	34.72	T	T	1.004	
442		*** Total ***		34.72	# of Peaks:		1	
458		0.90	42:12	331.32	T	T	1.000	
458		*** Total ***		331.32	# of Peaks:		1	
470		0.90	42:11	5710.35	T	T	1.000	
470		*** Total ***		5710.35	# of Peaks:		1	

*** End of Report ***

Flags. D - Deleted

O/W - Outside of retention time window

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	19	5
Benzene	2 J	5
Toluene	ND	5
Ethylbenzene	73	5

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	116
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 54 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-1 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 54 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	22	(22-135)	(10-155)
Fluorobiphenyl	66	(34-140)	(12-153)
Terphenyl-d14	13	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 54 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOIL
2-Fluorophenol	21	(17-95)	(24-118)
Phenol-d5	20	(11-89)	(17-124)
2,4,6-Tribromophenol	83	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Dihydro-methyl 1H-indene isomer	7.0	ug/L
Tetramethyl benzene isomer	19	ug/L
Dimethylphenyl ethanone isomer	12	ug/L
Unknown	5.0	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	108	(33-122)	(32-154)
Dibutylchlorendate	45	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALBERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-2 **DATE EXTRACTED:** NA
MATRIX: WATER **DATE ANALYZED:** 12/ 4/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

VOLATILE ORGANICS HRS82497
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	6.0
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	5.0
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	100	(75-123)	(85-126)	(85-138)
Toluene-d8	107	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	113	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-2
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE, FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	4	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	7	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	111
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-2
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 12 ug/L) dry weight
ND* (None Detected, lower detectable limit = 60 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-2 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 12 ug/L) dry weight
ND* (None Detected, lower detectable limit = 60 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	24	(22-135)	(10-155)
Fluorobiphenyl	65	(34-140)	(12-153)
Terphenyl-d14	10	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-2 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 12 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 60 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
2-Fluorophenol	13	(17-95)	(24-118)
Phenol-d5	11	(11-89)	(17-124)
2,4,6-Tribromophenol	91	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-2
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/11/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	2.0
Beta-BHC	ND	2.0
Delta-BHC	ND	2.0
Lindane	ND	2.0
Heptachlor	ND	2.0
Aldrin	ND	2.0
Heptachlor Epoxide	ND	2.0
Endosulfan I	ND	2.0
Dieldrin	ND	2.0
4,4'-DDE	ND	2.0
Endrin	ND	2.0
Endosulfan II	ND	2.0
4,4'-DDD	ND	2.0
Endosulfan Sulfate	ND	2.0
4,4'-DDT	ND	2.0
Methoxychlor	ND	10.0
Endrin-Ketone	ND	2.0
Alpha-Chlordane	ND	20.0
Gamma-Chlordane	ND	20.0
Toxaphene	ND	20.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	DILUT	(33-122)	(32-154)
Dibutylchlorendate	DILUT	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-2 **DATE EXTRACTED:** 12/ 5/90
MATRIX: WATER **DATE ANALYZED:** 12/11/90

SAMPLE ID: W-113090-PS-02 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 25 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	48	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	111	(75-123)	(85-126)	(85-138)
Toluene-d8	105	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	101	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/l)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	112%
Trifluorotoluene	(73-131)	(70-123)	100%

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 11/30/90
LAB #: K3004-1 **DATE EXTRACTED:** 12/ 3/90
MATRIX: WATER **DATE ANALYZED:** 12/ 6/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND
3-Nitronaniline	ND
4-Nitronaniline	ND
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	27	(22-135)	(10-155)
Fluorobiphenyl	78	(34-140)	(12-153)
Terphenyl-d14	16	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	12	(17-95)	(24-118)
Phenol-d5	21	(11-89)	(17-124)
2,4,6-Tribromophenol	59	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	121	(33-122)	(32-154)
Dibutylchlorendate	51	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-1
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-112890-PS-03 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-3
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	79	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	102	(75-123)	(85-126)	(85-138)
Toluene-d8	105	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	98	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-3
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	99
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-3
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 15 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 74 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-3 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 15 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 74 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	23	(22-135)	(10-155)
Fluorobiphenyl	67	(34-140)	(12-153)
Terphenyl-d14	17	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-3 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 15 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 74 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	14	(17-95)	(24-118)
Phenol-d5	11	(11-89)	(17-124)
2,4,6-Tribromophenol	103	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-3
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/13/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE, FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.9
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	96	(33-122)	(32-154)
Dibutylchlorendate	89	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-3 **DATE EXTRACTED:** 12/ 5/90
MATRIX: WATER **DATE ANALYZED:** 12/13/90

SAMPLE ID: W-113090-PS-04 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 4.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	99	(92-107)	(89-124)	(89-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	109
Trifluorotoluene	(73-131)	(70-123)	97

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: .12/10/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-4 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	22	(22-135)	(10-155)
Fluorobiphenyl	67	(34-140)	(12-153)
Terphenyl-d14	13	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 56 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
2-Fluorophenol	16	(17-95)	(24-118)
Phenol-d5	13	(11-89)	(17-124)
2,4,6-Tribromophenol	118	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Henanedioic acid, dicyclohexyl ester	120	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/14/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.6
Beta-BHC	ND	.6
Delta-BHC	ND	.6
Lindane	ND	.6
Heptachlor	ND	.6
Aldrin	ND	.6
Heptachlor Epoxide	ND	.6
Endosulfan I	ND	.6
Dieldrin	ND	.6
4,4'-DDE	ND	.6
Endrin	ND	.6
Endosulfan II	ND	.6
4,4'-DDD	ND	.6
Endosulfan Sulfate	ND	.6
4,4'-DDT	ND	.6
Methoxychlor	ND	3.0
Endrin-Ketone	ND	.6
Alpha-Chlordane	ND	6.0
Gamma-Chlordane	ND	6.0
Toxaphene	ND	6.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	DILUT	(33-122)	(32-154)
Dibutylchlorendate	DILUT	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Henanedioic acid, dicyclohexyl ester	120	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

00023

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/14/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.6
Beta-BHC	ND	.6
Delta-BHC	ND	.6
Lindane	ND	.6
Heptachlor	ND	.6
Aldrin	ND	.6
Heptachlor Epoxide	ND	.6
Endosulfan I	ND	.6
Dieldrin	ND	.6
4,4'-DDE	ND	.6
Endrin	ND	.6
Endosulfan II	ND	.6
4,4'-DDD	ND	.6
Endosulfan Sulfate	ND	.6
4,4'-DDT	ND	.6
Methoxychlor	ND	3.0
Endrin-Ketone	ND	.6
Alpha-Chlordane	ND	6.0
Gamma-Chlordane	ND	6.0
Toxaphene	ND	6.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	DILUT	(33-122)	(32-154)
Dibutylchlorendate	DILUT	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-4
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/14/90

SAMPLE ID: W-113090-PS-05 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 3.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 6.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 9/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	106	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	98	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/l)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	109%
Trifluorotoluene	(73-131)	(70-123)	99%

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 11/30/90
LAB #: K3004-2 **DATE EXTRACTED:** 12/ 3/90
MATRIX: WATER **DATE ANALYZED:** 12/ 6/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND
3-Nitronaniline	ND
4-Nitronaniline	ND
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	36	(22-135)	(10-155)
Fluorobiphenyl	91	(34-140)	(12-153)
Terphenyl-d14	20	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	10	(17-95)	(24-118)
Phenol-d5	22	(11-89)	(17-124)
2,4,6-Tribromophenol	66	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 8/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	76	(33-122)	(32-154)
Dibutylchlorendate	37	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-2
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 8/90

SAMPLE ID: W-112890-PS-06 SUN BANK

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 4.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	2.0	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	8.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1.2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	104	(75-123)	(85-126)	(85-138)
Toluene-d8	93	(92-107)	(89-124)	(89-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	119
Trifluorotoluene	(73-131)	(70-123)	96

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALEFT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-5 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	19	(22-135)	(10-155)
Fluorobiphenyl	74	(34-140)	(12-153)
Terphenyl-d14	67	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. DATE RECEIVED: 12/ 3/90
LAB #: L0302-5 DATE EXTRACTED: 12/ 6/90
MATRIX: WATER DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 56 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	18	(17-95)	(24-118)
Phenol-d5	16	(11-89)	(17-124)
2,4,6-Tribromophenol	131	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Unknown	94 ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/13/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	95	(33-122)	(32-154)
Dibutylchlorendate	78	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-5 **DATE EXTRACTED:** 12/ 5/90
MATRIX: WATER **DATE ANALYZED:** 12/13/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 3.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 6.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 20

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-8 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	32	(22-135)	(10-155)
Fluorobiphenyl	86	(34-140)	(12-153)
Terphenyl-d14	92	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-8 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 20

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	11	(17-95)	(24-118)
Phenol-d5	25	(11-89)	(17-124)
2,4,6-Tribromophenol	141	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 4

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	78	(33-122)	(32-154)
Dibutylchlorendate	96	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 4

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.0 mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** NA
MATRIX: WATER **DATE ANALYZED:** 12/ 7/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	2.0	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	7.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	102	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	94	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	116
Trifluorotoluene	(73-131)	(70-123)	97

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. DATE RECEIVED: 12/ 3/90
LAB #: L0302-9 DATE EXTRACTED: 12/ 6/90
MATRIX: WATER DATE ANALYZED: 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Nitrobenzene-d5	42	(22-135)	(10-155)
Fluorobiphenyl	79	(34-140)	(12-153)
Terphenyl-d14	73	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 56 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	67	(17-95)	(24-118)
Phenol-d5	19	(11-89)	(17-124)
2,4,6-Tribromophenol	187	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Di-(2-ethylhexyl) ester of adipic acid	45 ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/11/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	107	(33-122)	(32-154)
Dibutylchlorendate	89	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** 12/ 5/90
MATRIX: WATER **DATE ANALYZED:** 12/11/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 4.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-10
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 7/90

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	98	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	97	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES. INC.
LAB #: 0302-10
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	109
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY CONTROL SECTION

- Quality Control Summary
- Laboratory Blanks
- Laboratory Control Sample
- Matrix Spike/Matrix Spike Duplicate Results
- Chain of Custody Record

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY ASSURANCE / QUALITY CONTROL
PROGRAM SUMMARY

Wadsworth/ALERT Laboratories' QA/QC program consists of a system of standard operating procedures and practices which maintain high quality standards of operation throughout all component laboratory activities. Furthermore, this QA/QC program verifies and ensures these high quality standards of operation through continuous, documented surveillance and evaluation of acceptable analytical method performance. These continuous method performance evaluations are achieved through the systematic insertion of quality control samples into, at least, 15% of all laboratory analyses.

Wadsworth/ALERT Laboratories considers continuous analytical method performance evaluations to be an integral portion of the data package, and routinely includes the pertinent QA/QC data associated with various analytical result reports. Brief discussions of the various QA/QC procedures utilized to measure acceptable method and matrix performance follows.

Surrogate Spike Recovery Evaluations

Known concentrations of designated surrogate spikes, consisting of a number of similar, non-method compounds or method compound analogues, are added, as appropriate, to routine GC and GC/MS sample fractions prior to extraction and analysis. The percent recovery determinations calculated from the subsequent analysis is an indication of the overall method efficiency for the individual sample. This surrogate spike recovery data is displayed alongside acceptable analytical method performance limits at the bottom of each applicable analytical result report sheet.

**********EXAMPLE**********

	SURROGATE SPIKE % RECOVERY	
Toluene-d8	98%	85-115
2-Fluorophenol	45%	21-100
(cmpd. name)	(% recovered)	(acceptable method performance range)

NOTE: Acceptable method performance for Base/Neutral Acid extractables is indicated by two (2) of three (3) surrogates for each fraction meeting performance criteria, with a minimum recovery of ten (10) percent each.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Recovery Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to two of three separate aliquots of a sequentially predetermined sample prior to extraction and analysis. Percent recovery determinations are calculated from both of the spiked samples by comparison to the actual values generated from the unspiked sample. These percent recovery

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY ASSURANCE / QUALITY CONTROL
PROGRAM SUMMARY
(cont'd)

determinations indicate the accuracy of the analysis at recovering actual analytical method compounds from the matrix. Relative percent difference determinations calculated from a comparison of the MS/MSD recoveries, also, demonstrate the precision of the analytical method. Actual percent recovery and relative percent difference data is displayed alongside their respective acceptable analytical method performance limits in the QA/QC section of the report. A minimum of ten percent (10%) of all analyses are MS/MSD quality control samples.

**********EXAMPLE**********

COMPOUND	SAMPLE CONC.	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
4,4'-DDT	0	95	112	16	22	66-119
Benzene	10	86	93	8	20	39-150
(cmpd. name)	sample result	1st% recov.	2nd% recov.	Rel.% diff.	accep. method perform range	

Laboratory Analytical Method Blank Evaluations

Laboratory analytical method blanks are systematically prepared and analyzed in order to continuously evaluate the system interferences and background contamination levels associated with each analytical method. These method blanks include all aspects of actual laboratory method analysis (chemical reagents, glassware, etc.), substituting laboratory reagent water or solid for actual sample. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method blanks.

Laboratory Analytical Method Check Sample Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to a laboratory reagent blank prior to extraction and analysis. Percent recovery determinations demonstrate the performance of the analytical method. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method check samples.

Analytical Result Qualifiers

The following qualifiers, as defined below, may be appended to analytical results in order to allow proper interpretation of the results presented:

J - indicates an estimated concentration (typically used when a dilution, matrix interference or instrumental limitation prevents accurate quantitation of a particular analyte).

B - indicates the presence of a particular analyte in the laboratory blank analyzed concurrently with the samples. Results must be interpreted accordingly.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-3
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 7

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	1.0
Methoxychlor	ND	.5
Endrin-Ketone	ND	1.0
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	79	(33-122)	(32-154)
Dibutylchlorendate	88	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 11/30/90
LAB #: K3004-3 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 5/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

% MOISTURE: 7

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/10/90
DATE ANALYZED: 12/10/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	111	(75-123)	(85-126)	(85-138)
Toluene-d8	88	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	102	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/kg)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) dry weight
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-HECD	(69-117)	(58-124)	106
Bromofluorobenzene-PID	(81-117)	(79-120)	93

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 6

Acenaphthene	ND	Chrysene	.08 J
Acenaphthylene	.03 J	Dibenzo(a,h)anthracene	ND
Anthracene	.01 J	Dibenzofuran	.02 J
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	.26 J	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	.30 J	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	.14 J	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	.07 J
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	.02 J
Pyrene	.09 J
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	13	(22-135)	(10-155)
Fluorobiphenyl	63	(34-140)	(12-153)
Terphenyl-d14	72	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 6

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	.28 J
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	13	(17-95)	(24-118)
Phenol-d5	20	(11-89)	(17-124)
2,4,6-Tribromophenol	88	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-6
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	12
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	8.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	8.0
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	103	(75-123)	(85-126)	(85-138)
Toluene-d8	94	(92-107)	(89-124)	(89-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-6
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 6/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	18	5
Benzene	2 J	5
Toluene	ND	5
Ethylbenzene	68	5

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	114
Trifluorotoluene	(73-131)	(70-123)	97

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-6
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 55 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-6 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 55 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	17	(22-135)	(10-155)
Fluorobiphenyl	71	(34-140)	(12-153)
Terphenyl-d14	12	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-6 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 55 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	15	(17-95)	(24-118)
Phenol-d5	12	(11-89)	(17-124)
2,4,6-Tribromophenol	128	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-3
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 7

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .36 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
2-Fluorophenol	16	(17-95)	(24-118)
Phenol-d5	24	(11-89)	(17-124)
2,4,6-Tribromophenol	75	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-3
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Tetrachlorophenol isomer	.16	mg/kg
Trichloroethyliden bis-chlor benzene isomer	.60	mg/kg

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-3
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 7

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	1.0
Methoxychlor	ND	.5
Endrin-Ketone	ND	1.0
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	79	(33-122)	(32-154)
Dibutylchlorendate	88	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-3
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-09 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 7

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/10/90
DATE ANALYZED: 12/10/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	111	(75-123)	(85-126)	(85-138)
Toluene-d8	88	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	102	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/kg)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) dry weight
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-HECD	(69-117)	(58-124)	106
Bromofluorobenzene-PID	(81-117)	(79-120)	93

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 6

Acenaphthene	ND	Chrysene	.08 J
Acenaphthylene	.03 J	Dibenzo(a,h)anthracene	ND
Anthracene	.01 J	Dibenzofuran	.02 J
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	.26 J	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	.30 J	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	.14 J	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	.07 J
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE: ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	.02 J
Pyrene	.09 J
1,2,4-Trichlorobenzene	ND

NOTE:
ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	13	(22-135)	(10-155)
Fluorobiphenyl	63	(34-140)	(12-153)
Terphenyl-d14	72	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 6

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	.28 J
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .35 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.8 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	13	(17-95)	(24-118)
Phenol-d5	20	(11-89)	(17-124)
2,4,6-Tribromophenol	88	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 15

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	91	(33-122)	(32-154)
Dibutylchlorendate	78	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Tetrachlorophenol isomer	0.20	mg/kg
Trichloroethyliden bis-chlor benzene isomer	.5	mg/kg

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/11/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 6

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	75	(33-122)	(32-154)
Dibutylchlorendate	74	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-4
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/11/90

SAMPLE ID: S-112890-PS-10 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 6

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 2.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 4.0 mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/12/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	17	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	88	(75-123)	(85-126)	(85-138)
Toluene-d8	94	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	104	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/kg)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) dry weight
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-HECD	(69-117)	(58-124)	109
Bromofluorobenzene-PID	(81-117)	(79-120)	98

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 15

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = .39 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.9 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE:
- ND (None Detected, lower detectable limit = .39 mg/kg) dry weight
- ND* (None Detected, lower detectable limit = 1.9 mg/kg) dry weight
- J (Detected, but below quantitation limit; estimated value)
- B (Compound detected in method blank associated with this sample)
- -- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	22	(22-135)	(10-155)
Fluorobiphenyl	68	(34-140)	(12-153)
Terphenyl-d14	69	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 15

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	91	(33-122)	(32-154)
Dibutylchlorendate	78	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-5
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-112890-PS-11 SUN BANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 15

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-7 **DATE EXTRACTED:** 12/12/90
MATRIX: SOIL **DATE ANALYZED:** 12/12/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	36	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	91	(75-123)	(85-126)	(85-138)
Toluene-d8	103	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	99	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-7
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 7/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/kg)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) dry weight
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-PID	(81-117)	(79-120)	86

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-7
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 8/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297

TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 4

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 1.7 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 8.7 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-7 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 8/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 1.7 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 8.7 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Nitrobenzene-d5	DILUT	(22-135)	(10-155)
Fluorobiphenyl	DILUT	(34-140)	(12-153)
Terphenyl-d14	DILUT	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. DATE RECEIVED: 12/ 3/90
LAB #: L0302-7 DATE EXTRACTED: 12/ 4/90
MATRIX: SOIL DATE ANALYZED: 12/ 8/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 4

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 1.7 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 8.7 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
2-Fluorophenol	DILUT	(17-95)	(24-118)
Phenol-d5	DILUT	(11-89)	(17-124)
2,4,6-Tribromophenol	DILUT	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-7
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 8/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE.FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Pentachloromethoxy-benzene	.51	mg/kg

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-7
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 4

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	75	(33-122)	(32-154)
Dibutylchlorendate	85	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-7
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-12 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 4

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.0 mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/10/90
DATE ANALYZED: 12/10/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE, FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	27	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	101	(75-123)	(85-126)	(85-138)
Toluene-d8	86	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	108	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 7/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/kg)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) dry weight
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-PID	(81-117)	(79-120)	105

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

% MOISTURE: 20

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE: ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-8 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	32	(22-135)	(10-155)
Fluorobiphenyl	86	(34-140)	(12-153)
Terphenyl-d14	92	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-8 **DATE EXTRACTED:** 12/ 4/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 5/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

% MOISTURE: 20

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .42 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.1 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	11	(17-95)	(24-118)
Phenol-d5	25	(11-89)	(17-124)
2,4,6-Tribromophenol	141	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

% MOISTURE: 4

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	78	(33-122)	(32-154)
Dibutylchlorendate	96	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-8
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/12/90

SAMPLE ID: S-113090-PS-13 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

% MOISTURE: 4

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 2.0 mg/kg) dry weight
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** NA
MATRIX: WATER **DATE ANALYZED:** 12/ 7/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	2.0	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	7.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	99	(75-123)	(85-126)	(85-138)
Toluene-d8	102	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	94	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	116
Trifluorotoluene	(73-131)	(70-123)	97

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) dry weight
ND* (None Detected, lower detectable limit = 56 ug/L) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Nitrobenzene-d5	42	(22-135)	(10-155)
Fluorobiphenyl	79	(34-140)	(12-153)
Terphenyl-d14	73	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/13/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL
CERTIFICATION #: E84059

ACID EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 11 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 56 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	67	(17-95)	(24-118)
Phenol-d5	19	(11-89)	(17-124)
2,4,6-Tribromophenol	187	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

EXTRACTABLE ORGANICS
OTHER COMPOUNDS

MASS SPECTROMETER/DATA SYSTEM (MSDS) TENTATIVELY IDENTIFIED COMPOUNDS
with their estimated concentrations

Di-(2-ethylhexyl) ester of adipic acid	45	ug/L

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-9
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/11/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	107	(33-122)	(32-154)
Dibutylchlorendate	89	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: L0302-9 **DATE EXTRACTED:** 12/ 5/90
MATRIX: WATER **DATE ANALYZED:** 12/11/90

SAMPLE ID: W-113090-PS-14 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059

POLYCHLORINATED BIPHENYLS HRS84297
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 4.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-10
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 7/90

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	98	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	97	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES. INC.
LAB #: 0302-10
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 5/90

SAMPLE ID: TRIP BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	109
Trifluorotoluene	(73-131)	(70-123)	98

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY CONTROL SECTION

- Quality Control Summary
- Laboratory Blanks
- Laboratory Control Sample
- Matrix Spike/Matrix Spike Duplicate Results
- Chain of Custody Record

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY ASSURANCE / QUALITY CONTROL
PROGRAM SUMMARY

Wadsworth/ALERT Laboratories' QA/QC program consists of a system of standard operating procedures and practices which maintain high quality standards of operation throughout all component laboratory activities. Furthermore, this QA/QC program verifies and ensures these high quality standards of operation through continuous, documented surveillance and evaluation of acceptable analytical method performance. These continuous method performance evaluations are achieved through the systematic insertion of quality control samples into, at least, 15% of all laboratory analyses.

Wadsworth/ALERT Laboratories considers continuous analytical method performance evaluations to be an integral portion of the data package, and routinely includes the pertinent QA/QC data associated with various analytical result reports. Brief discussions of the various QA/QC procedures utilized to measure acceptable method and matrix performance follows.

Surrogate Spike Recovery Evaluations

Known concentrations of designated surrogate spikes, consisting of a number of similar, non-method compounds or method compound analogues, are added, as appropriate, to routine GC and GC/MS sample fractions prior to extraction and analysis. The percent recovery determinations calculated from the subsequent analysis is an indication of the overall method efficiency for the individual sample. This surrogate spike recovery data is displayed alongside acceptable analytical method performance limits at the bottom of each applicable analytical result report sheet.

**********EXAMPLE**********

SURROGATE SPIKE % RECOVERY

Toluene-d8	98%	85-115
2-Fluorophenol	45%	21-100
(cmpd. name)	(% recovered)	(acceptable method performance range)

NOTE: Acceptable method performance for Base/Neutral Acid extractables is indicated by two (2) of three (3) surrogates for each fraction meeting performance criteria, with a minimum recovery of ten (10) percent each.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Recovery Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to two of three separate aliquots of a sequentially predetermined sample prior to extraction and analysis. Percent recovery determinations are calculated from both of the spiked samples by comparison to the actual values generated from the unspiked sample. These percent recovery

WADSWORTH/ALERT
LABORATORIES, INC.

QUALITY ASSURANCE / QUALITY CONTROL
PROGRAM SUMMARY
(cont'd)

determinations indicate the accuracy of the analysis at recovering actual analytical method compounds from the matrix. Relative percent difference determinations calculated from a comparison of the MS/MSD recoveries, also, demonstrate the precision of the analytical method. Actual percent recovery and relative percent difference data is displayed alongside their respective acceptable analytical method performance limits in the QA/QC section of the report. A minimum of ten percent (10%) of all analyses are MS/MSD quality control samples.

**********EXAMPLE**********

COMPOUND	SAMPLE CONC.	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
4,4'-DDT	0	95	112	16	22	66-119
Benzene	10	86	93	8	20	39-150
(cmpd. name)	sample result	1st% recov.	2nd% recov.	Rel.% diff.	accep. method perform range	

Laboratory Analytical Method Blank Evaluations

Laboratory analytical method blanks are systematically prepared and analyzed in order to continuously evaluate the system interferences and background contamination levels associated with each analytical method. These method blanks include all aspects of actual laboratory method analysis (chemical reagents, glassware, etc.), substituting laboratory reagent water or solid for actual sample. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method blanks.

Laboratory Analytical Method Check Sample Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to a laboratory reagent blank prior to extraction and analysis. Percent recovery determinations demonstrate the performance of the analytical method. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method check samples.

Analytical Result Qualifiers

The following qualifiers, as defined below, may be appended to analytical results in order to allow proper interpretation of the results presented:

J - indicates an estimated concentration (typically used when a dilution, matrix interference or instrumental limitation prevents accurate quantitation of a particular analyte).

B - indicates the presence of a particular analyte in the laboratory blank analyzed concurrently with the samples. Results must be interpreted accordingly.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/l)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	94%
Trifluorotoluene	(73-131)	(70-123)	98%

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1
Benzene	ND	1
Toluene	ND	1
Ethylbenzene	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromochloromethane	(78-122)	(49-121)	104
Trifluorotoluene	(73-131)	(70-123)	99

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 7/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	30
Benzene	ND	30
Toluene	ND	30
Ethylbenzene	ND	30

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-PID	(81-117)	(79-120)	107

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Xylenes	ND	1.0
Benzene	ND	1.0
Toluene	ND	1.0
Ethylbenzene	ND	1.0

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromofluorobenzene-HECD	(69-117)	(58-124)	100
Bromofluorobenzene-PID	(81-117)	(79-120)	94

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 9/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: .E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	98	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	104	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	98	(75-123)	(85-126)	(85-138)
Toluene-d8	100	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	104	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/10/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
ND** (None Detected, lower detectable limit = ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	101	(75-123)	(85-126)	(85-138)
Toluene-d8	89	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	98	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/12/90
DATE ANALYZED: 12/12/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND*	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND*
Bromomethane	ND*	Methylene chloride	ND
2-Butanone	ND*	4-Methyl-2-pentanone	ND*
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND*	Toluene	ND
Chloroform	ND	1,1.1-Trichloroethane	ND
Chloromethane	ND*	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND*
1,2-Dichloroethane	ND	Vinyl chloride	ND*
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 5 ug/kg) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	90	(75-123)	(85-126)	(85-138)
Toluene-d8	96	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	99	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 4/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND
3-Nitronaniline	ND
4-Nitronaniline	ND
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	22	(22-135)	(10-155)
Fluorobiphenyl	63	(34-140)	(12-153)
Terphenyl-d14	51	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	24	(17-95)	(24-118)
Phenol-d5	34	(11-89)	(17-124)
2,4,6-Tribromophenol	97	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 11/30/90
LAB #: K3004-BK **DATE EXTRACTED:** 12/ 3/90
MATRIX: SOIL **DATE ANALYZED:** 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	36	(22-135)	(10-155)
Fluorobiphenyl	84	(34-140)	(12-153)
Terphenyl-d14	77	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	14	(17-95)	(24-118)
Phenol-d5	31	(11-89)	(17-124)
2,4,6-Tribromophenol	104	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = .33 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.7 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) dry weight
ND* (None Detected, lower detectable limit = 1.7 mg/kg) dry weight
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	3	(22-135)	(10-155)
Fluorobiphenyl	95	(34-140)	(12-153)
Terphenyl-d14	81	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND
4-Nitrophenol	ND*
Pentachlorophenol	ND*
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	10	(17-95)	(24-118)
Phenol-d5	26	(11-89)	(17-124)
2,4,6-Tribromophenol	127	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (1 of 2)

Acenaphthene	ND	Chrysene	ND
Acenaphthylene	ND	Dibenzo(a,h)anthracene	ND
Anthracene	ND	Dibenzofuran	ND
Benzo(a)anthracene	ND	Di-n-butyl phthalate	ND
Benzo(b)fluoranthene	ND	1,2-Dichlorobenzene	ND
Benzo(k)fluoranthene	ND	1,3-Dichlorobenzene	ND
Benzo(ghi)perylene	ND	1,4-Dichlorobenzene	ND
Benzo(a)pyrene	ND	3,3'-Dichlorobenzidine	ND*
Benzyl alcohol	ND	Diethyl phthalate	ND
Bis(2-chloroethoxy)methane	ND	Dimethyl phthalate	ND
Bis(2-chloroethyl)ether	ND	2,4-Dinitrotoluene	ND
Bis(2-chloroisopropyl)ether	ND	2,6-Dinitrotoluene	ND
Bis(2-ethylhexyl)phthalate	ND	Di-n-octyl phthalate	ND
4-Bromophenyl phenyl ether	ND	Fluoranthene	ND
Butyl benzyl phthalate	ND	Fluorene	ND
4-Chloroaniline	ND	Hexachlorobenzene	ND
2-Chloronaphthalene	ND	Hexachlorobutadiene	ND
4-Chlorophenyl phenyl ether	ND	Hexachlorocyclopentadiene	ND

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC. **DATE RECEIVED:** 12/ 3/90
LAB #: 0302-BK **DATE EXTRACTED:** 12/ 6/90
MATRIX: WATER **DATE ANALYZED:** 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059

BASE/NEUTRAL EXTRACTABLE ORGANICS HRS84297
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	17	(22-135)	(10-155)
Fluorobiphenyl	66	(34-140)	(12-153)
Terphenyl-d14	65	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

ACID EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS

Benzoic Acid	ND*
4-Chloro-3-methylphenol	ND
2-Chlorophenol	ND
2,4-Dichlorophenol	ND
2,4-Dimethylphenol	ND
2,4-Dinitrophenol	ND*
2-Methyl-4,6-dinitrophenol	ND*
2-Methylphenol	ND
4-Methylphenol	ND
2-Nitrophenol	ND*
4-Nitrophenol	ND*
Pentachlorophenol	ND
Phenol	ND
2,4,5-Trichlorophenol	ND
2,4,6-Trichlorophenol	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 50 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
2-Fluorophenol	13	(17-95)	(24-118)
Phenol-d5	13	(11-89)	(17-124)
2,4,6-Tribromophenol	102	(10-134)	(10-156)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: .E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	86	(33-122)	(32-154)
Dibutylchlorendate	91	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: WATER

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 3/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (mg/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) dry weight
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Tetrachloro(m)xylene	93	(33-122)	(32-154)
Dibutylchlorendate	100	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: K3004-BK
MATRIX: SOIL

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = mg/kg) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/L)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	74	(33-122)	(32-154)
Dibutylchlorendate	94	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 5/90
DATE ANALYZED: 12/10/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND*
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 2.0 ug/L) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

CHLORINATED PESTICIDES
TARGET COMPOUND LIST - GC

	RESULT (ug/kg)	DETECTION LIMIT
Alpha-BHC	ND	.1
Beta-BHC	ND	.1
Delta-BHC	ND	.1
Lindane	ND	.1
Heptachlor	ND	.1
Aldrin	ND	.1
Heptachlor Epoxide	ND	.1
Endosulfan I	ND	.1
Dieldrin	ND	.1
4,4'-DDE	ND	.1
Endrin	ND	.1
Endosulfan II	ND	.1
4,4'-DDD	ND	.1
Endosulfan Sulfate	ND	.1
4,4'-DDT	ND	.1
Methoxychlor	ND	.5
Endrin-Ketone	ND	.1
Alpha-Chlordane	ND	1.0
Gamma-Chlordane	ND	1.0
Toxaphene	ND	1.0

NOTE: ND (None Detected) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID
Tetrachloro(m)xylene	83	(33-122)	(32-154)
Dibutylchlorendate	101	(18-129)	(27-139)

WADSWORTH/ALERT
LABORATORIES, INC. 5910 Breckenridge Pkwy, Suite H, Tampa, FL 33610

Sampling, testing, mobile labs

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ANALYTICAL REPORT

SUN BANK-FT. LAUDERDALE, FL.

PROJECT NUMBER 3050

Presented to :

TONY MISERCOLA

CONESTOGA-ROVERS & ASSOCIATES, INC.

WADSWORTH/ALERT LABORATORIES, INC.

JAY APITZ
Project Manager

Randall C. Grubbs
Laboratory Director - Florida

January 11, 1991

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WADSWORTH/ALERT
LABORATORIES, INC.

ANALYTICAL METHODS

Wadsworth/ALERT Laboratories utilizes only USEPA approved analytical methods and instrumentation. The analytical methods utilized for the analysis of these samples are listed below.

PARAMETER		METHOD
ORGANICS		
Volatile Organics	** EPA Method 602	** SW846 Method 8020
		** SW846 Method 8240
Extraction		** SW846 Method 5030
Base/Neutral Acid Extractables		** SW846 Method 8270
Extraction		** SW846 Method 3520,3550
Pesticides/PCB's		** SW846 Method 8080
Extraction		** SW846 Method 3510,3520 3550

NOTE: ** indicates usage of this method to obtain results for this report.

EPA Methods -Method for Chemical Analysis of Water and Wastes, USEPA, 600/4-79-020, March, 1983. July, 1982.

Std. Methods -Standard Methods for the Examination of Water and Wastewater, APHA, 16th edition, 1985.

USEPA Methods -From 40CFR Part 136, published in Federal Register on October 26, 1984.

SW846 Methods -Test Methods for Evaluating Solid Waste Physical/Chemical Methods, 3rd Edition, USEPA, 1986.

ASTM Methods -American Society for Testing and Materials.

WADSWORTH/ALERT
LABORATORIES, INC.

INVOLVEMENT

This report summarizes the analytical results of samples from the Sun Bank-Ft. Lauderdale, FL site submitted by Conestoga-Rovers & Associates. Wadsworth/ALERT Laboratories, Inc. who provided independent, analytical services for this project under the direction of Mr. Tony Misercola. Nine (9) water samples, five (5) soil samples and a trip blank were accepted into Wadsworth's Florida facility on 30 November and 3 December 1990, in accordance with documented sample acceptance procedures. The samples were analyzed for organics as specified by Conestoga-Rovers & Associates. Volatile organic soil analyses were performed by Wadsworth/ALERT Laboratories, North Canton, Ohio (Florida certification #E87225). The associated analytical methods and sample results are outlined sequentially in this report.

Analytical results included in this report have been reviewed for compliance with the Laboratory QA/QC Plan as summarized in the Quality Control Section at the rear of the report. All presented data has been found to be compliant. Any qualificaitons and/or non-compliant items have been noted below.

Laboratory I.D.	Narrative
OK3004-4	The recovery of Nitrosodipropylamine and phenol in the matrix spike/duplicate was below acceptable limits. However, adequate method performance was demonstrated by the duplicate precision data, blanks and Laboratory Control Samples for these compounds. Results should be interpreted accordingly.
OL0302-3	The recovery of Lindane in the matrix spike/duplicate was below acceptance limits. However, adequate method permance was demonstrated by the duplicate precision data, blanks and Laboratory Control Samples for these compounds. Results should be interpreted accordingly.

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-1
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/14/90

SAMPLE ID: W-113090-PS-01 SUN BANK-FT. LAUDERDALE,FL

CERTIFICATION #: E84059
HRS82497

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	2.0 J	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	62
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	51
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 2.5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 25 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	122	(75-123)	(85-126)	(85-138)
Toluene-d8	95	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	101	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY : CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 6/90
DATE ANALYZED: 12/ 6/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYCHLORINATED BIPHENYLS
TARGET COMPOUND LIST - GC

PCB-1016	ND
PCB-1221	ND
PCB-1232	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND
PCB-1262	--

NOTE: ND (None Detected, lower detectable limit = 1.0 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = mg/kg) as rec'd
-- (Not Analyzed)

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0K3004-LCS
MATRIX: WATER
METHOD: 602

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/04/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	88	58-141
Trichloroethene	103	80-128
Chlorobenzene	89	72-131
Toluene	91	77-123
Benzene	93	77-120
Dichlorobromomethane	91	83-125

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #:	0L0302-LCS	DATE RECEIVED:	12/03/90
MATRIX:	WATER	DATE EXTRACTED:	NA
METHOD:	602	DATE ANALYZED:	12/06/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	93	58-141
Trichloroethene	112	80-128
Chlorobenzene	88	72-131
Toluene	91	77-123
Benzene	91	77-120
Dichlorobromomethane	102	83-125

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0L0302-LCS
MATRIX: SOIL
METHOD: 8020

DATE RECEIVED: 12/03/90
DATE EXTRACTED: N/A
DATE ANALYZED: 12/07/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	100	49-132
Trichloroethene	95	63-121
Chlorobenzene	77	54-117
Toluene	102	74-126
Benzene	103	64-143
Dichlorobromomethane	97	55-136

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0K3004-LCS
MATRIX: SOIL
METHOD: 8020

DATE RECEIVED: 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/12/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	94	49-132
Trichloroethene	114	63-121
Chlorobenzene	96	54-117
Toluene	100	74-126
Benzene	107	64-143
Dichlorobromomethane	98	55-136

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0K3004-LCS
MATRIX: WATER
METHOD: 8240

DATE RECEIVED: 11/30/90
DATE EXTRACTED: N/A
DATE ANALYZED: 12/09/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	84	61-145
Trichloroethene	72	71-120
Chlorobenzene	91	75-130
Toluene	111	76-125
Benzene	107	76-127
Dichlorobromomethane	86	78-104

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0K3004-LCS
MATRIX: WATER
METHOD: 8240

DATE RECEIVED: 11/30/90
DATE EXTRACTED: N/A
DATE ANALYZED: 12/12/90

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS %RECOVERY
1,1-Dichloroethene	94	61-145
Trichloroethene	77	71-120
Chlorobenzene	94	75-130
Toluene	98	76-125
Benzene	97	76-127
Dichlorobromomethane	99	78-104

WADSWORTH/ALERT
LABORATORIES, INC.

CHECK SAMPLE DATA

LAB ID	PARAMETER	PERCENT RECOVERY	MATRIX	QC CONTROL LIMITS
	GC/MS VOLATILE COMPOUNDS			
93210	1,1-Dichloroethene	84	SOLID	(67-127)
	Trichloroethene	99		(87-112)
	Chlorobenzene	100		(90-110)
	Toluene	90		(86-109)
	Benzene	87		(86-113)
	GC/MS VOLATILE COMPOUNDS			
93212	1,1-Dichloroethene	107	SOLID	(67-127)
	Trichloroethene	96		(87-112)
	Chlorobenzene	101		(90-110)
	Toluene	99		(86-109)
	Benzene	106		(86-113)

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0L3004-LCS
MATRIX: WATER
METHOD: 8270

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/03/91 to 12/04/90
DATE ANALYZED: 12/06/91 to 12/06/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
1,2,4-Trichlorobenzene	68	39-98
Acenaphthene	63	46-118
2,4-Dinitrotoluene	62	24-96
Pyrene	83	26-127
Nitrosodipropylamine	46	41-116
1,4-Dichlorobenzene	67	36-97
Pentachlorophenol	54	9-103
Phenol	45	12-89
2-Chlorophenol	76	27-123
4-Chloro-o-cresol	90	33-97
4-Nitrophenol	30	10-80

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: OL0302-LCS
MATRIX: WATER
METHOD: 8270

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/06/90
DATE ANALYZED: 12/10/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
1,2,4-Trichlorobenzene	76	39-98
Acenaphthene	65	46-118
2,4-Dinitrotoluene	27	24-96
Pyrene	68	26-127
Nitrosodipropylamine	50	41-116
1,4-Dichlorobenzene	85	36-97
Pentachlorophenol	56	9-103
Phenol	21	12-89
2-Chlorophenol	59	27-123
4-Chloro-o-cresol	50	33-97
4-Nitrophenol	15	10-80

WADSWORTH/
LABORATORIES, INC.

LAB #:	0L3004-LCS	**DATE RECEIVED:**	11/30/90
MATRIX:	SOIL	**DATE EXTRACTED:**	12/03/91
METHOD:	8270	**DATE ANALYZED:**	12/06/91

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
1,2,4-Trichlorobenzene	79	39-98
Acenaphthene	82	46-118
2,4-Dinitrotoluene	72	24-96
Pyrene	83	26-127
Nitrosodipropylamine	52	41-116
1,4-Dichlorobenzene	84	36-97
Pentachlorophenol	23	9-103
Phenol	45	12-89
2-Chlorophenol	93	27-123
4-Chloro-o-cresol	75	33-97
4-Nitrophenol	36	10-80

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0K3004-LCS
MATRIX: WATER
METHOD: 8080

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/03/90
DATE ANALYZED: 12/07/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lindane	74	56-123
Heptachlor	114	40-131
Aldrin	71	40-120
Dieldrin	89	52-126
Endrin	51	56-121
4,4'-DDT	77	38-127

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: OL0302-LCS
MATRIX: WATER
METHOD: 8080

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/05/90
DATE ANALYZED: 12/08/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lindane	80	56-123
Heptachlor	84	40-131
Aldrin	77	40-120
Dieldrin	83	52-126
Endrin	87	56-121
4,4'-DDT	76	38-127

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0K3004-LCS
MATRIX: WATER
METHOD: 8080

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/03/90
DATE ANALYZED: 12/08/90

LABORATORY CHECK SAMPLE RECOVERY

	LCS %REC	QC LIMITS RECOVERY
PCB	100	42-104

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0L0302-LCS
MATRIX: WATER
METHOD: 8080

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/05/90
DATE ANALYZED: 12/08/90

LABORATORY CHECK SAMPLE RECOVERY

	LCS %REC	QC LIMITS RECOVERY
PCB	78	42-104

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: OK3004-LCS
MATRIX: SOIL
METHOD: 8080

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/04/90
DATE ANALYZED: 12/05/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lindane	76	46-127
Heptachlor	89	35-130
Aldrin	81	34-132
Dieldrin	96	31-134
Endrin	85	42-139
4,4'-DDT	72	23-134

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0K3004-LCS
MATRIX: SOIL
METHOD: 8080

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/04/90
DATE ANALYZED: 12/05/90

LABORATORY CHECK SAMPLE RECOVERY

	LCS %REC	QC LIMITS RECOVERY
PCB	79	48-126

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0L0302-LCS
MATRIX: SOIL
METHOD: 8080

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/06/90
DATE ANALYZED: 12/07/90

LABORATORY CHECK SAMPLE RECOVERY

	LCS %REC	QC LIMITS RECOVERY
PCB	69	48-126

WADSWORTH/ALERT
LABORATORIES, INC.

LAB #: 0L0302-LCS
MATRIX: SOIL
METHOD: 8080

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/06/90
DATE ANALYZED: 12/07/90

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lindane	79	46-127
Heptachlor	88	35-130
Aldrin	83	34-132
Dieldrin	110	31-134
Endrin	81	42-139
4,4'-DDT	87	23-134

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0L0302-3
MATRIX: WATER
METHOD: 602

DATE RECEIVED: 12/03/90
DATE EXTRACTED: N/A
DATE ANALYZED: 12/06/90

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,1-Dichloroethene	94	88	7	36	58-141
Trichloroethene	107	98	9	31	80-128
Chlorobenzene	89	90	1	33	72-131
Toluene	92	92	0	25	77-123
Benzene	93	92	1	21	77-120
Dichlorobromomethane	100	97	3	27	83-125

WADSWORTH/ALERT
LABORATORIES, INC.

LAB# : 0K1202-4
MATRIX: SOIL
METHOD: 8020

DATE RECEIVED : 11/30/90
DATE EXTRACTED: NA
DATE ANALYZED : 12/13/90

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,1-Dichloroethene	105	116	10	22	49-132
Trichloroethene	77	79	3	24	63-121
Chlorobenzene	97	98	1	27	54-117
Toluene	104	103	1	19	74-126
Benzene	112	113	1	25	64-143
Dichlorobromomethane	115	119	3	41	55-136

WADSWORTH/ALERT
LABORATORIES, INC.

MATRIX SPIKE DATA

LAB ID	PARAMETER	SPIKE PERCENT RECOVERY	SPK/DUP PERCENT RECOVERY	SPIKE MATRIX	QC CONTROL LIMITS
	GC/MS VOLATILE COMPOUNDS				
32144	1,1-Dichloroethene	88	86	SOLID	(53-146)
	Trichloroethene	98	98		(79-117)
	Chlorobenzene	106	106		(83-115)
	Toluene	97	94		(73-130)
	Benzene	82	84		(71-122)

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0L0302-3
MATRIX: WATER
METHOD: 8270

DATE RECEIVED: 12/03/90
DATE EXTRACTED: 12/06/90
DATE ANALYZED: 12/10/91

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,2,4-Trichlorobenzene	89	90	1	28	39-98
Acenaphthene	59	56	5	31	46-118
2,4-Dinitrotoluene	51	44	15	38	24-96
Pyrene	42	41	2	31	26-127
Nitrosodipropylamine	24	28	15	38	41-116
1,4-Dichlorobenzene	67	56	18	28	36-97
Pentachlorophenol	24	24	0	50	9-103
Phenol	13	14	7	42	12-89
2-Chlorophenol	35	30	15	40	27-123
4-Chloro-o-cresol	24	25	4	42	23-97
4-Nitrophenol	13	11	17	50	10-80

WADSWORTH/ALERT
LABORATORIES, INC.

LAB#: 0K3004-4
MATRIX: SOIL
METHOD: 8270

DATE RECEIVED: 11/30/90
DATE EXTRACTED: 12/03/90
DATE ANALYZED: 12/04/90

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,2,4-Trichlorobenzene	79	68	15	23	38-107
Acenaphthene	71	65	9	19	31-137
2,4-Dinitrotoluene	63	50	23	47	28-89
Pyrene	95	94	1	36	35-142
Nitrosodipropylamine	25	27	8	38	41-126
1,4-Dichlorobenzene	61	59	3	27	28-104
Pentachlorophenol	98	129	27	47	17-109
Phenol	19	24	23	35	26-90
2-Chlorophenol	50	53	6	50	25-102
4-Chloro-o-cresol	69	63	9	33	26-103
4-Nitrophenol	22	20	10	50	11-114

WADSWORTH/ALERT
LABORATORIES, INC.

LAB # : 0L0302-3
MATRIX: WATER
METHOD: 8080

DATE RECEIVED : 12/03/90
DATE EXTRACTED: 12/05/90
DATE ANALYZED : 12/11/90

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Lindane	29	31	7	15	56-123
Heptachlor	81	86	6	20	40-131
Aldrin	71	73	3	22	40-120
Dieldrin	91	95	4	18	52-126
Endrin	86	87	1	21	56-121
4,4'-DDT	89	92	3	27	38-127

WADSWORTH/ALERT
LABORATORIES, INC.

LAB # : 0K3004-4
MATRIX: SOIL
METHOD: 8080

DATE RECEIVED : 11/30/90
DATE EXTRACTED: 12/04/90
DATE ANALYZED : 12/11/90

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Lindane	83	114	31	50	46-127
Heptachlor	85	109	25	31	35-130
Aldrin	75	99	27	43	34-132
Dieldrin	95	125	27	38	31-134
Endrin	86	103	18	45	42-139
4,4'-DDT	90	110	20	50	23-134

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	32	(22-135)	(10-155)
Fluorobiphenyl	95	(34-140)	(12-153)
Terphenyl-d14	81	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: 0302-BK
MATRIX: SOIL

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: 12/ 4/90
DATE ANALYZED: 12/ 5/90

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

BASE/NEUTRAL EXTRACTABLE ORGANICS
TARGET COMPOUND LIST - GC/MS (2 of 2)

Hexachloroethane	ND
Indeno(1,2,3-cd)pyrene	ND
Isophorone	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Nitrobenzene	ND
2-Nitronaniline	ND*
3-Nitronaniline	ND*
4-Nitronaniline	ND*
N-Nitrosodiphenylamine	ND
N-Nitrosodi-n-propylamine	ND
Phenanthrene	ND
Pyrene	ND
1,2,4-Trichlorobenzene	ND

NOTE: ND (None Detected, lower detectable limit = .33 mg/kg) as rec'd
ND* (None Detected, lower detectable limit = 1.7 mg/kg) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	32	(22-135)	(10-155)
Fluorobiphenyl	95	(34-140)	(12-153)
Terphenyl-d14	81	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-5
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-07 SUN BANK-FT. LAUDERDALE,FL.

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	2.0	Ethylbenzene	ND
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	8.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	ND
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	104	(75-123)	(85-126)	(85-138)
Toluene-d8	93	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	101	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES, INC.

COMPANY: CONESTOGA-ROVERS & ASSOCIATES, INC.
LAB #: L0302-6
MATRIX: WATER

DATE RECEIVED: 12/ 3/90
DATE EXTRACTED: NA
DATE ANALYZED: 12/ 4/90

SAMPLE ID: W-113090-PS-08 SUN BANK-FT. LAUDERDALE,FL

VOLATILE ORGANICS
TARGET COMPOUND LIST - GC/MS

Acetone	ND**	cis-1,3-Dichloropropene	ND
Benzene	ND	trans-1,3-Dichloropropene	ND
Bromodichloromethane	ND	Ethylbenzene	12
Bromoform	ND	2-Hexanone	ND**
Bromomethane	ND	Methylene chloride	ND
2-Butanone	ND**	4-Methyl-2-pentanone	ND**
Carbon disulfide	ND	Styrene	ND
Carbon tetrachloride	ND	1,1,2,2-Tetrachloroethane	ND
Chlorobenzene	ND	Tetrachloroethene	ND
Chloroethane	ND	Toluene	ND
Chloroform	8.0	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,1-Dichloroethane	ND	Vinyl acetate	ND**
1,2-Dichloroethane	ND	Vinyl chloride	ND
1,1-Dichloroethene	ND	Total Xylenes	8.0
1,2-Dichloroethene (Total)	ND		
1,2-Dichloropropane	ND		

NOTE: ND (None Detected, lower detectable limit = 1.0 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
ND** (None Detected, lower detectable limit = 10 ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	103	(75-123)	(85-126)	(85-138)
Toluene-d8	94	(92-107)	(89-124)	(89-128)
Bromofluorobenzene	105	(86-115)	(84-124)	(83-128)

CRA Consulting Engineers
CONESTOGA-ROVERS & ASSOCIATES
651 Colby Drive, Waterloo, Ontario Canada N2V 1C2

SHIPPED TO (Laboratory name): WADSWORTH ALERT LABS

CHAIN OF CUSTODY RECORD

PROJECT Nº: 3050

PROJECT NAME: Sun Bank

SAMPLER'S SIGNATURE _____ (SIGN)

SEQ. Nº.	SAMPLE Nº.	DATE	TIME	SAMPLE LOCATOIN	SAMPLE TYPE	Nº OF CONTAINERS	REMARKS
S-1	12890-PS-09		15:15		SOIL	4	TCL VOC, TCL
S-1	12890-PS-10 (MS/MSD)		15:00		SOIL	9	PCB/PEST., TCL
S-1	12890-PS-11		15:30		SOIL	4	BNA, Polychlorinated Dibenzo-p-Dioxins & Dibenzofurans & Mineral Spirits (602)
				TOTAL NUMBER OF CONTAINERS		17	

ANTICIPATED CHEMICAL HAZARDS:

RELINQUISHED BY: [1] (SIGN)	DATE/TIME 11-28-99 20:00	RECEIVED BY: [2] (SIGN)	
RELINQUISHED BY: [2] (SIGN)	DATE/TIME	RECEIVED BY: [3] (SIGN)	
RELINQUISHED BY: [3] (SIGN)	DATE/TIME	RECEIVED BY: [4] (SIGN)	
ADDITIONAL SIGNATURE SHEET REQUIRED ☐			

METHOD OF SHIPMENT: Overnight	SHIPPED BY: Fed ex	RECEIVED FOR LABORATORY BY: (SIGN)	DATE/TIME
CONDITION OF SEAL UPON RECEIPT: GENERAL CONDITION OF COOLER:		COOLER OPENED BY: (SIGN)	DATE/TIME

WHITE – CRA OFFICE COPY
YELLOW – RECEIVING LABORATORY COPY
PINK – CRA LABORATORY COPY
GOLDEN ROD – SHIPPERS

Nº 009294

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002049 CLIENT ID....: WADSWORTH TLI NUMBER....: M. BLANK
CONCAL.....: E002048 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 1000.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805W SHIPMENT NO...: N/A

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.2				
12378-PeCDD	ND		0.5				
123478-HxCDD	ND		0.3				
123678-HxCDD	ND		0.2				
123789-HxCDD	ND		0.2				
1234678-HpCDD	ND		0.4				
OCDD	EMPC			0.18			
2378-TCDF	ND		0.1				
12378-PeCDF	ND		0.2				
23478-PeCDF	ND		0.2				
123478-HxCDF	ND		0.1				
123678-HxCDF	ND		0.1				
234678-HxCDF	ND		0.1				
123789-HxCDF	ND		0.2				
1234678-HpCDF	ND		0.2				
1234789-HpCDF	ND		0.2				
OCDF	ND		0.2				
TOTAL TCDD	EMPC			4.78			
TOTAL PeCDD	ND		0.5				
TOTAL HxCDD	ND		0.2				
TOTAL HpCDD	ND		0.4				
TOTAL TCDF	EMPC			0.19			
TOTAL PeCDF	ND		0.2				
TOTAL HxCDF	ND		0.1				
TOTAL HpCDF	ND		0.2				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.6	79.2	0.80	25:20	
13C12-2378-TCDD	35.4	70.9	0.80	26:17	
13C12-HxCDD 678	43.7	87.4	1.27	39:45	
13C12-HpCDF 678	85.6	85.6	1.06	44:20	
13C12-OCDD	84.4	84.4	0.90	53:03	

8280_RPT rev:3.02

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/24/91

FILE NAME....: E002064 CLIENT ID....: WADSWORTH TLI NUMBER....: M.BLANK
CONCAL.....: E002063 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
SAMPLE SIZE..: 10.00 g SAMPLE MATRIX: SOIL DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: N/A

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				___
12378-PeCDD	ND		0.003				___
123478-HxCDD	ND		0.003				___
123678-HxCDD	ND		0.003				___
123789-HxCDD	ND		0.003				___
1234678-HpCDD	ND		0.003				___
OCDD	0.02				0.80	53:05	_L_
2378-TCDF	ND		0.003				___
12378-PeCDF	ND		0.003				___
23478-PeCDF	ND		0.003				___
123478-HxCDF	ND		0.003				___
123678-HxCDF	ND		0.003				___
234678-HxCDF	ND		0.003				___
123789-HxCDF	ND		0.003				___
1234678-HpCDF	ND		0.003				___
1234789-HpCDF	ND		0.003				___
OCDF	ND		0.003				___
TOTAL TCDD	EMPC			0.52			___
TOTAL PeCDD	ND		0.003				___
TOTAL HxCDD	EMPC			0.01			___
TOTAL HpCDD	ND		0.003				___
TOTAL TCDF	EMPC			0.026			___
TOTAL PeCDF	ND		0.003				___
TOTAL HxCDF	ND		0.003				___
TOTAL HpCDF	ND		0.003				___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.7	74.6	0.80	25:19	___
13C12-2378-TCDD	3.9	77.0	0.79	26:15	___
13C12-HxCDD 678	4.6	92.3	1.26	39:44	___
13C12-HpCDF 678	7.9	78.8	1.05	44:20	___
13C12-OCDD	8.8	88.2	0.90	53:04	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002069 CLIENT ID....: WADSWORTH TLI NUMBER....: M.BLANK
CONCAL.....: E002063 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.00 g SAMPLE MATRIX: SOIL DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: N/A

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				
12378-PeCDD	ND		0.008				
123478-HxCDD	ND		0.005				
123678-HxCDD	ND		0.005				
123789-HxCDD	ND		0.005				
1234678-HpCDD	ND		0.005				
OCDD	0.09				0.90	53:07	L
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.005				
23478-PeCDF	ND		0.005				
123478-HxCDF	ND		0.003				
123678-HxCDF	ND		0.003				
234678-HxCDF	ND		0.003				
123789-HxCDF	ND		0.003				
1234678-HpCDF	ND		0.003				
1234789-HpCDF	ND		0.005				
OCDF	0.004				0.97	53:20	L
TOTAL TCDD	EMPC			0.44			
TOTAL PeCDD	ND		0.008				
TOTAL HxCDD	ND		0.005				
TOTAL HpCDD	ND		0.005				
TOTAL TCDF	EMPC			0.03			
TOTAL PeCDF	ND		0.005				
TOTAL HxCDF	ND		0.003				
TOTAL HpCDF	ND		0.003				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.9	58.4	0.79	25:20	
13C12-2378-TCDD	3.1	61.3	0.79	26:15	
13C12-HxCDD 678	4.8	96.9	1.25	39:47	
13C12-HpCDF 678	8.9	89.1	1.04	44:23	
13C12-OCDD	9.6	95.9	0.90	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/23/91

FILE NAME....: E002051 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3E MS
CONCAL.....: E002048 SAMPLE ID....: OL 0302-3 MS
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 930.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	51.7				0.79	26:18	
12378-PeCDD	76.6				1.54	33:06	
123478-HxCDD	140				1.23	39:37	
123678-HxCDD	124				1.23	39:48	
123789-HxCDD	132				1.22	40:26	
1234678-HpCDD	157				1.06	46:36	
OCDD	261				0.88	53:10	
2378-TCDF	52.4				0.77	25:21	
12378-PeCDF	72.6				1.56	31:12	
23478-PeCDF	70.0				1.55	32:28	
123478-HxCDF	134				1.23	37:59	
123678-HxCDF	127				1.22	38:12	
234678-HxCDF	126				1.22	39:19	
123789-HxCDF	123				1.23	40:52	
1234678-HpCDF	134				1.05	44:25	
1234789-HpCDF	134				1.05	47:26	
OCDF	223				0.87	53:23	
TOTAL TCDD	51.7	2		57.1	0.79		
TOTAL PeCDD	77.6	2		77.2	1.59		
TOTAL HxCDD	403	4		394.5	1.28		
TOTAL HpCDD	157	1		312.6	1.06		
TOTAL TCDF	54.2	3		53.2	0.73		
TOTAL PeCDF	148	8			1.56		
TOTAL HxCDF	513	6		255.5	1.24		
TOTAL HpCDF	270	3		269.0	1.06		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	41.1	76.4	0.79	25:20	
13C12-2378-TCDD	41.9	78.0	0.78	26:17	
13C12-HxCDD 678	49.3	91.7	1.26	39:47	
13C12-HpCDF 678	97.5	90.7	1.05	44:24	
13C12-OCDD	97.5	90.7	0.90	53:09	

8280_RPT rev:3.02

FILE NAME....: E002052 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3HMSD
CONCAL.....: E002048 SAMPLE ID....: OL 0302-3 MSD
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 965.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	40.6				0.79	26:18	
12378-PeCDD	67.8				1.55	33:05	
123478-HxCDD	107				1.25	39:36	
123678-HxCDD	101				1.24	39:48	
123789-HxCDD	105				1.24	40:25	
1234678-HpCDD	124				1.05	46:35	
OCDD	205				0.89	53:09	
2378-TCDF	41.2				0.77	25:22	
12378-PeCDF	67.5				1.57	31:11	
23478-PeCDF	67.2				1.56	32:27	
123478-HxCDF	95.0				1.24	37:59	
123678-HxCDF	95.9				1.24	38:11	
234678-HxCDF	94.9				1.24	39:18	
123789-HxCDF	91.9				1.25	40:52	
1234678-HpCDF	104				1.04	44:24	
1234789-HpCDF	107				1.04	47:24	
OCDF	178				0.89	53:21	
TOTAL TCDD	40.6	1		45.7	0.79		
TOTAL PeCDD	67.8	2		68.4	1.63		
TOTAL HxCDD	316	4		316	1.27		
TOTAL HpCDD	125	2			1.07		
TOTAL TCDF	41.7	4		42.2	0.78		
TOTAL PeCDF	140	8			1.53		
TOTAL HxCDF	381	6		381	1.26		
TOTAL HpCDF	212	3		212	1.06		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	36.9	71.3	0.79	25:20	
13C12-2378-TCDD	42.1	81.3	0.79	26:17	
13C12-HxCDD 678	54.5	105	1.26	39:46	
13C12-HpCDF 678	110	106	1.06	44:23	
13C12-OCDD	103	99.8	0.90	53:07	

FILE NAME....: E002086	CLIENT ID....: WADSWORTH	TLI NUMBER....:	3-53-4MS
CONCAL.....: E002076	SAMPLE ID....: OK 3004-4MS		
ANALYST.....: XL	ANALYSIS DATE: 01/21/91	PROJECT NUMBER:	219-S2
SAMPLE SIZE..: 10.04 g	SAMPLE MATRIX: SOIL	DATE RECEIVED.:	12/04/90
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED:	/ /
SPIKE FILE...: SF82805N		SHIPMENT NO...:	FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.9				0.79	26:15	___
12378-PeCDD	5.6				1.57	33:01	___
123478-HxCDD	9.3				1.24	39:30	___
123678-HxCDD	13.3				1.23	39:40	___
123789-HxCDD	9.6				1.23	40:19	___
1234678-HpCDD	67.3				1.05	46:28	_H_
OCDD	970				0.88	53:04	H,BL
2378-TCDF	4.8				0.78	25:19	___
12378-PeCDF	5.5				1.58	31:07	___
23478-PeCDF	5.3				1.57	32:22	___
123478-HxCDF	13.3				1.24	37:52	___
123678-HxCDF	13.3				1.24	38:05	___
234678-HxCDF	12.6				1.23	39:12	___
123789-HxCDF	12.5				1.24	40:44	___
1234678-HpCDF	28.8				1.02	44:16	___
1234789-HpCDF	12.7				1.04	47:17	___
OCDF	107				0.87	53:14	H,BL
TOTAL TCDD	4.9	1		5.5	0.79		___
TOTAL PeCDD	5.6	1			1.57		___
TOTAL HxCDD	35.1	5		36.0	1.24		___
TOTAL HpCDD	112	2			1.05		___
TOTAL TCDF	4.8	1		4.9	0.78		___
TOTAL PeCDF	11.3	4		11.6	1.59		___
TOTAL HxCDF	62.9	7		63.0	1.24		___
TOTAL HpCDF	106	3		106	1.04		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.1	83.3	0.80	25:18	___
13C12-2378-TCDD	3.8	76.0	0.80	26:14	___
13C12-HxCDD 678	5.5	111	1.26	39:40	___
13C12-HpCDF 678	8.4	84.0	1.04	44:15	___
13C12-OCDD	9.1	91.3	1.02	53:03	___

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)
01/25/91

FILE NAME....: E002087 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-4MSD
CONCAL.....: E002076 SAMPLE ID....: OK 3004-4MSD
ANALYST.....: XL ANALYSIS DATE: 01/21/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.40 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.7				0.79	26:14	
12378-PeCDD	5.1				1.59	33:01	
123478-HxCDD	9.9				1.24	39:29	
123678-HxCDD	12.9				1.23	39:40	
123789-HxCDD	9.9				1.22	40:18	
1234678-HpCDD	55.3				1.05	46:27	H
OCDD	705				0.88	53:01	H,BL
2378-TCDF	4.7				0.78	25:19	
12378-PeCDF	5.0				1.59	31:06	
23478-PeCDF	4.8				1.57	32:22	
123478-HxCDF	12.6				1.24	37:52	
123678-HxCDF	12.5				1.24	38:04	
234678-HxCDF	11.7				1.22	39:11	
123789-HxCDF	11.6				1.24	40:43	
1234678-HpCDF	25.0				1.02	44:15	
1234789-HpCDF	12.0				1.04	47:15	
OCDF	82.2				0.87	53:12	BL
TOTAL TCDD	4.7	1		5.25	0.79		
TOTAL PeCDD	5.1	1			1.59		
TOTAL HxCDD	35.1	5		35.2	1.23		
TOTAL HpCDD	90.2	2			1.05		
TOTAL TCDF	4.7	1		4.8	0.78		
TOTAL PeCDF	10.2	4		10.4	1.58		
TOTAL HxCDF	57.7	6		58.0	1.24		
TOTAL HpCDF	92.5	3		92.2	1.03		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.3	89.5	0.80	25:17	
13C12-2378-TCDD	3.9	80.5	0.80	26:13	
13C12-HxCDD 678	5.0	104	1.27	39:39	
13C12-HpCDF 678	8.6	89.8	1.04	44:14	
13C12-OCDD	11.1	116	1.00	53:00	

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....:	E002053	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-51-1C
CONCAL.....:	E002048	SAMPLE ID....:	OL 0302-1		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	835.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.06				
12378-PeCDD	ND		0.1				
123478-HxCDD	ND		0.06				
123678-HxCDD	ND		0.06				
123789-HxCDD	ND		0.06				
1234678-HpCDD	0.17				1.03	46:34	L
OCDD	17.0				0.89	53:06	L
2378-TCDF	ND		0.04				
12378-PeCDF	ND		0.06				
23478-PeCDF	ND		0.06				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.03				
123789-HxCDF	ND		0.04				
1234678-HpCDF	ND		0.04				
1234789-HpCDF	ND		0.06				
OCDF	0.06				0.77	53:18	L
TOTAL TCDD	0.10	1		5.3	0.71		
TOTAL PeCDD	0.23	1			1.70		
TOTAL HxCDD	2.0	1		2.12	1.30		
TOTAL HpCDD	1.7	2			1.03		
TOTAL TCDF	EMPC			0.33			
TOTAL PeCDF	0.10	1			1.36		
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	0.05	1			1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	33.3	55.6	0.80	25:20	
13C12-2378-TCDD	36.7	61.4	0.79	26:16	
13C12-HxCDD 678	48.4	80.8	1.27	39:45	
13C12-HpCDF 678	95.6	79.8	1.05	44:21	
13C12-OCDD	92.5	77.2	0.90	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002054 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-2C
CONCAL.....: E002048 SAMPLE ID....: OL 0302-2
ANALYST.....: XL ANALYSIS DATE: 01/18/91. PROJECT NUMBER: 219-W
SAMPLE SIZE..: 760.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
TCAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.09				
123478-HxCDD	ND		0.06				
123678-HxCDD	ND		0.05				
123789-HxCDD	ND		0.05				
1234678-HpCDD	2.1				1.08	46:34	L
OCDD	25.5				0.89	53:06	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	0.54				1.06	44:23	L
1234789-HpCDF	ND		0.05				
OCDF	2.1				0.89	53:19	L
TOTAL TCDD	0.29	1		7.5	0.76		
TOTAL PeCDD	ND		0.09				
TOTAL HxCDD	0.11	1			1.32		
TOTAL HpCDD	3.7	2			1.06		
TOTAL TCDF	EMPC			0.36			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	0.33	1		0.37	1.28		
TOTAL HpCDF	2.6	2			1.06		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	45.4	69.1	0.80	25:20	
13C12-2378-TCDD	45.9	69.8	0.79	26:17	
13C12-HxCDD 678	58.1	88.4	1.28	39:45	
13C12-HpCDF 678	121	92.2	1.06	44:22	
13C12-OCDD	111	84.4	0.90	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....: E002050	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-51-3D	
CONCAL.....: E002048	SAMPLE ID....: OL 0302-3		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 955.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL 3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.10				
123478-HxCDD	ND		0.05				
123678-HxCDD	ND		0.05				
123789-HxCDD	ND		0.05				
1234678-HpCDD	ND		0.07				
OCDD	0.98				0.85	53:08	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	ND		0.03				
1234789-HpCDF	ND		0.04				
OCDF	0.04				0.90	53:18	L
TOTAL TCDD	EMPC			5.5			
TOTAL PeCDD	ND		0.10				
TOTAL HxCDD	ND		0.05				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.30			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	ND		0.04				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	34.3	65.5	0.81	25:19	
13C12-2378-TCDD	34.9	66.7	0.80	26:16	
13C12-HxCDD 678	47.1	89.9	1.27	39:46	
13C12-HpCDF 678	93.8	89.6	1.06	44:23	
13C12-OCDD	93.5	89.3	0.90	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002055 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-1D
ONCAL.....: E002048 SAMPLE ID....: OL0302-4
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 790.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
CAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.1				
123478-HxCDD	ND		0.08				
123678-HxCDD	0.77				1.29	39:45	L
123789-HxCDD	ND		0.07				
1234678-HpCDD	ND		0.1				
OCDD	948				0.86	53:07	H
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	0.08				1.05	37:57	L
123678-HxCDF	ND		0.05				
234678-HxCDF	ND		0.04				
123789-HxCDF	ND		0.05				
1234678-HpCDF	14.2				1.10	44:21	L
1234789-HpCDF	EMPC			0.33			
OCDF	55.4				0.87	53:20	
TOTAL TCDD	EMPC			4.9			
TOTAL PeCDD	EMPC			0.65			
TOTAL HxCDD	15.5	3			1.26		
TOTAL HpCDD	46.3	1			1.03		
TOTAL TCDF	EMPC			0.23			
TOTAL PeCDF	EMPC			0.05			
TOTAL HxCDF	1.8	3		2.2	1.17		
TOTAL HpCDF	68.8	2		69.2	1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	41.5	65.6	0.79	25:19	
13C12-2378-TCDD	43.3	68.4	0.79	26:15	
13C12-HxCDD 678	55.5	87.7	1.24	39:44	
13C12-HpCDF 678	98.2	77.6	1.02	44:20	
13C12-OCDD	118	93.1	0.93	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
H = CONCENTRATION ABOVE CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....: E002057	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-3D	
CONCAL.....: E002048	SAMPLE ID....: OL 0302-6		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 865.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				___
12378-PeCDD	ND		0.2				___
123478-HxCDD	ND		0.07				___
123678-HxCDD	ND		0.07				___
123789-HxCDD	ND		0.07				___
1234678-HpCDD	0.37				1.09	46:34	_L_
OCDD	26.7				0.89	53:06	_L_
2378-TCDF	ND		0.05				___
12378-PeCDF	ND		0.08				___
23478-PeCDF	ND		0.08				___
123478-HxCDF	ND		0.04				___
123678-HxCDF	ND		0.04				___
234678-HxCDF	ND		0.03				___
123789-HxCDF	ND		0.04				___
1234678-HpCDF	ND		0.05				___
1234789-HpCDF	ND		0.06				___
OCDF	0.28				0.87	53:19	_L_
TOTAL TCDD	EMPC			5.6			___
TOTAL PeCDD	ND		0.2				___
TOTAL HxCDD	3.2	1			1.28		___
TOTAL HpCDD	3.1	2			1.08		___
TOTAL TCDF	EMPC			0.36			___
TOTAL PeCDF	EMPC			0.12			___
TOTAL HxCDF	EMPC			0.07			___
TOTAL HpCDF	0.16	1			1.08		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	29.3	50.7	0.80	25:20	___
13C12-2378-TCDD	31.1	53.8	0.79	26:17	___
13C12-HxCDD 678	50.3	87.0	1.28	39:46	___
13C12-HpCDF 678	104	89.9	1.06	44:22	___
13C12-OCDD	95.2	82.4	0.90	53:05	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002058 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-6A
CONCAL.....: E002048 SAMPLE ID....: OL 0302-9
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 210-W
SAMPLE SIZE..: 895.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.03				
12378-PeCDD	ND		0.06				
123478-HxCDD	ND		0.04				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	ND		0.05				
OCDD	0.58				0.90	53:04	L
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.03				
23478-PeCDF	ND		0.03				
123478-HxCDF	ND		0.02				
123678-HxCDF	ND		0.02				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
1234678-HpCDF	ND		0.02				
1234789-HpCDF	ND		0.03				
OCDF	ND		0.03				
TOTAL TCDD	EMPC			6.3			
TOTAL PeCDD	ND		0.06				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.05				
TOTAL TCDF	EMPC			0.29			
TOTAL PeCDF	ND		0.03				
TOTAL HxCDF	ND		0.02				
TOTAL HpCDF	ND		0.03				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.2	72.0	0.80	25:17	
13C12-2378-TCDD	40.7	72.9	0.79	26:13	
13C12-HxCDD 678	48.2	86.3	1.28	39:42	
13C12-HpCDF 678	101	90.2	1.06	44:19	
13C12-OCDD	84.5	75.6	0.91	53:03	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002059 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-1A
CONCAL.....: E002048 SAMPLE ID....: OK 3004-1
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 925.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				
12378-PeCDD	ND		0.07				
123478-HxCDD	ND		0.04				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	0.15				1.08	46:33	_L_
OCDD	3.5				0.88	53:03	_L_
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.04				
23478-PeCDF	ND		0.04				
123478-HxCDF	ND		0.02				
123678-HxCDF	ND		0.02				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
1234678-HpCDF	EMPC			0.04			
1234789-HpCDF	ND		0.03				
OCDF	0.24				0.88	53:16	_L_
TOTAL TCDD	EMPC			5.6			
TOTAL PeCDD	ND		0.07				
TOTAL HxCDD	EMPC			0.18			
TOTAL HpCDD	0.15	1		0.26	1.08		
TOTAL TCDF	EMPC			0.27			
TOTAL PeCDF	ND		0.04				
TOTAL HxCDF	0.02	1			1.10		
TOTAL HpCDF	0.15	1		0.20	1.07		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.2	72.6	0.80	25:17	
13C12-2378-TCDD	41.1	76.0	0.79	26:13	
13C12-HxCDD 678	54.1	100	1.27	39:42	
13C12-HpCDF 678	113	105	1.06	44:19	
13C12-OCDD	104	96.0	0.91	53:01	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)
01/25/91

FILE NAME....:	E002060	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-53-2A
CONCAL.....:	E002048	SAMPLE ID....:	OK 3004-2		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	770.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				
12378-PeCDD	ND		0.08				
123478-HxCDD	ND		0.05				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	ND		0.07				
OCDD	3.1				0.91	53:05	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.04				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	0.05				1.06	44:22	L
1234789-HpCDF	ND		0.05				
OCDF	0.21				1.00	53:18	L
TOTAL TCDD	EMPC			6.0			
TOTAL PeCDD	ND		0.08				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.37			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	0.22	2			1.09		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.0	61.6	0.80	25:19	
13C12-2378-TCDD	44.0	67.8	0.79	26:16	
13C12-HxCDD 678	56.8	87.5	1.27	39:45	
13C12-HpCDF 678	101	77.7	1.06	44:21	
13C12-OCDD	82.7	63.7	0.91	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/26/91

FILE NAME....:	E002065	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-4
CONCAL.....:	E002063	SAMPLE ID....:	OL-0302-7		
ANALYST.....:	XL	ANALYSIS DATE:	01/19/91	PROJECT NUMBER:	219-S
SAMPLE SIZE..:	9.77 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805N			SHIPMENT NO...:	FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				___
12378-PeCDD	ND		0.005				___
123478-HxCDD	ND		0.005				___
123678-HxCDD	0.88				1.25	39:47	_L_
123789-HxCDD	0.11				1.25	40:25	_L_
1234678-HpCDD	32.6				1.04	46:34	___
OCDD	357				0.89	53:17	H,BL
2378-TCDF	ND		0.003				___
12378-PeCDF	ND		0.003				___
23478-PeCDF	ND		0.003				___
123478-HxCDF	0.13				1.27	37:58	_L_
123678-HxCDF	0.05				1.26	38:10	_L_
234678-HxCDF	0.04				1.32	39:18	_L_
123789-HxCDF	ND		0.003				___
1234678-HpCDF	9.8				1.06	44:22	___
1234789-HpCDF	0.33				1.05	47:21	_L_
OCDF	34.1				0.89	53:26	___
TOTAL TCDD	0.01	1		0.56	0.89		___
TOTAL PeCDD	EMPC			0.014			___
TOTAL HxCDD	2.6	4		2.73	1.25		___
TOTAL HpCDD	59.3	2			1.04		___
TOTAL TCDF	0.005	1		0.12	0.74		___
TOTAL PeCDF	0.05	1		0.09	1.37		___
TOTAL HxCDF	5.6	8		5.6	1.24		___
TOTAL HpCDF	45.1	3		45.2	1.05		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.1	61.0	0.80	25:19	___
13C12-2378-TCDD	3.3	64.6	0.79	26:15	___
13C12-HxCDD 678	4.4	85.2	1.27	39:45	___
13C12-HpCDF 678	8.6	84.5	1.05	44:20	___
13C12-OCDD	12.5	122	0.95	53:15	___

8280_RPT rev:3.02

H = CONCENTRATION ABOVE CALIBRATION RANGE
L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/26/91

FILE NAME....: E002066 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-5
CONCAL.....: E002063 SAMPLE ID....: OL-0302-8
NALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
SAMPLE SIZE..: 8.78 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
PIKE FILE...: SP82805N SHIPMENT NO...: FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
3478-TCDD	ND		0.003				
12378-PeCDD	ND		0.005				
23478-HxCDD	ND		0.003				
23678-HxCDD	0.03				1.32	39:46	_L_
123789-HxCDD	ND		0.003				
1234678-HpCDD	1.5				1.05	46:34	_L_
CDD	21.0				0.89	53:07	_BL
2378-TCDF	ND		0.003				
2378-PeCDF	ND		0.003				
3478-PeCDF	ND		0.003				
123478-HxCDF	0.006				1.41	37:56	_L_
23678-HxCDF	EMPC			0.002			
34678-HxCDF	0.002				1.12	39:17	_L_
123789-HxCDF	ND		0.003				
1234678-HpCDF	0.46				1.06	44:22	_L_
234789-HpCDF	0.01				1.16	47:24	_L_
CDF	1.6				0.92	53:20	_L_
OTAL TCDD	0.03	1		0.60	0.69		
OTAL PeCDD	ND		0.005				
TOTAL HxCDD	0.10	3		0.11	1.35		
OTAL HpCDD	2.8	2			1.05		
TOTAL TCDF	0.002	1		0.03	0.91		
TOTAL PeCDF	ND		0.003				
OTAL HxCDF	0.24	4		0.26	1.24		
OTAL HpCDF	1.9	3			1.09		

NTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.2	74.0	0.79	25:19	
13C12-2378-TCDD	4.5	78.6	0.79	26:15	
3C12-HxCDD 678	5.4	94.7	1.26	39:45	
3C12-HpCDF 678	10.2	89.7	1.06	44:21	
13C12-OCDD	12.0	106	0.90	53:06	

8280_RPT rev:3.02

H = CONCENTRATION ABOVE CALIBRATION RANGE
= CONCENTRATION BELOW CALIBRATION RANGE
L = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002073 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-3
CONCAL.....: E002063 SAMPLE ID....: OK-3004-3
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
SAMPLE SIZE..: 10.27 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805N SHIPMENT NO...: FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				___
12378-PeCDD	ND		0.03				___
123478-HxCDD	0.03				1.17	39:34	_L_
123678-HxCDD	1.5				1.25	39:46	_L_
123789-HxCDD	0.15				1.30	40:25	_L_
1234678-HpCDD	72.3				1.04	46:34	_H_
OCDD	852				0.88	53:11	H,BL
2378-TCDF	ND		0.01				___
12378-PeCDF	ND		0.01				___
23478-PeCDF	ND		0.01				___
123478-HxCDF	0.17				1.24	37:58	_L_
123678-HxCDF	0.04				1.17	38:11	_L_
234678-HxCDF	0.04				1.23	39:17	_L_
123789-HxCDF	ND		0.01				___
1234678-HpCDF	16.1				1.05	44:22	___
1234789-HpCDF	0.60				1.09	47:22	_L_
OCDF	79.6				0.87	53:21	___
TOTAL TCDD	EMPC			0.46			___
TOTAL PeCDD	ND		0.03				___
TOTAL HxCDD	5.5	6			1.26		___
TOTAL HpCDD	131	2			1.04		___
TOTAL TCDF	EMPC			0.04			___
TOTAL PeCDF	0.08	1			1.60		___
TOTAL HxCDF	11.2	9		11.4	1.23		___
TOTAL HpCDF	124	4		97.3	1.86		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.4	70.4	0.80	25:22	___
13C12-2378-TCDD	3.3	67.1	0.80	26:19	___
13C12-HxCDD 678	4.3	88.1	1.28	39:45	___
13C12-HpCDF 678	8.2	84.7	1.05	44:21	___
13C12-OCDD	12.1	124	1.02	53:09	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2X
H = CONCENTRATION ABOVE CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002085 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-4
CONCAL.....: E002076 SAMPLE ID....: OK 3004-4
ANALYST.....: XL ANALYSIS DATE: 01/21/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.44 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.09				
123478-HxCDD	ND		0.05				
123678-HxCDD	1.2				1.26	39:39	L
123789-HxCDD	0.14				1.39	40:16	L
1234678-HpCDD	38.2				1.04	46:26	
OCDD	684				0.88	53:01	H,BL
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	0.16				1.27	37:51	L
123678-HxCDF	0.06				1.42	38:03	L
234678-HxCDF	0.03				1.18	39:10	L
123789-HxCDF	ND		0.04				
1234678-HpCDF	13.6				1.07	44:14	
1234789-HpCDF	0.50				1.12	47:14	L
OCDF	64.1				0.87	53:12	BL
TOTAL TCDD	EMPC			0.53			
TOTAL PeCDD	0.15	1			1.59		
TOTAL HxCDD	3.9	5			1.31		
TOTAL HpCDD	70.9	2			1.04		
TOTAL TCDF	EMPC			0.05			
TOTAL PeCDF	0.45	2			1.51		
TOTAL HxCDF	10.1	6		10.4	1.26		
TOTAL HpCDF	70.3	3		70.7	1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.8	79.9	0.81	25:17	
13C12-2378-TCDD	4.0	83.0	0.80	26:12	
13C12-HxCDD 678	5.6	116	1.27	39:38	
13C12-HpCDF 678	8.1	84.8	1.04	44:13	
13C12-OCDD	9.5	99.3	0.99	53:00	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....:	E002068	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-53-5
CONCAL.....:	E002063	SAMPLE ID....:	OK-3004-5		
ANALYST.....:	XL	ANALYSIS DATE:	01/19/91	PROJECT NUMBER:	219-S
SAMPLE SIZE..:	8.54 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805N			SHIPMENT NO...:	FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.01				___
12378-PeCDD	ND		0.02				___
123478-HxCDD	ND		0.008				___
123678-HxCDD	0.16				1.33	39:46	_L_
123789-HxCDD	0.01				1.09	40:25	_L_
1234678-HpCDD	6.2				1.04	46:34	___
OCDD	65.4				0.88	53:06	_BL_
2378-TCDF	ND		0.02				___
12378-PeCDF	ND		0.02				___
23478-PeCDF	ND		0.02				___
123478-HxCDF	0.01				1.29	37:57	_L_
123678-HxCDF	ND		0.005				___
234678-HxCDF	ND		0.005				___
123789-HxCDF	ND		0.008				___
1234678-HpCDF	1.8				1.05	44:22	_L_
1234789-HpCDF	0.07				1.01	47:23	_L_
OCDF	6.6				0.87	53:19	___
TOTAL TCDD	EMPC			0.24			___
TOTAL PeCDD	ND		0.02				___
TOTAL HxCDD	0.55	4			1.25		___
TOTAL HpCDD	11.0	2			1.05		___
TOTAL TCDF	EMPC			0.17			___
TOTAL PeCDF	ND		0.02				___
TOTAL HxCDF	1.5	3		1.46	1.30		___
TOTAL HpCDF	11.5	3			1.04		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.63	10.7	0.81	25:19	___
13C12-2378-TCDD	1.3	22.5	0.81	26:16	___
13C12-HxCDD 678	3.0	51.7	1.27	39:44	___
13C12-HpCDF 678	4.1	34.9	1.05	44:21	___
13C12-OCDD	7.5	64.3	0.91	53:05	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2X

QUALITY CONTROL

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TLH PROJECT #: 219
DATE: 1-26-91
METHOD: IFB DRAFT 4/89
MATRIX: WATER
SAMPLE ID: OL 0302-3

	SAMPLE ID:OL 0302-3 MS		SAMPLE ID:OL 0302-3 MSD	
	VOLUME:	0.93 L	VOLUME:	0.965 L

COMPOUND	SAMPLE CONC. (ppt)	MS SPIKE ADDED (ppt)	MS CONC. OBSERVED (ppt)	MS %REC %	MSD SPIKE ADDED (ppt)	MSD CONC. OBSERVED (ppt)	MSD %REC %	%RPD %
2378-TCDD	ND	53.8	51.7	96.2	51.8	40.6	78.4	17.1
12378-PeCDD	ND	53.8	76.6	142.5	51.8	67.8	130.9	8.5
123478-HxCDD	ND	134.4	140.0	104.2	129.5	107.0	82.6	29.6
123678-HxCDD	ND	134.4	124.0	92.3	129.5	101.0	78.0	22.8
123789-HxCDD	ND	134.4	132.0	98.2	129.5	105.0	81.1	25.3
1234678-HpCDD	ND	134.4	157.0	116.8	129.5	124.0	95.7	26.1
OCDD	0.98	268.8	261.0	97.1	259.1	205.0	79.1	32.9
2378-TCDF	ND	53.8	52.4	97.5	51.8	41.2	79.5	17.0
12378-PeCDF	ND	53.8	72.6	135.0	51.8	67.5	130.3	5.0
23478-PeCDF	ND	53.8	70.0	130.2	51.8	67.2	129.7	2.8
123478-HxCDF	ND	134.4	134.0	99.7	129.5	95.0	73.3	37.6
123678-HxCDF	ND	134.4	127.0	94.5	129.5	95.9	74.0	30.9
234678-HxCDF	ND	134.4	126.0	93.7	129.5	94.9	73.3	31.2
123789-HxCDF	ND	134.4	123.0	91.5	129.5	91.9	70.9	32.1
1234678-HpCDF	ND	134.4	134.0	99.7	129.5	104.0	80.3	28.0
1234789-HpCDF	ND	134.4	134.0	99.7	129.5	107.0	82.6	24.9
OCDF	0.04	268.8	223.0	83.0	259.1	178.0	68.7	30.9

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TLH PROJECT #: 219
DATE: 1-26-91
METHOD: IFB DRAFT 4/89
MATRIX: SOIL
SAMPLE ID: OK 3004-4

	SAMPLE ID:OK 3004-4 MS				SAMPLE ID:OK 3004-4 MSD			
	MASS: 10.04 g				MASS: 10.4 g			
COMPOUND	SAMPLE CONC. (ppb)	MS SPIKE ADDED (ppb)	MS CONC. OBSERVED (ppb)	MS %REC %	MSD SPIKE ADDED (ppb)	MSD CONC. OBSERVED (ppb)	MSD %REC %	%RPD %
2378-TCDD	ND	5.0	4.9	98.4	4.8	4.7	97.8	0.6
12378-PeCDD	ND	5.0	5.6	112.4	4.8	5.1	106.1	5.8
123478-HxCDD	ND	12.5	9.3	74.7	12.0	9.9	82.4	9.8
123678-HxCDD	1.2	12.5	13.3	106.8	12.0	12.9	107.3	0.5
123789-HxCDD	0.1	12.5	9.6	77.1	12.0	9.9	82.4	6.6
1234678-HpCDD	38.2	12.5	67.3	540.6	12.0	55.3	460.1	16.1
OCDD	684.0	24.9	970.0	3895.5	24.0	705.0	2932.8	28.2
2378-TCDF	ND	5.0	4.8	96.4	4.8	4.7	97.8	1.4
12378-PeCDF	ND	5.0	5.5	110.4	4.8	5.0	104.0	6.0
23478-PeCDF	ND	5.0	5.3	106.4	4.8	4.8	99.8	6.4
123478-HxCDF	0.2	12.5	13.3	106.8	12.0	12.6	104.8	1.9
123678-HxCDF	0.1	12.5	13.3	106.8	12.0	12.5	104.0	2.7
234678-HxCDF	0.0	12.5	12.6	101.2	12.0	11.7	97.3	3.9
123789-HxCDF	ND	12.5	12.5	100.4	12.0	11.6	96.5	3.9
1234678-HpCDF	13.6	12.5	28.8	231.3	12.0	25.0	208.0	10.6
1234789-HpCDF	0.5	12.5	12.7	102.0	12.0	12.0	99.8	2.1
OCDF	64.1	24.9	107.0	429.7	24.0	82.2	342.0	22.7

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002049 CLIENT ID....: WADSWORTH TLI NUMBER....: M. BLANK
CONCAL.....: E002048 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 1000.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805W SHIPMENT NO...: N/A

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.2				
12378-PeCDD	ND		0.5				
123478-HxCDD	ND		0.3				
123678-HxCDD	ND		0.2				
123789-HxCDD	ND		0.2				
1234678-HpCDD	ND		0.4				
OCDD	EMPC			0.18			
2378-TCDF	ND		0.1				
12378-PeCDF	ND		0.2				
23478-PeCDF	ND		0.2				
123478-HxCDF	ND		0.1				
123678-HxCDF	ND		0.1				
234678-HxCDF	ND		0.1				
123789-HxCDF	ND		0.2				
1234678-HpCDF	ND		0.2				
1234789-HpCDF	ND		0.2				
OCDF	ND		0.2				
TOTAL TCDD	EMPC			4.78			
TOTAL PeCDD	ND		0.5				
TOTAL HxCDD	ND		0.2				
TOTAL HpCDD	ND		0.4				
TOTAL TCDF	EMPC			0.19			
TOTAL PeCDF	ND		0.2				
TOTAL HxCDF	ND		0.1				
TOTAL HpCDF	ND		0.2				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.6	79.2	0.80	25:20	
13C12-2378-TCDD	35.4	70.9	0.80	26:17	
13C12-HxCDD 678	43.7	87.4	1.27	39:45	
13C12-HpCDF 678	85.6	85.6	1.06	44:20	
13C12-OCDD	84.4	84.4	0.90	53:03	

8280_RPT rev:3.02

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/24/91

LE NAME....: E002064 CLIENT ID....: WADSWORTH TLI NUMBER....: M.BLANK
ONCAL.....: E002063 SAMPLE ID....: METHOD BLANK
ALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
MPLE SIZE..: 10.00 g SAMPLE MATRIX: SOIL DATE RECEIVED.: / /
CAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
IKE FILE...: SP82805N SHIPMENT NO...: N/A

AME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
78-TCDD	ND		0.003				
378-PeCDD	ND		0.003				
23478-HxCDD	ND		0.003				
3678-HxCDD	ND		0.003				
3789-HxCDD	ND		0.003				
234678-HpCDD	ND		0.003				
DD	0.02				0.80	53:05	L
378-TCDF	ND		0.003				
2378-PeCDF	ND		0.003				
478-PeCDF	ND		0.003				
3478-HxCDF	ND		0.003				
23678-HxCDF	ND		0.003				
4678-HxCDF	ND		0.003				
3789-HxCDF	ND		0.003				
1234678-HpCDF	ND		0.003				
1234789-HpCDF	ND		0.003				
DF	ND		0.003				
TAL TCDD	EMPC			0.52			
TAL PeCDD	ND		0.003				
TAL HxCDD	EMPC			0.01			
TAL HpCDD	ND		0.003				
TAL TCDF	EMPC			0.026			
TAL PeCDF	ND		0.003				
TAL HxCDF	ND		0.003				
TAL HpCDF	ND		0.003				

TERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
C12-2378-TCDF	3.7	74.6	0.80	25:19	
3C12-2378-TCDD	3.9	77.0	0.79	26:15	
C12-HxCDD 678	4.6	92.3	1.26	39:44	
C12-HpCDF 678	7.9	78.8	1.05	44:20	
3C12-OCDD	8.8	88.2	0.90	53:04	

8280_RPT rev:3.02

AGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002069 CLIENT ID....: WADSWORTH TLI NUMBER....: M.BLANK
CONCAL.....: E002063 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.00 g SAMPLE MATRIX: SOIL DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: N/A

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				
12378-PeCDD	ND		0.008				
123478-HxCDD	ND		0.005				
123678-HxCDD	ND		0.005				
123789-HxCDD	ND		0.005				
1234678-HpCDD	ND		0.005				
OCDD	0.09				0.90	53:07	L
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.005				
23478-PeCDF	ND		0.005				
123478-HxCDF	ND		0.003				
123678-HxCDF	ND		0.003				
234678-HxCDF	ND		0.003				
123789-HxCDF	ND		0.003				
1234678-HpCDF	ND		0.003				
1234789-HpCDF	ND		0.005				
OCDF	0.004				0.97	53:20	L
TOTAL TCDD	EMPC			0.44			
TOTAL PeCDD	ND		0.008				
TOTAL HxCDD	ND		0.005				
TOTAL HpCDD	ND		0.005				
TOTAL TCDF	EMPC			0.03			
TOTAL PeCDF	ND		0.005				
TOTAL HxCDF	ND		0.003				
TOTAL HpCDF	ND		0.003				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.9	58.4	0.79	25:20	
13C12-2378-TCDD	3.1	61.3	0.79	26:15	
13C12-HxCDD 678	4.8	96.9	1.25	39:47	
13C12-HpCDF 678	8.9	89.1	1.04	44:23	
13C12-OCDD	9.6	95.9	0.90	53:06	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/23/91

LE NAME....: E002051 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3E MS
ONCAL.....: E002048 SAMPLE ID....: OL 0302-3 MS
ALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
MPLE SIZE..: 930.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
CAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
IKE FILE...: SP82805W SHIPMENT NO...: FL 3209

AME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
78-TCDD	51.7				0.79	26:18	___
2378-PeCDD	76.6				1.54	33:06	___
23478-HxCDD	140				1.23	39:37	___
3678-HxCDD	124				1.23	39:48	___
3789-HxCDD	132				1.22	40:26	___
234678-HpCDD	157				1.06	46:36	___
DD	261				0.88	53:10	___
2378-TCDF	52.4				0.77	25:21	___
2378-PeCDF	72.6				1.56	31:12	___
478-PeCDF	70.0				1.55	32:28	___
23478-HxCDF	134				1.23	37:59	___
123678-HxCDF	127				1.22	38:12	___
4678-HxCDF	126				1.22	39:19	___
3789-HxCDF	123				1.23	40:52	___
1234678-HpCDF	134				1.05	44:25	___
234789-HpCDF	134				1.05	47:26	___
DF	223				0.87	53:23	___
TOTAL TCDD	51.7	2		57.1	0.79		___
TAL PeCDD	77.6	2		77.2	1.59		___
TAL HxCDD	403	4		394.5	1.28		___
TAL HpCDD	157	1		312.6	1.06		___
TAL TCDF	54.2	3		53.2	0.73		___
OTAL PeCDF	148	8			1.56		___
TAL HxCDF	513	6		255.5	1.24		___
TAL HpCDF	270	3		269.0	1.06		___

TERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
C12-2378-TCDF	41.1	76.4	0.79	25:20	___
13C12-2378-TCDD	41.9	78.0	0.78	26:17	___
C12-HxCDD 678	49.3	91.7	1.26	39:47	___
C12-HpCDF 678	97.5	90.7	1.05	44:24	___
13C12-OCDD	97.5	90.7	0.90	53:09	___

8280_RPT rev:3.02

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002052	CLIENT ID....: WADSWORTH	TLI NUMBER....:	3-51-3HMSD
CONCAL.....: E002048	SAMPLE ID....: OL 0302-3 MSD		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..: 965.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...: SP82805W		SHIPMENT NO...:	FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	40.6				0.79	26:18	___
12378-PeCDD	67.8				1.55	33:05	___
123478-HxCDD	107				1.25	39:36	___
123678-HxCDD	101				1.24	39:48	___
123789-HxCDD	105				1.24	40:25	___
1234678-HpCDD	124				1.05	46:35	___
OCDD	205				0.89	53:09	___
2378-TCDF	41.2				0.77	25:22	___
12378-PeCDF	67.5				1.57	31:11	___
23478-PeCDF	67.2				1.56	32:27	___
123478-HxCDF	95.0				1.24	37:59	___
123678-HxCDF	95.9				1.24	38:11	___
234678-HxCDF	94.9				1.24	39:18	___
123789-HxCDF	91.9				1.25	40:52	___
1234678-HpCDF	104				1.04	44:24	___
1234789-HpCDF	107				1.04	47:24	___
OCDF	178				0.89	53:21	___
TOTAL TCDD	40.6	1		45.7	0.79		___
TOTAL PeCDD	67.8	2		68.4	1.63		___
TOTAL HxCDD	316	4		316	1.27		___
TOTAL HpCDD	125	2			1.07		___
TOTAL TCDF	41.7	4		42.2	0.78		___
TOTAL PeCDF	140	8			1.53		___
TOTAL HxCDF	381	6		381	1.26		___
TOTAL HpCDF	212	3		212	1.06		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	36.9	71.3	0.79	25:20	___
13C12-2378-TCDD	42.1	81.3	0.79	26:17	___
13C12-HxCDD 678	54.5	105	1.26	39:46	___
13C12-HpCDF 678	110	106	1.06	44:23	___
13C12-OCDD	103	99.8	0.90	53:07	___

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002086 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-4MS
CONCAL.....: E002076 SAMPLE ID....: OK 3004-4MS
ANALYST.....: XL ANALYSIS DATE: 01/21/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.04 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.9				0.79	26:15	
12378-PeCDD	5.6				1.57	33:01	
123478-HxCDD	9.3				1.24	39:30	
123678-HxCDD	13.3				1.23	39:40	
123789-HxCDD	9.6				1.23	40:19	
1234678-HpCDD	67.3				1.05	46:28	H
OCDD	970				0.88	53:04	H, BL
2378-TCDF	4.8				0.78	25:19	
12378-PeCDF	5.5				1.58	31:07	
23478-PeCDF	5.3				1.57	32:22	
123478-HxCDF	13.3				1.24	37:52	
123678-HxCDF	13.3				1.24	38:05	
234678-HxCDF	12.6				1.23	39:12	
123789-HxCDF	12.5				1.24	40:44	
1234678-HpCDF	28.8				1.02	44:16	
1234789-HpCDF	12.7				1.04	47:17	
OCDF	107				0.87	53:14	H, BL
TOTAL TCDD	4.9	1		5.5	0.79		
TOTAL PeCDD	5.6	1			1.57		
TOTAL HxCDD	35.1	5		36.0	1.24		
TOTAL HpCDD	112	2			1.05		
TOTAL TCDF	4.8	1		4.9	0.78		
TOTAL PeCDF	11.3	4		11.6	1.59		
TOTAL HxCDF	62.9	7		63.0	1.24		
TOTAL HpCDF	106	3		106	1.04		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.1	83.3	0.80	25:18	
13C12-2378-TCDD	3.8	76.0	0.80	26:14	
13C12-HxCDD 678	5.5	111	1.26	39:40	
13C12-HpCDF 678	8.4	84.0	1.04	44:15	
13C12-OCDD	9.1	91.3	1.02	53:03	

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

FILE NAME....: E002087 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-4MSD
CONCAL.....: E002076 SAMPLE ID....: OK 3004-4MSD
ANALYST.....: XL ANALYSIS DATE: 01/21/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.40 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.7				0.79	26:14	
12378-PeCDD	5.1				1.59	33:01	
123478-HxCDD	9.9				1.24	39:29	
123678-HxCDD	12.9				1.23	39:40	
123789-HxCDD	9.9				1.22	40:18	
1234678-HpCDD	55.3				1.05	46:27	_H_
OCDD	705				0.88	53:01	H,BL
2378-TCDF	4.7				0.78	25:19	
12378-PeCDF	5.0				1.59	31:06	
23478-PeCDF	4.8				1.57	32:22	
123478-HxCDF	12.6				1.24	37:52	
123678-HxCDF	12.5				1.24	38:04	
234678-HxCDF	11.7				1.22	39:11	
123789-HxCDF	11.6				1.24	40:43	
1234678-HpCDF	25.0				1.02	44:15	
1234789-HpCDF	12.0				1.04	47:15	
OCDF	82.2				0.87	53:12	_BL
TOTAL TCDD	4.7	1		5.25	0.79		
TOTAL PeCDD	5.1	1			1.59		
TOTAL HxCDD	35.1	5		35.2	1.23		
TOTAL HpCDD	90.2	2			1.05		
TOTAL TCDF	4.7	1		4.8	0.78		
TOTAL PeCDF	10.2	4		10.4	1.58		
TOTAL HxCDF	57.7	6		58.0	1.24		
TOTAL HpCDF	92.5	3		92.2	1.03		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.3	89.5	0.80	25:17	
13C12-2378-TCDD	3.9	80.5	0.80	26:13	
13C12-HxCDD 678	5.0	104	1.27	39:39	
13C12-HpCDF 678	8.6	89.8	1.04	44:14	
13C12-OCDD	11.1	116	1.00	53:00	

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....:	E002053	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-51-1C
DNCAL.....:	E002048	SAMPLE ID....:	OL 0302-1		
NALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	835.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
CAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
PIKE FILE...:	SP82805W			SHIPMENT NO...:	FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
378-TCDD	ND		0.06				
12378-PeCDD	ND		0.1				
23478-HxCDD	ND		0.06				
23678-HxCDD	ND		0.06				
123789-HxCDD	ND		0.06				
234678-HpCDD	0.17				1.03	46:34	L
CDD	17.0				0.89	53:06	L
2378-TCDF	ND		0.04				
2378-PeCDF	ND		0.06				
3478-PeCDF	ND		0.06				
123478-HxCDF	ND		0.03				
23678-HxCDF	ND		0.03				
34678-HxCDF	ND		0.03				
123789-HxCDF	ND		0.04				
234678-HpCDF	ND		0.04				
234789-HpCDF	ND		0.06				
OCDF	0.06				0.77	53:18	L
OTAL TCDD	0.10	1		5.3	0.71		
OTAL PeCDD	0.23	1			1.70		
TOTAL HxCDD	2.0	1		2.12	1.30		
OTAL HpCDD	1.7	2			1.03		
TOTAL TCDF	EMPC			0.33			
OTAL PeCDF	0.10	1			1.36		
OTAL HxCDF	ND		0.03				
OTAL HpCDF	0.05	1			1.08		

NTERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	33.3	55.6	0.80	25:20	
3C12-2378-TCDD	36.7	61.4	0.79	26:16	
3C12-HxCDD 678	48.4	80.8	1.27	39:45	
13C12-HpCDF 678	95.6	79.8	1.05	44:21	
13C12-OCDD	92.5	77.2	0.90	53:05	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

ILE NAME....: E002054	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-51-2C	
ONCAL.....: E002048	SAMPLE ID....: OL 0302-2		
NALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
AMPLE SIZE..: 760.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
CAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
PIKE FILE...: SP82805W		SHIPMENT NO...: FL 3209	

AME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
378-TCDD	ND		0.05				
2378-PeCDD	ND		0.09				
23478-HxCDD	ND		0.06				
23678-HxCDD	ND		0.05				
23789-HxCDD	ND		0.05				
234678-HpCDD	2.1				1.08	46:34	L
CDD	25.5				0.89	53:06	L
378-TCDF	ND		0.03				
2378-PeCDF	ND		0.05				
3478-PeCDF	ND		0.05				
23478-HxCDF	ND		0.03				
23678-HxCDF	ND		0.03				
34678-HxCDF	ND		0.02				
23789-HxCDF	ND		0.03				
234678-HpCDF	0.54				1.06	44:23	L
234789-HpCDF	ND		0.05				
CDF	2.1				0.89	53:19	L
OTAL TCDD	0.29	1		7.5	0.76		
OTAL PeCDD	ND		0.09				
OTAL HxCDD	0.11	1			1.32		
OTAL HpCDD	3.7	2			1.06		
OTAL TCDF	EMPC			0.36			
OTAL PeCDF	ND		0.05				
OTAL HxCDF	0.33	1		0.37	1.28		
OTAL HpCDF	2.6	2			1.06		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	45.4	69.1	0.80	25:20	
13C12-2378-TCDD	45.9	69.8	0.79	26:17	
13C12-HxCDD 678	58.1	88.4	1.28	39:45	
13C12-HpCDF 678	121	92.2	1.06	44:22	
13C12-OCDD	111	84.4	0.90	53:05	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc. Page 1 of 1
PCDD/PCDF 8280 ANALYSIS (a) 01/26/91

FILE NAME....: E002050	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-51-3D	
CONCAL.....: E002048	SAMPLE ID....: OL 0302-3		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 955.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL 3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.10				
123478-HxCDD	ND		0.05				
123678-HxCDD	ND		0.05				
123789-HxCDD	ND		0.05				
1234678-HpCDD	ND		0.07				
OCDD	0.98				0.85	53:08	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	ND		0.03				
1234789-HpCDF	ND		0.04				
OCDF	0.04				0.90	53:18	L
TOTAL TCDD	EMPC			5.5			
TOTAL PeCDD	ND		0.10				
TOTAL HxCDD	ND		0.05				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.30			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	ND		0.04				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	34.3	65.5	0.81	25:19	
13C12-2378-TCDD	34.9	66.7	0.80	26:16	
13C12-HxCDD 678	47.1	89.9	1.27	39:46	
13C12-HpCDF 678	93.8	89.6	1.06	44:23	
13C12-OCDD	93.5	89.3	0.90	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....:	E002055	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-1D
CONCAL.....:	E002048	SAMPLE ID....:	OL0302-4		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	790.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.1				
123478-HxCDD	ND		0.08				
123678-HxCDD	0.77				1.29	39:45	L
123789-HxCDD	ND		0.07				
1234678-HpCDD	ND		0.1				
OCDD	948				0.86	53:07	H
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	0.08				1.05	37:57	L
123678-HxCDF	ND		0.05				
234678-HxCDF	ND		0.04				
123789-HxCDF	ND		0.05				
1234678-HpCDF	14.2				1.10	44:21	L
1234789-HpCDF	EMPC			0.33			
OCDF	55.4				0.87	53:20	
TOTAL TCDD	EMPC			4.9			
TOTAL PeCDD	EMPC			0.65			
TOTAL HxCDD	15.5	3			1.26		
TOTAL HpCDD	46.3	1			1.03		
TOTAL TCDF	EMPC			0.23			
TOTAL PeCDF	EMPC			0.05			
TOTAL HxCDF	1.8	3		2.2	1.17		
TOTAL HpCDF	68.8	2		69.2	1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	41.5	65.6	0.79	25:19	
13C12-2378-TCDD	43.3	68.4	0.79	26:15	
13C12-HxCDD 678	55.5	87.7	1.24	39:44	
13C12-HpCDF 678	98.2	77.6	1.02	44:20	
13C12-OCDD	118	93.1	0.93	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
H = CONCENTRATION ABOVE CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

ILE NAME....: E002056	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-2D	
)NCAL.....: E002048	SAMPLE ID....: OL 0302-5		
IALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
AMPLE SIZE..: 970.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
AL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
PIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

AME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
78-TCDD	ND		0.08				
2378-PeCDD	ND		0.2				
23478-HxCDD	ND		0.10				
23678-HxCDD	ND		0.09				
123789-HxCDD	ND		0.09				
234678-HpCDD	ND		0.1				
CDD	1.2				0.92	53:05	L
378-TCDF	ND		0.05				
2378-PeCDF	ND		0.08				
23478-PeCDF	ND		0.08				
123478-HxCDF	ND		0.05				
23678-HxCDF	ND		0.04				
34678-HxCDF	ND		0.04				
123789-HxCDF	ND		0.05				
234678-HpCDF	ND		0.06				
234789-HpCDF	ND		0.08				
OCDF	ND		0.07				
OTAL TCDD	EMPC			6.5			
OTAL PeCDD	ND		0.2				
TOTAL HxCDD	ND		0.09				
OTAL HpCDD	ND		0.1				
OTAL TCDF	EMPC			0.44			
OTAL PeCDF	ND		0.08				
OTAL HxCDF	ND		0.04				
TOTAL HpCDF	ND		0.06				

NTERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	28.1	54.5	0.80	25:19	
3C12-2378-TCDD	29.3	56.8	0.81	26:15	
3C12-HxCDD 678	42.9	83.3	1.30	39:44	
13C12-HpCDF 678	97.8	94.9	1.07	44:20	
3C12-OCDD	82.6	80.1	0.90	53:04	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....: E002057	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-3D	
CONCAL.....: E002048	SAMPLE ID....: OL 0302-6		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 865.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				___
12378-PeCDD	ND		0.2				___
123478-HxCDD	ND		0.07				___
123678-HxCDD	ND		0.07				___
123789-HxCDD	ND		0.07				___
1234678-HpCDD	0.37				1.09	46:34	_L_
OCDD	26.7				0.89	53:06	_L_
2378-TCDF	ND		0.05				___
12378-PeCDF	ND		0.08				___
23478-PeCDF	ND		0.08				___
123478-HxCDF	ND		0.04				___
123678-HxCDF	ND		0.04				___
234678-HxCDF	ND		0.03				___
123789-HxCDF	ND		0.04				___
1234678-HpCDF	ND		0.05				___
1234789-HpCDF	ND		0.06				___
OCDF	0.28				0.87	53:19	_L_
TOTAL TCDD	EMPC			5.6			___
TOTAL PeCDD	ND		0.2				___
TOTAL HxCDD	3.2	1			1.28		___
TOTAL HpCDD	3.1	2			1.08		___
TOTAL TCDF	EMPC			0.36			___
TOTAL PeCDF	EMPC			0.12			___
TOTAL HxCDF	EMPC			0.07			___
TOTAL HpCDF	0.16	1			1.08		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	29.3	50.7	0.80	25:20	___
13C12-2378-TCDD	31.1	53.8	0.79	26:17	___
13C12-HxCDD 678	50.3	87.0	1.28	39:46	___
13C12-HpCDF 678	104	89.9	1.06	44:22	___
13C12-OCDD	95.2	82.4	0.90	53:05	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002058 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-6A
)NCAL.....: E002048 SAMPLE ID....: OL 0302-9
.IALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 210-W
SAMPLE SIZE..: 895.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
CAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
PIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

AME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.03				
12378-PeCDD	ND		0.06				
23478-HxCDD	ND		0.04				
23678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
234678-HpCDD	ND		0.05				
CDD	0.58				0.90	53:04	L
2378-TCDF	ND		0.02				
2378-PeCDF	ND		0.03				
23478-PeCDF	ND		0.03				
123478-HxCDF	ND		0.02				
23678-HxCDF	ND		0.02				
34678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
234678-HpCDF	ND		0.02				
234789-HpCDF	ND		0.03				
OCDF	ND		0.03				
OTAL TCDD	EMPC			6.3			
OTAL PeCDD	ND		0.06				
OTAL HxCDD	ND		0.04				
OTAL HpCDD	ND		0.05				
OTAL TCDF	EMPC			0.29			
OTAL PeCDF	ND		0.03				
OTAL HxCDF	ND		0.02				
TOTAL HpCDF	ND		0.03				

INTERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.2	72.0	0.80	25:17	
3C12-2378-TCDD	40.7	72.9	0.79	26:13	
3C12-HxCDD 678	48.2	86.3	1.28	39:42	
13C12-HpCDF 678	101	90.2	1.06	44:19	
3C12-OCDD	84.5	75.6	0.91	53:03	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002059	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-53-1A	
CONCAL.....: E002048	SAMPLE ID....: OK 3004-1		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 925.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				___
12378-PeCDD	ND		0.07				___
123478-HxCDD	ND		0.04				___
123678-HxCDD	ND		0.04				___
123789-HxCDD	ND		0.04				___
1234678-HpCDD	0.15				1.08	46:33	_L_
OCDD	3.5				0.88	53:03	_L_
2378-TCDF	ND		0.02				___
12378-PeCDF	ND		0.04				___
23478-PeCDF	ND		0.04				___
123478-HxCDF	ND		0.02				___
123678-HxCDF	ND		0.02				___
234678-HxCDF	ND		0.02				___
123789-HxCDF	ND		0.02				___
1234678-HpCDF	EMPC			0.04			___
1234789-HpCDF	ND		0.03				___
OCDF	0.24				0.88	53:16	_L_
TOTAL TCDD	EMPC			5.6			___
TOTAL PeCDD	ND		0.07				___
TOTAL HxCDD	EMPC			0.18			___
TOTAL HpCDD	0.15	1		0.26	1.08		___
TOTAL TCDF	EMPC			0.27			___
TOTAL PeCDF	ND		0.04				___
TOTAL HxCDF	0.02	1			1.10		___
TOTAL HpCDF	0.15	1		0.20	1.07		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.2	72.6	0.80	25:17	___
13C12-2378-TCDD	41.1	76.0	0.79	26:13	___
13C12-HxCDD 678	54.1	100	1.27	39:42	___
13C12-HpCDF 678	113	105	1.06	44:19	___
13C12-OCDD	104	96.0	0.91	53:01	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)
01/25/91

FILE NAME....:	E002060	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-53-2A
INCAL.....:	E002048	SAMPLE ID....:	OK 3004-2		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	770.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
CAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				
12378-PeCDD	ND		0.08				
23478-HxCDD	ND		0.05				
23678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
234678-HpCDD	ND		0.07				
OCDD	3.1				0.91	53:05	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.04				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	0.05				1.06	44:22	L
1234789-HpCDF	ND		0.05				
OCDF	0.21				1.00	53:18	L
TOTAL TCDD	EMPC			6.0			
TOTAL PeCDD	ND		0.08				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.37			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	0.22	2			1.09		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.0	61.6	0.80	25:19	
13C12-2378-TCDD	44.0	67.8	0.79	26:16	
13C12-HxCDD 678	56.8	87.5	1.27	39:45	
13C12-HpCDF 678	101	77.7	1.06	44:21	
13C12-OCDD	82.7	63.7	0.91	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

LE NAME....:	E002065	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-4
NCAL.....:	E002063	SAMPLE ID....:	OL-0302-7		
ALYST.....:	XL	ANALYSIS DATE:	01/19/91	PROJECT NUMBER:	219-S
MPLE SIZE..:	9.77 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	12/04/90
AL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
IKE FILE...:	SP82805N			SHIPMENT NO...:	FL 3209

ME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
378-TCDD	ND		0.003				
2378-PeCDD	ND		0.005				
23478-HxCDD	ND		0.005				
23678-HxCDD	0.88				1.25	39:47	L
23789-HxCDD	0.11				1.25	40:25	L
234678-HpCDD	32.6				1.04	46:34	
DD	357				0.89	53:17	H,BL
378-TCDF	ND		0.003				
2378-PeCDF	ND		0.003				
3478-PeCDF	ND		0.003				
23478-HxCDF	0.13				1.27	37:58	L
23678-HxCDF	0.05				1.26	38:10	L
34678-HxCDF	0.04				1.32	39:18	L
23789-HxCDF	ND		0.003				
234678-HpCDF	9.8				1.06	44:22	
234789-HpCDF	0.33				1.05	47:21	L
DF	34.1				0.89	53:26	
TAL TCDD	0.01	1		0.56	0.89		
TAL PeCDD	EMPC			0.014			
TAL HxCDD	2.6	4		2.73	1.25		
TAL HpCDD	59.3	2			1.04		
TAL TCDF	0.005	1		0.12	0.74		
TAL PeCDF	0.05	1		0.09	1.37		
TAL HxCDF	5.6	8		5.6	1.24		
TAL HpCDF	45.1	3		45.2	1.05		

NTERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
3C12-2378-TCDF	3.1	61.0	0.80	25:19	
3C12-2378-TCDD	3.3	64.6	0.79	26:15	
3C12-HxCDD 678	4.4	85.2	1.27	39:45	
3C12-HpCDF 678	8.6	84.5	1.05	44:20	
3C12-OCDD	12.5	122	0.95	53:15	

8280_RPT rev:3.02

= CONCENTRATION ABOVE CALIBRATION RANGE
= CONCENTRATION BELOW CALIBRATION RANGE
L = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/26/91

E NAME....: E002066 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-5
ONCAL.....: E002063 SAMPLE ID....: OL-0302-8
LYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
PLE SIZE..: 8.78 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
AL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
KE FILE...: SP82805N SHIPMENT NO...: FL 3209

ME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
8-TCDD	ND		0.003				
378-PeCDD	ND		0.005				
23478-HxCDD	ND		0.003				
3678-HxCDD	0.03				1.32	39:46	L
3789-HxCDD	ND		0.003				
234678-HpCDD	1.5				1.05	46:34	L
OD	21.0				0.89	53:07	BL
78-TCDF	ND		0.003				
2378-PeCDF	ND		0.003				
378-PeCDF	ND		0.003				
3478-HxCDF	0.006				1.41	37:56	L
23678-HxCDF	EMPC			0.002			
3678-HxCDF	0.002				1.12	39:17	L
3789-HxCDF	ND		0.003				
234678-HpCDF	0.46				1.06	44:22	L
234789-HpCDF	0.01				1.16	47:24	L
DF	1.6				0.92	53:20	L
OTAL TCDD	0.03	1		0.60	0.69		
TAL PeCDD	ND		0.005				
TAL HxCDD	0.10	3		0.11	1.35		
OTAL HpCDD	2.8	2			1.05		
TAL TCDF	0.002	1		0.03	0.91		
OTAL PeCDF	ND		0.003				
TAL HxCDF	0.24	4		0.26	1.24		
TAL HpCDF	1.9	3			1.09		

TERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
C12-2378-TCDF	4.2	74.0	0.79	25:19	
3C12-2378-TCDD	4.5	78.6	0.79	26:15	
C12-HxCDD 678	5.4	94.7	1.26	39:45	
C12-HpCDF 678	10.2	89.7	1.06	44:21	
C12-OCDD	12.0	106	0.90	53:06	

8280_RPT rev:3.02

= CONCENTRATION ABOVE CALIBRATION RANGE
= CONCENTRATION BELOW CALIBRATION RANGE
= FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....:	E002056	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-2D
CONCAL.....:	E002048	SAMPLE ID....:	OL 0302-5		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	970.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				___
12378-PeCDD	ND		0.2				___
123478-HxCDD	ND		0.10				___
123678-HxCDD	ND		0.09				___
123789-HxCDD	ND		0.09				___
1234678-HpCDD	ND		0.1				___
OCDD	1.2				0.92	53:05	_L_
2378-TCDF	ND		0.05				___
12378-PeCDF	ND		0.08				___
23478-PeCDF	ND		0.08				___
123478-HxCDF	ND		0.05				___
123678-HxCDF	ND		0.04				___
234678-HxCDF	ND		0.04				___
123789-HxCDF	ND		0.05				___
1234678-HpCDF	ND		0.06				___
1234789-HpCDF	ND		0.08				___
OCDF	ND		0.07				___
TOTAL TCDD	EMPC			6.5			___
TOTAL PeCDD	ND		0.2				___
TOTAL HxCDD	ND		0.09				___
TOTAL HpCDD	ND		0.1				___
TOTAL TCDF	EMPC			0.44			___
TOTAL PeCDF	ND		0.08				___
TOTAL HxCDF	ND		0.04				___
TOTAL HpCDF	ND		0.06				___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	28.1	54.5	0.80	25:19	___
13C12-2378-TCDD	29.3	56.8	0.81	26:15	___
13C12-HxCDD 678	42.9	83.3	1.30	39:44	___
13C12-HpCDF 678	97.8	94.9	1.07	44:20	___
13C12-OCDD	82.6	80.1	0.90	53:04	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....: E002057 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-3D
CONCAL.....: E002048 SAMPLE ID....: OL 0302-6
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 865.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				
12378-PeCDD	ND		0.2				
123478-HxCDD	ND		0.07				
123678-HxCDD	ND		0.07				
123789-HxCDD	ND		0.07				
1234678-HpCDD	0.37				1.09	46:34	L
OCDD	26.7				0.89	53:06	L
2378-TCDF	ND		0.05				
12378-PeCDF	ND		0.08				
23478-PeCDF	ND		0.08				
123478-HxCDF	ND		0.04				
123678-HxCDF	ND		0.04				
234678-HxCDF	ND		0.03				
123789-HxCDF	ND		0.04				
1234678-HpCDF	ND		0.05				
1234789-HpCDF	ND		0.06				
OCDF	0.28				0.87	53:19	L
TOTAL TCDD	EMPC			5.6			
TOTAL PeCDD	ND		0.2				
TOTAL HxCDD	3.2	1			1.28		
TOTAL HpCDD	3.1	2			1.08		
TOTAL TCDF	EMPC			0.36			
TOTAL PeCDF	EMPC			0.12			
TOTAL HxCDF	EMPC			0.07			
TOTAL HpCDF	0.16	1			1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	29.3	50.7	0.80	25:20	
13C12-2378-TCDD	31.1	53.8	0.79	26:17	
13C12-HxCDD 678	50.3	87.0	1.28	39:46	
13C12-HpCDF 678	104	89.9	1.06	44:22	
13C12-OCDD	95.2	82.4	0.90	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002058 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-6A
CONCAL.....: E002048 SAMPLE ID....: OL 0302-9
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 210-W
SAMPLE SIZE..: 895.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.03				
12378-PeCDD	ND		0.06				
123478-HxCDD	ND		0.04				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	ND		0.05				
OCDD	0.58				0.90	53:04	L
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.03				
23478-PeCDF	ND		0.03				
123478-HxCDF	ND		0.02				
123678-HxCDF	ND		0.02				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
1234678-HpCDF	ND		0.02				
1234789-HpCDF	ND		0.03				
OCDF	ND		0.03				
TOTAL TCDD	EMPC			6.3			
TOTAL PeCDD	ND		0.06				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.05				
TOTAL TCDF	EMPC			0.29			
TOTAL PeCDF	ND		0.03				
TOTAL HxCDF	ND		0.02				
TOTAL HpCDF	ND		0.03				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.2	72.0	0.80	25:17	
13C12-2378-TCDD	40.7	72.9	0.79	26:13	
13C12-HxCDD 678	48.2	86.3	1.28	39:42	
13C12-HpCDF 678	101	90.2	1.06	44:19	
13C12-OCDD	84.5	75.6	0.91	53:03	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002059 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-1A
CONCAL.....: E002048 SAMPLE ID....: OK 3004-1
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 925.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				
12378-PeCDD	ND		0.07				
123478-HxCDD	ND		0.04				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	0.15				1.08	46:33	L
OCDD	3.5				0.88	53:03	L
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.04				
23478-PeCDF	ND		0.04				
123478-HxCDF	ND		0.02				
123678-HxCDF	ND		0.02				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
1234678-HpCDF	EMPC			0.04			
1234789-HpCDF	ND		0.03				
OCDF	0.24				0.88	53:16	L
TOTAL TCDD	EMPC			5.6			
TOTAL PeCDD	ND		0.07				
TOTAL HxCDD	EMPC			0.18			
TOTAL HpCDD	0.15	1		0.26	1.08		
TOTAL TCDF	EMPC			0.27			
TOTAL PeCDF	ND		0.04				
TOTAL HxCDF	0.02	1			1.10		
TOTAL HpCDF	0.15	1		0.20	1.07		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.2	72.6	0.80	25:17	
13C12-2378-TCDD	41.1	76.0	0.79	26:13	
13C12-HxCDD 678	54.1	100	1.27	39:42	
13C12-HpCDF 678	113	105	1.06	44:19	
13C12-OCDD	104	96.0	0.91	53:01	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....:	E002060	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-53-2A
CONCAL.....:	E002048	SAMPLE ID....:	OK 3004-2		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	770.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				
12378-PeCDD	ND		0.08				
123478-HxCDD	ND		0.05				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	ND		0.07				
OCDD	3.1				0.91	53:05	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.04				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	0.05				1.06	44:22	L
1234789-HpCDF	ND		0.05				
OCDF	0.21				1.00	53:18	L
TOTAL TCDD	EMPC			6.0			
TOTAL PeCDD	ND		0.08				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.37			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	0.22	2			1.09		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.0	61.6	0.80	25:19	
13C12-2378-TCDD	44.0	67.8	0.79	26:16	
13C12-HxCDD 678	56.8	87.5	1.27	39:45	
13C12-HpCDF 678	101	77.7	1.06	44:21	
13C12-OCDD	82.7	63.7	0.91	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/26/91

FILE NAME....: E002065	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-4	
CONCAL.....: E002063	SAMPLE ID....: OL-0302-7		
ANALYST.....: XL	ANALYSIS DATE: 01/19/91	PROJECT NUMBER: 219-S	
SAMPLE SIZE..: 9.77 g	SAMPLE MATRIX: SOIL	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805N		SHIPMENT NO...: FL 3209	

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				
12378-PeCDD	ND		0.005				
123478-HxCDD	ND		0.005				
123678-HxCDD	0.88				1.25	39:47	L
123789-HxCDD	0.11				1.25	40:25	L
1234678-HpCDD	32.6				1.04	46:34	
OCDD	357				0.89	53:17	H,BL
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.003				
23478-PeCDF	ND		0.003				
123478-HxCDF	0.13				1.27	37:58	L
123678-HxCDF	0.05				1.26	38:10	L
234678-HxCDF	0.04				1.32	39:18	L
123789-HxCDF	ND		0.003				
1234678-HpCDF	9.8				1.06	44:22	
1234789-HpCDF	0.33				1.05	47:21	L
OCDF	34.1				0.89	53:26	
TOTAL TCDD	0.01	1		0.56	0.89		
TOTAL PeCDD	EMPC			0.014			
TOTAL HxCDD	2.6	4		2.73	1.25		
TOTAL HpCDD	59.3	2			1.04		
TOTAL TCDF	0.005	1		0.12	0.74		
TOTAL PeCDF	0.05	1		0.09	1.37		
TOTAL HxCDF	5.6	8		5.6	1.24		
TOTAL HpCDF	45.1	3		45.2	1.05		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.1	61.0	0.80	25:19	
13C12-2378-TCDD	3.3	64.6	0.79	26:15	
13C12-HxCDD 678	4.4	85.2	1.27	39:45	
13C12-HpCDF 678	8.6	84.5	1.05	44:20	
13C12-OCDD	12.5	122	0.95	53:15	

8280_RPT rev:3.02

H = CONCENTRATION ABOVE CALIBRATION RANGE
L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

FILE NAME....:	E002066	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-S
CONCAL.....:	E002063	SAMPLE ID....:	OL-0302-8		
ANALYST.....:	XL	ANALYSIS DATE:	01/19/91	PROJECT NUMBER:	219-S
SAMPLE SIZE..:	8.78 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805N			SHIPMENT NO...:	FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				
12378-PeCDD	ND		0.005				
123478-HxCDD	ND		0.003				
123678-HxCDD	0.03				1.32	39:46	L
123789-HxCDD	ND		0.003				
1234678-HpCDD	1.5				1.05	46:34	L
OCDD	21.0				0.89	53:07	BL
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.003				
23478-PeCDF	ND		0.003				
123478-HxCDF	0.006				1.41	37:56	L
123678-HxCDF	EMPC			0.002			
234678-HxCDF	0.002				1.12	39:17	L
123789-HxCDF	ND		0.003				
1234678-HpCDF	0.46				1.06	44:22	L
1234789-HpCDF	0.01				1.16	47:24	L
OCDF	1.6				0.92	53:20	L
TOTAL TCDD	0.03	1		0.60	0.69		
TOTAL PeCDD	ND		0.005				
TOTAL HxCDD	0.10	3		0.11	1.35		
TOTAL HpCDD	2.8	2			1.05		
TOTAL TCDF	0.002	1		0.03	0.91		
TOTAL PeCDF	ND		0.003				
TOTAL HxCDF	0.24	4		0.26	1.24		
TOTAL HpCDF	1.9	3			1.09		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.2	74.0	0.79	25:19	
13C12-2378-TCDD	4.5	78.6	0.79	26:15	
13C12-HxCDD 678	5.4	94.7	1.26	39:45	
13C12-HpCDF 678	10.2	89.7	1.06	44:21	
13C12-OCDD	12.0	106	0.90	53:06	

8280_RPT rev:3.02

H = CONCENTRATION ABOVE CALIBRATION RANGE
L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

FILE NAME....: E002073	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-53-3	
CONCAL.....: E002063	SAMPLE ID....: OK-3004-3		
ANALYST.....: XL	ANALYSIS DATE: 01/19/91	PROJECT NUMBER: 219-S	
SAMPLE SIZE..: 10.27 g	SAMPLE MATRIX: SOIL	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805N		SHIPMENT NO...: FL 3209	

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.02				___
12378-PeCDD	ND		0.03				___
123478-HxCDD	0.03				1.17	39:34	_L_
123678-HxCDD	1.5				1.25	39:46	_L_
123789-HxCDD	0.15				1.30	40:25	_L_
1234678-HpCDD	72.3				1.04	46:34	_H_
OCDD	852				0.88	53:11	H,BL
2378-TCDF	ND		0.01				___
12378-PeCDF	ND		0.01				___
23478-PeCDF	ND		0.01				___
123478-HxCDF	0.17				1.24	37:58	_L_
123678-HxCDF	0.04				1.17	38:11	_L_
234678-HxCDF	0.04				1.23	39:17	_L_
123789-HxCDF	ND		0.01				___
1234678-HpCDF	16.1				1.05	44:22	___
1234789-HpCDF	0.60				1.09	47:22	_L_
OCDF	79.6				0.87	53:21	___
TOTAL TCDD	EMPC			0.46			___
TOTAL PeCDD	ND		0.03				___
TOTAL HxCDD	5.5	6			1.26		___
TOTAL HpCDD	131	2			1.04		___
TOTAL TCDF	EMPC			0.04			___
TOTAL PeCDF	0.08	1			1.60		___
TOTAL HxCDF	11.2	9		11.4	1.23		___
TOTAL HpCDF	124	4		97.3	1.86		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.4	70.4	0.80	25:22	___
13C12-2378-TCDD	3.3	67.1	0.80	26:19	___
13C12-HxCDD 678	4.3	88.1	1.28	39:45	___
13C12-HpCDF 678	8.2	84.7	1.05	44:21	___
13C12-OCDD	12.1	124	1.02	53:09	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%
H = CONCENTRATION ABOVE CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002085	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-53-4	
CONCAL.....: E002076	SAMPLE ID....: OK 3004-4		
ANALYST.....: XL	ANALYSIS DATE: 01/21/91	PROJECT NUMBER: 219-S2	
SAMPLE SIZE..: 10.44 g	SAMPLE MATRIX: SOIL	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: / /	
SPIKE FILE...: SP82805N		SHIPMENT NO...: FL.3209	

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				___
12378-PeCDD	ND		0.09				___
123478-HxCDD	ND		0.05				___
123678-HxCDD	1.2				1.26	39:39	_L_
123789-HxCDD	0.14				1.39	40:16	_L_
1234678-HpCDD	38.2				1.04	46:26	___
OCDD	684				0.88	53:01	H,BL
2378-TCDF	ND		0.03				___
12378-PeCDF	ND		0.05				___
23478-PeCDF	ND		0.05				___
123478-HxCDF	0.16				1.27	37:51	_L_
123678-HxCDF	0.06				1.42	38:03	_L_
234678-HxCDF	0.03				1.18	39:10	_L_
123789-HxCDF	ND		0.04				___
1234678-HpCDF	13.6				1.07	44:14	___
1234789-HpCDF	0.50				1.12	47:14	_L_
OCDF	64.1				0.87	53:12	_BL
TOTAL TCDD	EMPC			0.53			___
TOTAL PeCDD	0.15	1			1.59		___
TOTAL HxCDD	3.9	5			1.31		___
TOTAL HpCDD	70.9	2			1.04		___
TOTAL TCDF	EMPC			0.05			___
TOTAL PeCDF	0.45	2			1.51		___
TOTAL HxCDF	10.1	6		10.4	1.26		___
TOTAL HpCDF	70.3	3		70.7	1.08		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.8	79.9	0.81	25:17	___
13C12-2378-TCDD	4.0	83.0	0.80	26:12	___
13C12-HxCDD 678	5.6	116	1.27	39:38	___
13C12-HpCDF 678	8.1	84.8	1.04	44:13	___
13C12-OCDD	9.5	99.3	0.99	53:00	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002068 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-5
CONCAL.....: E002063 SAMPLE ID....: OK-3004-5
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
SAMPLE SIZE..: 8.54 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805N SHIPMENT NO...: FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.01				
12378-PeCDD	ND		0.02				
123478-HxCDD	ND		0.008				
123678-HxCDD	0.16				1.33	39:46	L
123789-HxCDD	0.01				1.09	40:25	L
1234678-HpCDD	6.2				1.04	46:34	
OCDD	65.4				0.88	53:06	BL
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.02				
23478-PeCDF	ND		0.02				
123478-HxCDF	0.01				1.29	37:57	L
123678-HxCDF	ND		0.005				
234678-HxCDF	ND		0.005				
123789-HxCDF	ND		0.008				
1234678-HpCDF	1.8				1.05	44:22	L
1234789-HpCDF	0.07				1.01	47:23	L
OCDF	6.6				0.87	53:19	
TOTAL TCDD	EMPC			0.24			
TOTAL PeCDD	ND		0.02				
TOTAL HxCDD	0.55	4			1.25		
TOTAL HpCDD	11.0	2			1.05		
TOTAL TCDF	EMPC			0.17			
TOTAL PeCDF	ND		0.02				
TOTAL HxCDF	1.5	3		1.46	1.30		
TOTAL HpCDF	11.5	3			1.04		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	0.63	10.7	0.81	25:19	
13C12-2378-TCDD	1.3	22.5	0.81	26:16	
13C12-HxCDD 678	3.0	51.7	1.27	39:44	
13C12-HpCDF 678	4.1	34.9	1.05	44:21	
13C12-OCDD	7.5	64.3	0.91	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

QUALITY CONTROL

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TLH PROJECT #: 219
DATE: 1-26-91
METHOD: EPA DRAFT 4/89
MATRIX: WATER
SAMPLE ID: OL 0302-3

		SAMPLE ID:OL 0302-3 MS			SAMPLE ID:OL 0302-3 MSD			
		VOLUME: 0.93 L			VOLUME: 0.965 L			
COMPOUND	SAMPLE CONC. (ppt)	MS SPIKE ADDED (ppt)	MS CONC. OBSERVED (ppt)	MS %REC %	MSD SPIKE ADDED (ppt)	MSD CONC. OBSERVED (ppt)	MSD %REC %	%RPD %
2378-TCDD	ND	53.8	51.7	96.2	51.8	40.6	78.4	17.1
12378-PeCDD	ND	53.8	76.6	142.5	51.8	67.8	130.9	8.5
123478-HxCDD	ND	134.4	140.0	104.2	129.5	107.0	82.6	29.6
123678-HxCDD	ND	134.4	124.0	92.3	129.5	101.0	78.0	22.8
123789-HxCDD	ND	134.4	132.0	98.2	129.5	105.0	81.1	25.3
1234678-HpCDD	ND	134.4	157.0	116.8	129.5	124.0	95.7	26.1
OCDD	0.98	268.8	261.0	97.1	259.1	205.0	79.1	32.9
2378-TCDF	ND	53.8	52.4	97.5	51.8	41.2	79.5	17.0
12378-PeCDF	ND	53.8	72.6	135.0	51.8	67.5	130.3	5.0
23478-PeCDF	ND	53.8	70.0	130.2	51.8	67.2	129.7	2.8
123478-HxCDF	ND	134.4	134.0	99.7	129.5	95.0	73.3	37.6
123678-HxCDF	ND	134.4	127.0	94.5	129.5	95.9	74.0	30.9
234678-HxCDF	ND	134.4	126.0	93.7	129.5	94.9	73.3	31.2
123789-HxCDF	ND	134.4	123.0	91.5	129.5	91.9	70.9	32.1
1234678-HpCDF	ND	134.4	134.0	99.7	129.5	104.0	80.3	28.0
1234789-HpCDF	ND	134.4	134.0	99.7	129.5	107.0	82.6	24.9
OCDF	0.04	268.8	223.0	83.0	259.1	178.0	68.7	30.9

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

TLH PROJECT #: 219
DATE: 1-26-91
METHOD: IFB DRAFT 4/89
MATRIX: SOIL
SAMPLE ID: OK 3004-4

		SAMPLE ID:OK 3004-4 MS			SAMPLE ID:OK 3004-4 MSD			
		MASS: 10.04 g			MASS: 10.4 g			
COMPOUND	SAMPLE CONC. (ppb)	MS SPIKE ADDED (ppb)	MS CONC. OBSERVED (ppb)	MS %REC %	MSD SPIKE ADDED (ppb)	MSD CONC. OBSERVED (ppb)	MSD %REC %	%RPD %
2378-TCDD	ND	5.0	4.9	98.4	4.8	4.7	97.8	0.6
12378-PeCDD	ND	5.0	5.6	112.4	4.8	5.1	106.1	5.8
123478-HxCDD	ND	12.5	9.3	74.7	12.0	9.9	82.4	9.8
123678-HxCDD	1.2	12.5	13.3	106.8	12.0	12.9	107.3	0.5
123789-HxCDD	0.1	12.5	9.6	77.1	12.0	9.9	82.4	6.6
1234678-HpCDD	38.2	12.5	67.3	540.6	12.0	55.3	460.1	16.1
OCDD	684.0	24.9	970.0	3895.5	24.0	705.0	2932.8	28.2
2378-TCDF	ND	5.0	4.8	96.4	4.8	4.7	97.8	1.4
12378-PeCDF	ND	5.0	5.5	110.4	4.8	5.0	104.0	6.0
23478-PeCDF	ND	5.0	5.3	106.4	4.8	4.8	99.8	6.4
123478-HxCDF	0.2	12.5	13.3	106.8	12.0	12.6	104.8	1.9
123678-HxCDF	0.1	12.5	13.3	106.8	12.0	12.5	104.0	2.7
234678-HxCDF	0.0	12.5	12.6	101.2	12.0	11.7	97.3	3.9
123789-HxCDF	ND	12.5	12.5	100.4	12.0	11.6	96.5	3.9
1234678-HpCDF	13.6	12.5	28.8	231.3	12.0	25.0	208.0	10.6
1234789-HpCDF	0.5	12.5	12.7	102.0	12.0	12.0	99.8	2.1
OCDF	64.1	24.9	107.0	429.7	24.0	82.2	342.0	22.7

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002049 CLIENT ID....: WADSWORTH TLI NUMBER....: M. BLANK
CONCAL.....: E002048 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 1000.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805W SHIPMENT NO...: N/A

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.2				—
12378-PeCDD	ND		0.5				—
123478-HxCDD	ND		0.3				—
123678-HxCDD	ND		0.2				—
123789-HxCDD	ND		0.2				—
1234678-HpCDD	ND		0.4				—
OCDD	EMPC			0.18			—
2378-TCDF	ND		0.1				—
12378-PeCDF	ND		0.2				—
23478-PeCDF	ND		0.2				—
123478-HxCDF	ND		0.1				—
123678-HxCDF	ND		0.1				—
234678-HxCDF	ND		0.1				—
123789-HxCDF	ND		0.2				—
1234678-HpCDF	ND		0.2				—
1234789-HpCDF	ND		0.2				—
OCDF	ND		0.2				—
TOTAL TCDD	EMPC			4.78			—
TOTAL PeCDD	ND		0.5				—
TOTAL HxCDD	ND		0.2				—
TOTAL HpCDD	ND		0.4				—
TOTAL TCDF	EMPC			0.19			—
TOTAL PeCDF	ND		0.2				—
TOTAL HxCDF	ND		0.1				—
TOTAL HpCDF	ND		0.2				—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.6	79.2	0.80	25:20	—
13C12-2378-TCDD	35.4	70.9	0.80	26:17	—
13C12-HxCDD 678	43.7	87.4	1.27	39:45	—
13C12-HpCDF 678	85.6	85.6	1.06	44:20	—
13C12-OCDD	84.4	84.4	0.90	53:03	—

8280_RPT rev:3.02

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/24/91

ILE NAME....:	E002064	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	M.BLANK
ONCAL.....:	E002063	SAMPLE ID....:	METHOD BLANK		
NALYST.....:	XL	ANALYSIS DATE:	01/19/91	PROJECT NUMBER:	219-S
AMPLE SIZE..:	10.00 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	/ /
CAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	/ /
PIKE FILE...:	SP82805N			SHIPMENT NO...:	N/A

AME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
378-TCDD	ND		0.003				
2378-PeCDD	ND		0.003				
23478-HxCDD	ND		0.003				
23678-HxCDD	ND		0.003				
23789-HxCDD	ND		0.003				
234678-HpCDD	ND		0.003				
CDD	0.02				0.80	53:05	L
378-TCDF	ND		0.003				
2378-PeCDF	ND		0.003				
3478-PeCDF	ND		0.003				
23478-HxCDF	ND		0.003				
23678-HxCDF	ND		0.003				
34678-HxCDF	ND		0.003				
23789-HxCDF	ND		0.003				
234678-HpCDF	ND		0.003				
234789-HpCDF	ND		0.003				
CDF	ND		0.003				
OTAL TCDD	EMPC			0.52			
OTAL PeCDD	ND		0.003				
OTAL HxCDD	EMPC			0.01			
OTAL HpCDD	ND		0.003				
OTAL TCDF	EMPC			0.026			
OTAL PeCDF	ND		0.003				
OTAL HxCDF	ND		0.003				
OTAL HpCDF	ND		0.003				

NTERNAL STANDARDS RECOVERY SUMMARY

AME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
3C12-2378-TCDF	3.7	74.6	0.80	25:19	
3C12-2378-TCDD	3.9	77.0	0.79	26:15	
3C12-HxCDD 678	4.6	92.3	1.26	39:44	
3C12-HpCDF 678	7.9	78.8	1.05	44:20	
3C12-OCDD	8.8	88.2	0.90	53:04	

8280_RPT rev:3.02

AGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002069 CLIENT ID....: WADSWORTH TLI NUMBER....: M.BLANK
CONCAL.....: E002063 SAMPLE ID....: METHOD BLANK
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.00 g SAMPLE MATRIX: SOIL DATE RECEIVED.: / /
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: N/A

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.005				
12378-PeCDD	ND		0.008				
123478-HxCDD	ND		0.005				
123678-HxCDD	ND		0.005				
123789-HxCDD	ND		0.005				
1234678-HpCDD	ND		0.005				
OCDD	0.09				0.90	53:07	L
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.005				
23478-PeCDF	ND		0.005				
123478-HxCDF	ND		0.003				
123678-HxCDF	ND		0.003				
234678-HxCDF	ND		0.003				
123789-HxCDF	ND		0.003				
1234678-HpCDF	ND		0.003				
1234789-HpCDF	ND		0.005				
OCDF	0.004				0.97	53:20	L
TOTAL TCDD	EMPC			0.44			
TOTAL PeCDD	ND		0.008				
TOTAL HxCDD	ND		0.005				
TOTAL HpCDD	ND		0.005				
TOTAL TCDF	EMPC			0.03			
TOTAL PeCDF	ND		0.005				
TOTAL HxCDF	ND		0.003				
TOTAL HpCDF	ND		0.003				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	2.9	58.4	0.79	25:20	
13C12-2378-TCDD	3.1	61.3	0.79	26:15	
13C12-HxCDD 678	4.8	96.9	1.25	39:47	
13C12-HpCDF 678	8.9	89.1	1.04	44:23	
13C12-OCDD	9.6	95.9	0.90	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/23/91

FILE NAME....: E002051 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3E MS
CONCAL.....: E002048 SAMPLE ID....: OL 0302-3 MS
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 930.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	51.7				0.79	26:18	___
12378-PeCDD	76.6				1.54	33:06	___
123478-HxCDD	140				1.23	39:37	___
123678-HxCDD	124				1.23	39:48	___
123789-HxCDD	132				1.22	40:26	___
1234678-HpCDD	157				1.06	46:36	___
OCDD	261				0.88	53:10	___
2378-TCDF	52.4				0.77	25:21	___
12378-PeCDF	72.6				1.56	31:12	___
23478-PeCDF	70.0				1.55	32:28	___
123478-HxCDF	134				1.23	37:59	___
123678-HxCDF	127				1.22	38:12	___
234678-HxCDF	126				1.22	39:19	___
123789-HxCDF	123				1.23	40:52	___
1234678-HpCDF	134				1.05	44:25	___
1234789-HpCDF	134				1.05	47:26	___
OCDF	223				0.87	53:23	___
TOTAL TCDD	51.7	2		57.1	0.79		___
TOTAL PeCDD	77.6	2		77.2	1.59		___
TOTAL HxCDD	403	4		394.5	1.28		___
TOTAL HpCDD	157	1		312.6	1.06		___
TOTAL TCDF	54.2	3		53.2	0.73		___
TOTAL PeCDF	148	8			1.56		___
TOTAL HxCDF	513	6		255.5	1.24		___
TOTAL HpCDF	270	3		269.0	1.06		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	41.1	76.4	0.79	25:20	___
13C12-2378-TCDD	41.9	78.0	0.78	26:17	___
13C12-HxCDD 678	49.3	91.7	1.26	39:47	___
13C12-HpCDF 678	97.5	90.7	1.05	44:24	___
13C12-OCDD	97.5	90.7	0.90	53:09	___

8280_RPT rev:3.02

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002052 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3HMSD
CONCAL.....: E002048 SAMPLE ID....: OL 0302-3 MSD
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 965.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	40.6				0.79	26:18	
12378-PeCDD	67.8				1.55	33:05	
123478-HxCDD	107				1.25	39:36	
123678-HxCDD	101				1.24	39:48	
123789-HxCDD	105				1.24	40:25	
1234678-HpCDD	124				1.05	46:35	
OCDD	205				0.89	53:09	
2378-TCDF	41.2				0.77	25:22	
12378-PeCDF	67.5				1.57	31:11	
23478-PeCDF	67.2				1.56	32:27	
123478-HxCDF	95.0				1.24	37:59	
123678-HxCDF	95.9				1.24	38:11	
234678-HxCDF	94.9				1.24	39:18	
123789-HxCDF	91.9				1.25	40:52	
1234678-HpCDF	104				1.04	44:24	
1234789-HpCDF	107				1.04	47:24	
OCDF	178				0.89	53:21	
TOTAL TCDD	40.6	1		45.7	0.79		
TOTAL PeCDD	67.8	2		68.4	1.63		
TOTAL HxCDD	316	4		316	1.27		
TOTAL HpCDD	125	2			1.07		
TOTAL TCDF	41.7	4		42.2	0.78		
TOTAL PeCDF	140	8			1.53		
TOTAL HxCDF	381	6		381	1.26		
TOTAL HpCDF	212	3		212	1.06		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	36.9	71.3	0.79	25:20	
13C12-2378-TCDD	42.1	81.3	0.79	26:17	
13C12-HxCDD 678	54.5	105	1.26	39:46	
13C12-HpCDF 678	110	106	1.06	44:23	
13C12-OCDD	103	99.8	0.90	53:07	

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....:	E002086	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-53-4MS
CONCAL.....:	E002076	SAMPLE ID....:	OK 3004-4MS		
ANALYST.....:	XL	ANALYSIS DATE:	01/21/91	PROJECT NUMBER:	219-S2
SAMPLE SIZE..:	10.04 g	SAMPLE MATRIX:	SOIL	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	/ /
SPIKE FILE...:	SP82805N			SHIPMENT NO...:	FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.9				0.79	26:15	___
12378-PeCDD	5.6				1.57	33:01	___
123478-HxCDD	9.3				1.24	39:30	___
123678-HxCDD	13.3				1.23	39:40	___
123789-HxCDD	9.6				1.23	40:19	___
1234678-HpCDD	67.3				1.05	46:28	_H_
OCDD	970				0.88	53:04	H,BL
2378-TCDF	4.8				0.78	25:19	___
12378-PeCDF	5.5				1.58	31:07	___
23478-PeCDF	5.3				1.57	32:22	___
123478-HxCDF	13.3				1.24	37:52	___
123678-HxCDF	13.3				1.24	38:05	___
234678-HxCDF	12.6				1.23	39:12	___
123789-HxCDF	12.5				1.24	40:44	___
1234678-HpCDF	28.8				1.02	44:16	___
1234789-HpCDF	12.7				1.04	47:17	___
OCDF	107				0.87	53:14	H,BL
TOTAL TCDD	4.9	1		5.5	0.79		___
TOTAL PeCDD	5.6	1			1.57		___
TOTAL HxCDD	35.1	5		36.0	1.24		___
TOTAL HpCDD	112	2			1.05		___
TOTAL TCDF	4.8	1		4.9	0.78		___
TOTAL PeCDF	11.3	4		11.6	1.59		___
TOTAL HxCDF	62.9	7		63.0	1.24		___
TOTAL HpCDF	106	3		106	1.04		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.1	83.3	0.80	25:18	___
13C12-2378-TCDD	3.8	76.0	0.80	26:14	___
13C12-HxCDD 678	5.5	111	1.26	39:40	___
13C12-HpCDF 678	8.4	84.0	1.04	44:15	___
13C12-OCDD	9.1	91.3	1.02	53:03	___

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/25/91

FILE NAME....: E002087 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-53-4MSD
CONCAL.....: E002076 SAMPLE ID....: OK 3004-4MSD
ANALYST.....: XL ANALYSIS DATE: 01/21/91 PROJECT NUMBER: 219-S2
SAMPLE SIZE..: 10.40 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: / /
SPIKE FILE...: SP82805N SHIPMENT NO...: FL.3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	4.7				0.79	26:14	
12378-PeCDD	5.1				1.59	33:01	
123478-HxCDD	9.9				1.24	39:29	
123678-HxCDD	12.9				1.23	39:40	
123789-HxCDD	9.9				1.22	40:18	
1234678-HpCDD	55.3				1.05	46:27	H
OCDD	705				0.88	53:01	H,BL
2378-TCDF	4.7				0.78	25:19	
12378-PeCDF	5.0				1.59	31:06	
23478-PeCDF	4.8				1.57	32:22	
123478-HxCDF	12.6				1.24	37:52	
123678-HxCDF	12.5				1.24	38:04	
234678-HxCDF	11.7				1.22	39:11	
123789-HxCDF	11.6				1.24	40:43	
1234678-HpCDF	25.0				1.02	44:15	
1234789-HpCDF	12.0				1.04	47:15	
OCDF	82.2				0.87	53:12	BL
TOTAL TCDD	4.7	1		5.25	0.79		
TOTAL PeCDD	5.1	1			1.59		
TOTAL HxCDD	35.1	5		35.2	1.23		
TOTAL HpCDD	90.2	2			1.05		
TOTAL TCDF	4.7	1		4.8	0.78		
TOTAL PeCDF	10.2	4		10.4	1.58		
TOTAL HxCDF	57.7	6		58.0	1.24		
TOTAL HpCDF	92.5	3		92.2	1.03		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	4.3	89.5	0.80	25:17	
13C12-2378-TCDD	3.9	80.5	0.80	26:13	
13C12-HxCDD 678	5.0	104	1.27	39:39	
13C12-HpCDF 678	8.6	89.8	1.04	44:14	
13C12-OCDD	11.1	116	1.00	53:00	

8280_RPT rev:3.02

FLAGS: H = CONCENTRATION ABOVE CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002053 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-1C
CONCAL.....: E002048 SAMPLE ID....: OL 0302-1
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 835.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.06				
12378-PeCDD	ND		0.1				
123478-HxCDD	ND		0.06				
123678-HxCDD	ND		0.06				
123789-HxCDD	ND		0.06				
1234678-HpCDD	0.17				1.03	46:34	L
OCDD	17.0				0.89	53:06	L
2378-TCDF	ND		0.04				
12378-PeCDF	ND		0.06				
23478-PeCDF	ND		0.06				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.03				
123789-HxCDF	ND		0.04				
1234678-HpCDF	ND		0.04				
1234789-HpCDF	ND		0.06				
OCDF	0.06				0.77	53:18	L
TOTAL TCDD	0.10	1		5.3	0.71		
TOTAL PeCDD	0.23	1			1.70		
TOTAL HxCDD	2.0	1		2.12	1.30		
TOTAL HpCDD	1.7	2			1.03		
TOTAL TCDF	EMPC			0.33			
TOTAL PeCDF	0.10	1			1.36		
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	0.05	1			1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	33.3	55.6	0.80	25:20	
13C12-2378-TCDD	36.7	61.4	0.79	26:16	
13C12-HxCDD 678	48.4	80.8	1.27	39:45	
13C12-HpCDF 678	95.6	79.8	1.05	44:21	
13C12-OCDD	92.5	77.2	0.90	53:05	

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002054 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-2C
CONCAL.....: E002048 SAMPLE ID....: OL 0302-2
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 760.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				___
12378-PeCDD	ND		0.09				___
123478-HxCDD	ND		0.06				___
123678-HxCDD	ND		0.05				___
123789-HxCDD	ND		0.05				___
1234678-HpCDD	2.1				1.08	46:34	_L_
OCDD	25.5				0.89	53:06	_L_
2378-TCDF	ND		0.03				___
12378-PeCDF	ND		0.05				___
23478-PeCDF	ND		0.05				___
123478-HxCDF	ND		0.03				___
123678-HxCDF	ND		0.03				___
234678-HxCDF	ND		0.02				___
123789-HxCDF	ND		0.03				___
1234678-HpCDF	0.54				1.06	44:23	_L_
1234789-HpCDF	ND		0.05				___
OCDF	2.1				0.89	53:19	_L_
TOTAL TCDD	0.29	1		7.5	0.76		___
TOTAL PeCDD	ND		0.09				___
TOTAL HxCDD	0.11	1			1.32		___
TOTAL HpCDD	3.7	2			1.06		___
TOTAL TCDF	EMPC			0.36			___
TOTAL PeCDF	ND		0.05				___
TOTAL HxCDF	0.33	1		0.37	1.28		___
TOTAL HpCDF	2.6	2			1.06		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	45.4	69.1	0.80	25:20	___
13C12-2378-TCDD	45.9	69.8	0.79	26:17	___
13C12-HxCDD 678	58.1	88.4	1.28	39:45	___
13C12-HpCDF 678	121	92.2	1.06	44:22	___
13C12-OCDD	111	84.4	0.90	53:05	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....: E002050 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-51-3D
CONCAL.....: E002048 SAMPLE ID....: OL 0302-3
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 955.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL 3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.10				
123478-HxCDD	ND		0.05				
123678-HxCDD	ND		0.05				
123789-HxCDD	ND		0.05				
1234678-HpCDD	ND		0.07				
OCDD	0.98				0.85	53:08	L
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	ND		0.03				
123678-HxCDF	ND		0.03				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.03				
1234678-HpCDF	ND		0.03				
1234789-HpCDF	ND		0.04				
OCDF	0.04				0.90	53:18	L
TOTAL TCDD	EMPC			5.5			
TOTAL PeCDD	ND		0.10				
TOTAL HxCDD	ND		0.05				
TOTAL HpCDD	ND		0.07				
TOTAL TCDF	EMPC			0.30			
TOTAL PeCDF	ND		0.05				
TOTAL HxCDF	ND		0.03				
TOTAL HpCDF	ND		0.04				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	34.3	65.5	0.81	25:19	
13C12-2378-TCDD	34.9	66.7	0.80	26:16	
13C12-HxCDD 678	47.1	89.9	1.27	39:46	
13C12-HpCDF 678	93.8	89.6	1.06	44:23	
13C12-OCDD	93.5	89.3	0.90	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002055 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-1D
CONCAL.....: E002048 SAMPLE ID....: OL0302-4
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 219-W
SAMPLE SIZE..: 790.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.05				
12378-PeCDD	ND		0.1				
123478-HxCDD	ND		0.08				
123678-HxCDD	0.77				1.29	39:45	L
123789-HxCDD	ND		0.07				
1234678-HpCDD	ND		0.1				
OCDD	948				0.86	53:07	H
2378-TCDF	ND		0.03				
12378-PeCDF	ND		0.05				
23478-PeCDF	ND		0.05				
123478-HxCDF	0.08				1.05	37:57	L
123678-HxCDF	ND		0.05				
234678-HxCDF	ND		0.04				
123789-HxCDF	ND		0.05				
1234678-HpCDF	14.2				1.10	44:21	L
1234789-HpCDF	EMPC			0.33			
OCDF	55.4				0.87	53:20	
TOTAL TCDD	EMPC			4.9			
TOTAL PeCDD	EMPC			0.65			
TOTAL HxCDD	15.5	3			1.26		
TOTAL HpCDD	46.3	1			1.03		
TOTAL TCDF	EMPC			0.23			
TOTAL PeCDF	EMPC			0.05			
TOTAL HxCDF	1.8	3		2.2	1.17		
TOTAL HpCDF	68.8	2		69.2	1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	41.5	65.6	0.79	25:19	
13C12-2378-TCDD	43.3	68.4	0.79	26:15	
13C12-HxCDD 678	55.5	87.7	1.24	39:44	
13C12-HpCDF 678	98.2	77.6	1.02	44:20	
13C12-OCDD	118	93.1	0.93	53:06	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE
H = CONCENTRATION ABOVE CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

ILE NAME....: E002056	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-2D	
ONCAL.....: E002048	SAMPLE ID....: OL 0302-5		
NALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
AMPLE SIZE..: 970.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
CAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
PIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				___
12378-PeCDD	ND		0.2				___
123478-HxCDD	ND		0.10				___
123678-HxCDD	ND		0.09				___
123789-HxCDD	ND		0.09				___
1234678-HpCDD	ND		0.1				___
OCDD	1.2				0.92	53:05	_L_
2378-TCDF	ND		0.05				___
12378-PeCDF	ND		0.08				___
23478-PeCDF	ND		0.08				___
123478-HxCDF	ND		0.05				___
123678-HxCDF	ND		0.04				___
234678-HxCDF	ND		0.04				___
123789-HxCDF	ND		0.05				___
1234678-HpCDF	ND		0.06				___
1234789-HpCDF	ND		0.08				___
OCDF	ND		0.07				___
TOTAL TCDD	EMPC			6.5			___
TOTAL PeCDD	ND		0.2				___
TOTAL HxCDD	ND		0.09				___
TOTAL HpCDD	ND		0.1				___
TOTAL TCDF	EMPC			0.44			___
TOTAL PeCDF	ND		0.08				___
TOTAL HxCDF	ND		0.04				___
TOTAL HpCDF	ND		0.06				___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	28.1	54.5	0.80	25:19	___
13C12-2378-TCDD	29.3	56.8	0.81	26:15	___
13C12-HxCDD 678	42.9	83.3	1.30	39:44	___
13C12-HpCDF 678	97.8	94.9	1.07	44:20	___
13C12-OCDD	82.6	80.1	0.90	53:04	___

8280_RPT rev:3.02

LAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/26/91

FILE NAME....:	E002057	CLIENT ID....:	WADSWORTH	TLI NUMBER....:	3-52-3D
CONCAL.....:	E002048	SAMPLE ID....:	OL 0302-6		
ANALYST.....:	XL	ANALYSIS DATE:	01/18/91	PROJECT NUMBER:	219-W
SAMPLE SIZE..:	865.00 ml	SAMPLE MATRIX:	WATER	DATE RECEIVED.:	12/04/90
ICAL DATE....:	01/02/91	SAMPLE ORIGIN:	N/A	DATE COLLECTED:	11/30/90
SPIKE FILE...:	SP82805W			SHIPMENT NO...:	FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.08				
12378-PeCDD	ND		0.2				
123478-HxCDD	ND		0.07				
123678-HxCDD	ND		0.07				
123789-HxCDD	ND		0.07				
1234678-HpCDD	0.37				1.09	46:34	L
OCDD	26.7				0.89	53:06	L
2378-TCDF	ND		0.05				
12378-PeCDF	ND		0.08				
23478-PeCDF	ND		0.08				
123478-HxCDF	ND		0.04				
123678-HxCDF	ND		0.04				
234678-HxCDF	ND		0.03				
123789-HxCDF	ND		0.04				
1234678-HpCDF	ND		0.05				
1234789-HpCDF	ND		0.06				
OCDF	0.28				0.87	53:19	L
TOTAL TCDD	EMPC			5.6			
TOTAL PeCDD	ND		0.2				
TOTAL HxCDD	3.2	1			1.28		
TOTAL HpCDD	3.1	2			1.08		
TOTAL TCDF	EMPC			0.36			
TOTAL PeCDF	EMPC			0.12			
TOTAL HxCDF	EMPC			0.07			
TOTAL HpCDF	0.16	1			1.08		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	29.3	50.7	0.80	25:20	
13C12-2378-TCDD	31.1	53.8	0.79	26:17	
13C12-HxCDD 678	50.3	87.0	1.28	39:46	
13C12-HpCDF 678	104	89.9	1.06	44:22	
13C12-OCDD	95.2	82.4	0.90	53:05	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002058 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-6A
CONCAL.....: E002048 SAMPLE ID....: OL 0302-9
ANALYST.....: XL ANALYSIS DATE: 01/18/91 PROJECT NUMBER: 210-W
SAMPLE SIZE..: 895.00 ml SAMPLE MATRIX: WATER DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.03				
12378-PeCDD	ND		0.06				
123478-HxCDD	ND		0.04				
123678-HxCDD	ND		0.04				
123789-HxCDD	ND		0.04				
1234678-HpCDD	ND		0.05				
OCDD	0.58				0.90	53:04	L
2378-TCDF	ND		0.02				
12378-PeCDF	ND		0.03				
23478-PeCDF	ND		0.03				
123478-HxCDF	ND		0.02				
123678-HxCDF	ND		0.02				
234678-HxCDF	ND		0.02				
123789-HxCDF	ND		0.02				
1234678-HpCDF	ND		0.02				
1234789-HpCDF	ND		0.03				
OCDF	ND		0.03				
TOTAL TCDD	EMPC			6.3			
TOTAL PeCDD	ND		0.06				
TOTAL HxCDD	ND		0.04				
TOTAL HpCDD	ND		0.05				
TOTAL TCDF	EMPC			0.29			
TOTAL PeCDF	ND		0.03				
TOTAL HxCDF	ND		0.02				
TOTAL HpCDF	ND		0.03				

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.2	72.0	0.80	25:17	
13C12-2378-TCDD	40.7	72.9	0.79	26:13	
13C12-HxCDD 678	48.2	86.3	1.28	39:42	
13C12-HpCDF 678	101	90.2	1.06	44:19	
13C12-OCDD	84.5	75.6	0.91	53:03	

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/24/91

FILE NAME....: E002059	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-53-1A
CONCAL.....: E002048	SAMPLE ID....: OK 3004-1	
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W
SAMPLE SIZE..: 925.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				—
12378-PeCDD	ND		0.07				—
123478-HxCDD	ND		0.04				—
123678-HxCDD	ND		0.04				—
123789-HxCDD	ND		0.04				—
1234678-HpCDD	0.15				1.08	46:33	L
OCDD	3.5				0.88	53:03	L
2378-TCDF	ND		0.02				—
12378-PeCDF	ND		0.04				—
23478-PeCDF	ND		0.04				—
123478-HxCDF	ND		0.02				—
123678-HxCDF	ND		0.02				—
234678-HxCDF	ND		0.02				—
123789-HxCDF	ND		0.02				—
1234678-HpCDF	EMPC			0.04			—
1234789-HpCDF	ND		0.03				—
OCDF	0.24				0.88	53:16	L
TOTAL TCDD	EMPC			5.6			—
TOTAL PeCDD	ND		0.07				—
TOTAL HxCDD	EMPC			0.18			—
TOTAL HpCDD	0.15	1		0.26	1.08		—
TOTAL TCDF	EMPC			0.27			—
TOTAL PeCDF	ND		0.04				—
TOTAL HxCDF	0.02	1			1.10		—
TOTAL HpCDF	0.15	1		0.20	1.07		—

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	39.2	72.6	0.80	25:17	—
13C12-2378-TCDD	41.1	76.0	0.79	26:13	—
13C12-HxCDD 678	54.1	100	1.27	39:42	—
13C12-HpCDF 678	113	105	1.06	44:19	—
13C12-OCDD	104	96.0	0.91	53:01	—

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (a)

01/25/91

FILE NAME....: E002060	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-53-2A	
CONCAL.....: E002048	SAMPLE ID....: OK 3004-2		
ANALYST.....: XL	ANALYSIS DATE: 01/18/91	PROJECT NUMBER: 219-W	
SAMPLE SIZE..: 770.00 ml	SAMPLE MATRIX: WATER	DATE RECEIVED.: 12/04/90	
ICAL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
SPIKE FILE...: SP82805W		SHIPMENT NO...: FL.3209	

NAME	CONC(ppt)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.04				___
12378-PeCDD	ND		0.08				___
123478-HxCDD	ND		0.05				___
123678-HxCDD	ND		0.04				___
123789-HxCDD	ND		0.04				___
1234678-HpCDD	ND		0.07				___
OCDD	3.1				0.91	53:05	_L_
2378-TCDF	ND		0.03				___
12378-PeCDF	ND		0.04				___
23478-PeCDF	ND		0.05				___
123478-HxCDF	ND		0.03				___
123678-HxCDF	ND		0.03				___
234678-HxCDF	ND		0.02				___
123789-HxCDF	ND		0.03				___
1234678-HpCDF	0.05				1.06	44:22	_L_
1234789-HpCDF	ND		0.05				___
OCDF	0.21				1.00	53:18	_L_
TOTAL TCDD	EMPC			6.0			___
TOTAL PeCDD	ND		0.08				___
TOTAL HxCDD	ND		0.04				___
TOTAL HpCDD	ND		0.07				___
TOTAL TCDF	EMPC			0.37			___
TOTAL PeCDF	ND		0.05				___
TOTAL HxCDF	ND		0.03				___
TOTAL HpCDF	0.22	2			1.09		___

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppt)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	40.0	61.6	0.80	25:19	___
13C12-2378-TCDD	44.0	67.8	0.79	26:16	___
13C12-HxCDD 678	56.8	87.5	1.27	39:45	___
13C12-HpCDF 678	101	77.7	1.06	44:21	___
13C12-OCDD	82.7	63.7	0.91	53:05	___

8280_RPT rev:3.02

FLAGS: L = CONCENTRATION BELOW CALIBRATION RANGE

FILE NAME....: E002065 CLIENT ID....: WADSWORTH TLI NUMBER....: 3-52-4
CONCAL.....: E002063 SAMPLE ID....: OL-0302-7
ANALYST.....: XL ANALYSIS DATE: 01/19/91 PROJECT NUMBER: 219-S
SAMPLE SIZE..: 9.77 g SAMPLE MATRIX: SOIL DATE RECEIVED.: 12/04/90
ICAL DATE....: 01/02/91 SAMPLE ORIGIN: N/A DATE COLLECTED: 11/30/90
SPIKE FILE...: SP82805N SHIPMENT NO...: FL 3209

NAME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
2378-TCDD	ND		0.003				
12378-PeCDD	ND		0.005				
123478-HxCDD	ND		0.005				
123678-HxCDD	0.88				1.25	39:47	L
123789-HxCDD	0.11				1.25	40:25	L
1234678-HpCDD	32.6				1.04	46:34	
OCDD	357				0.89	53:17	H,BL
2378-TCDF	ND		0.003				
12378-PeCDF	ND		0.003				
23478-PeCDF	ND		0.003				
123478-HxCDF	0.13				1.27	37:58	L
123678-HxCDF	0.05				1.26	38:10	L
234678-HxCDF	0.04				1.32	39:18	L
123789-HxCDF	ND		0.003				
1234678-HpCDF	9.8				1.06	44:22	
1234789-HpCDF	0.33				1.05	47:21	L
OCDF	34.1				0.89	53:26	
TOTAL TCDD	0.01	1		0.56	0.89		
TOTAL PeCDD	EMPC			0.014			
TOTAL HxCDD	2.6	4		2.73	1.25		
TOTAL HpCDD	59.3	2			1.04		
TOTAL TCDF	0.005	1		0.12	0.74		
TOTAL PeCDF	0.05	1		0.09	1.37		
TOTAL HxCDF	5.6	8		5.6	1.24		
TOTAL HpCDF	45.1	3		45.2	1.05		

INTERNAL STANDARDS RECOVERY SUMMARY

NAME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
13C12-2378-TCDF	3.1	61.0	0.80	25:19	
13C12-2378-TCDD	3.3	64.6	0.79	26:15	
13C12-HxCDD 678	4.4	85.2	1.27	39:45	
13C12-HpCDF 678	8.6	84.5	1.05	44:20	
13C12-OCDD	12.5	122	0.95	53:15	

8280_RPT rev:3.02

H = CONCENTRATION ABOVE CALIBRATION RANGE
L = CONCENTRATION BELOW CALIBRATION RANGE
BL = FOUND IN THE BLANK AT CONCENTRATION < 2%

Triangle Laboratories of Houston, Inc.
PCDD/PCDF 8280 ANALYSIS (b)

01/26/91

LE NAME....: E002066	CLIENT ID....: WADSWORTH	TLI NUMBER....: 3-52-5	
NCAL.....: E002063	SAMPLE ID....: OL-0302-8		
ALYST.....: XL	ANALYSIS DATE: 01/19/91	PROJECT NUMBER: 219-S	
MPLE SIZE..: 8.78 g	SAMPLE MATRIX: SOIL	DATE RECEIVED.: 12/04/90	
AL DATE....: 01/02/91	SAMPLE ORIGIN: N/A	DATE COLLECTED: 11/30/90	
IKE FILE...: SP82805N		SHIPMENT NO...: FL 3209	

ME	CONC(ppb)	NUMBER	DL	EMPC	RATIO	RT	FLAGS
378-TCDD	ND		0.003				___
2378-PeCDD	ND		0.005				___
3478-HxCDD	ND		0.003				___
3678-HxCDD	0.03				1.32	39:46	_L_
3789-HxCDD	ND		0.003				___
34678-HpCDD	1.5				1.05	46:34	_L_
DD	21.0				0.89	53:07	_BL
78-TCDF	ND		0.003				___
2378-PeCDF	ND		0.003				___
3478-PeCDF	ND		0.003				___
23478-HxCDF	0.006				1.41	37:56	_L_
3678-HxCDF	EMPC			0.002			___
34678-HxCDF	0.002				1.12	39:17	_L_
3789-HxCDF	ND		0.003				___
234678-HpCDF	0.46				1.06	44:22	_L_
234789-HpCDF	0.01				1.16	47:24	_L_
DF	1.6				0.92	53:20	_L_
TAL TCDD	0.03	1		0.60	0.69		___
TAL PeCDD	ND		0.005				___
TAL HxCDD	0.10	3		0.11	1.35		___
TAL HpCDD	2.8	2			1.05		___
TAL TCDF	0.002	1		0.03	0.91		___
TAL PeCDF	ND		0.003				___
TAL HxCDF	0.24	4		0.26	1.24		___
TAL HpCDF	1.9	3			1.09		___

TERNAL STANDARDS RECOVERY SUMMARY

ME	CONC (ppb)	% REC.	RATIO	RT	FLAGS
3C12-2378-TCDF	4.2	74.0	0.79	25:19	___
3C12-2378-TCDD	4.5	78.6	0.79	26:15	___
3C12-HxCDD 678	5.4	94.7	1.26	39:45	___
3C12-HpCDF 678	10.2	89.7	1.06	44:21	___
3C12-OCDD	12.0	106	0.90	53:06	___

8280_RPT rev:3.02

= CONCENTRATION ABOVE CALIBRATION RANGE
= CONCENTRATION BELOW CALIBRATION RANGE
_ = FOUND IN THE BLANK AT CONCENTRATION < 2%

Reference 7

SunBank/South Florida, N.A.
P.O. Box 405100
Fort Lauderdale, Florida 33340-5100
305 467-5000

RECEIVED
DEC 11 1991
DEPT. OF ENVIRONMENTAL REG.
WEST PALM BEACH

December 9, 1991

Dr. Alexander Padva
Waste Programs Administrator
Florida Department of Environmental Regulation
Southeast Florida District
1900 South Congress Avenue
Suite A
West Palm Beach, Florida 33406

Re: Florida Department of Environmental Regulation (FDER) Comments
Contamination Assessment Report (CAR)
SunBank Site ("the property")
300 West Broward Blvd., Ft. Lauderdale, Florida
OCG Case 89-0752

Dear Dr. Padva:

I am writing in response to your letter of November 12, 1991, concerning the Contamination Assessment Report ("CAR") submitted by Conestoga-Rovers & Associates ("CRA")on behalf of SunBank. The following is SunBank's response to the Department's specific comments.

Response to Comment No. 1

We do not agree that an additional monitoring well should be installed. SunBank asked CRA to look again at the concentrations of constituents detected in samples collected from monitoring wells MW-1A (the deeper well) and MW-2 (the more shallow well) located in the vicinity of the former underground storage tanks. While the Department is correct that some dioxin/dibensofuran isomers which were found at somewhat higher concentrations in MW-1A than in MW-2, SunBank believes that this is insignificant. First, CRA has determined that groundwater in the vicinity of our 300 West Broward Boulevard property discharges to surface water bodies in the area, such as the New river (south of the property) and that there are no receptors (i.e. groundwater users) between the bank's property and the surface water bodies. These surface water bodies are tidally influenced are not used for drinking water. Therefore, we do not believe that the constituents found in any of the monitoring wells on our property pose a threat to human health or the environment.

Second, potentiometric data collected during the two sampling rounds conducted during the CAR indicate that groundwater beneath the property has an upward hydraulic gradient. That is, the deeper groundwater recharges the more shallow water bearing zone.

Accordingly, the constituents at 300 West Broward Boulevard property found in the deeper well should move upward, rather than remaining at depth, and discharge to the nearby surface water bodies. This also suggests that additional groundwater investigation at "depth" is not warranted.

Finally, the mineral spirits which contained the pentachlorophenol treating solution which was recovered from the former storage tanks and from the tank pit floated on the water. However, no evidence of free floating product was found during the installation of monitoring wells or during the sampling and analyses of groundwater from the wells. This suggests that there are no additional "sources" of the constituents associated with the former tanks and that dissolved constituents are the only species of concern at the property. Moreover, the concentrations detections of the dissolved constituents found by CRA during the CAR (see Table 1) in all of the monitoring wells are significantly below any relevant drinking water or health-based standard. Accordingly, SunBank concludes that the magnitude of the differences between the concentrations of the dissolved constituents found in monitoring wells MW-1A and MW-2 is insignificant.

Given that a vertically upward hydraulic gradient exists in the area of the former tanks and across the 300 West Broward Boulevard property, that no free floating product was found in any monitoring well and that the concentrations of dissolved constituents found in samples collected from the monitoring wells are significantly below any relevant or appropriate standard for the protection of human health or the environment, SunBank believes that the installation of additional monitoring well(s) at its 300 West Broward Boulevard property is not justified. SunBank requests the Department's concurrence.

Response to Comment No. 2

As noted above, the analytical results presented in the CAR for dioxin/dibenzofuran isomers indicate that the concentrations of these compounds found in groundwater samples were at levels significantly below the toxicity equivalent concentration (TEC) for 2,3,7,8-tetrachloro-dibenzo-p-dioxin (based on the Times Beach criterion of 20 ug/kg for 2,3,7,8-TCDD). Moreover, given that Gate City Door and Sash ceased operating nearly twenty-five years ago, we doubt that accurate, new information concerning the origin of these compounds can be obtained. That dioxin/dibenzofuran isomers were found in samples from all monitoring wells suggests to SunBank's consultant, CRA, that the presence of these constituents in these concentrations may be related to general industrial activity in the downtown Ft. Lauderdale area and not to a release from the former USTs. For these reasons, SunBank does not believe an additional investigation of the source of the contamination is warranted.

Inasmuch as the concentrations of dioxin/dibenzofuran isomers were found at concentrations which are significantly below any established level of concern and appear to be unrelated to the location of the former storage tanks, SunBank believes that attempting to identify the origin of these compounds may yield little useful information. Accordingly, SunBank requests that the Department withdraw its request.

For more nearly three years, SunBank has attempted to address all of the concerns of the United States Environmental Protection Agency, the Florida Department of Environmental Regulation and the Broward County Environmental Quality Control Board concerning the tanks which SunBank found on its property at 300 West Broward Boulevard in February 1989. Nearly two years ago, SunBank executed a Consent Order with the Department dealing with the removal of drums containing pentachlorophenol treating solution and water. Finally, SunBank through its consultant, CRA, has conducted a contamination assessment of its 300 West Broward Boulevard property and found that any constituents remaining on or under the property are present in concentrations well below standards designed to protect human health and the environment, particularly given the lack of receptors (i.e. groundwater users) between the property and adjacent surface water bodies. In the process, SunBank has spent more than a half million dollars to remove these materials and to study possible adverse environmental impacts associated with its property. SunBank believes that these actions have fully satisfied the spirit and the intent of the 1990 Consent Order it executed with the Department.

For these reasons, SunBank requests that the Department approve the paving of 300 West Broward Boulevard property as originally intended more than three years ago. The payment will act to cap the property, thereby preventing direct contact with any constituents of concern which may remain. While SunBank does not believe that any additional investigation of its 300 West Broward Boulevard property is warranted, we are prepared to collect and analyze samples, on two occasions during 1992, from the existing monitoring wells. SunBank believes that, based upon all of the information obtained to date, collecting these additional samples should satisfy any remaining concerns which the Department may have.

If you have questions, or if the Department would like to meet to discuss SunBank's response to its comments, please call me at (305) 766-7001.

Sincerely,

Douglas K. Sinclair
Senior Vice President

DKS/aj

Enc.
cc: Les Oakes
Steve Quigley

Table 1

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		Round 1 (duplicate)		Round 2		Round 2 (duplicate)		Exceedances of Criteria
MW 1A											
VOCs	(µg/l)	benzene	2	J	ND (1)		3				(A) Rounds 1 and 2
		ethylbenzene	62	J	12	J	51	J			(A) Rounds 1 and 2
		total xylenes	51	J	8	J	4				(A) Round 1
		dichloroethene, 1,2-					1				
		chloroform			8	J					
SOCs	(µg/l)	total xylenes	19		18		2				
		benzene	2	J	2	J	3				
		ethylbenzene	73		68		51	J			
BNAs	(µg/l)	napthalene					85				(A) Round 2
Dioxins	(ng/l)	1,2,3,4,6,7,8-HpCDD	0.17	J	0.37		0.47				
		OCDD	17	J	26.7		61.2				
		1,2,3,4,6,7,8-HpCDF					0.07	(1)			
		OCDF	0.06	J	0.28	J	0.86				
		Total TCDD	0.1		5.6	U (1)	0.29				
		Total PeCDD	0.23		ND (0.2)		0.32				
		Total HxCDD	2	J	3.2	J	8				
		Total HpCDD	1.7	J	3.1	J	5.4				
		Total TCDF	0.33	U (1)	0.36	U (1)	0.2	(1)			
		Total PeCDF	0.1		0.12	(1)					
		Total HxCDF	ND (0.03)		0.07	(1)	0.08				
		Total HpCDF	0.05		0.16	J	0.32				
MW 2											
VOCs	(µg/l)	ethylbenzene	6								
		total xylenes	5								
SOCs	(µg/l)	ethylbenzene	7								
		total xylenes	4								
BNAs	(µg/l)	napthalene					11		11		(A) Round 2
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD					3.7		5.5		
		1,2,3,7,8,9-HxCDD					0.21		0.31		
		1,2,3,4,6,7,8-HpCDD	2.1				126		199		(B) Rounds 1 and 2
		OCDD	25.5				1810		2340		
		1,2,3,4,7,8-HxCDF					0.21	(1)	0.49		
		1,2,3,6,7,8-HxCDF					0.11		0.23		
		2,3,4,6,7,8-HxCDF					0.13		0.05		
		1,2,3,4,6,7,8-HpCDF	0.54				40.2		54.9		(C)
		1,2,3,4,7,8,9-HpCDF					0.91	(1)	1.66		
		OCDF	2.1				165		221		
		Total TCDD	0.29				4.6	(1)	0.05		
		Total PeCDD					1.5	(1)	4.2		
		Total HxCDD	0.11				13.5		22.7		
		Total HpCDD	3.7				216		350		
		Total TCDF	0.36	U (1)			0.19	(1)	0.18		
		Total PeCDF					0.85		1.9		
		Total HxCDF	0.33				35.3		51.2		
		Total HpCDF	2.6				208		258		

Table 1

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		Round 1 (duplicate)	Round 2		Exceedances of Criteria
MW 3								
VOCs	(µg/l)	acetone	48	J				
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD				0.22		
		1,2,3,4,6,7,8-HpCDD	0.15			6.2		
		OCDD	3.5			124		
		1,2,3,4,6,7,8-HpCDF	0.04	(1)		2.4		
		OCDF	0.24			12		
		Total TCDD	5.6	U (1)		4.9	(1)	(B) Rounds 1 and 2
		Total HxCDD	0.18	(1)		0.38		
		Total HpCDD	0.15			11.5		
		Total TCDF	0.27	U (1)		0.22	(1)	
		Total HxCDF	0.02			1.5		
		Total HpCDF	0.15			11.4		
MW 4								
VOCs	(µg/l)	acetone	79					
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD				0.38	(1)	
		1,2,3,4,6,7,8-HpCDD				16.8		
		OCDD	0.98			319		
		1,2,3,4,6,7,8-HpCDF				6.1		
		OCDF	0.04			26.3		
		Total TCDD	5.5	U (1)		12.36	(1)	
		Total HxCDD				0.15		
		Total HpCDD				29.3		
		Total TCDF	0.3	U (1)		0.4	(1)	
		Total HxCDF				4.4		
		Total HpCDF				26.9		
MW 8								
Dioxins	(ng/l)	1,2,3,6,7,8-HxCDD	0.77			9.3		(B) Round 2
		1,2,3,7,8,9-HxCDD				0.31		
		1,2,3,4,6,7,8-HpCDD				319		(B) Round 2
		OCDD	948			7530		
		1,2,3,4,7,8-HxCDF	0.08			1.1		
		1,2,3,6,7,8-HxCDF				0.22	(1)	
		1,2,3,4,6,7,8-HpCDF	14.2			133		(B) Round 2
		1,2,3,4,7,8,9-HpCDF	0.33	(1)		4.78	(1)	
		OCDF	55.4			719		
		Total TCDD	4.9	U (1)		0.46		
		Total PeCDD	0.65	(1)		5		
		Total HxCDD	15.5			56.4		
		Total HpCDD	46.3			647		
		Total TCDF	0.23	U (1)		0.12		
		Total PeCDF	0.05	(1)		2.1		
		Total HxCDF	1.8			108		
		Total HpCDF	68.8			787		

Table 1

SUMMARY OF CONTAMINANT DETECTION BY WELL
SAMPLING ROUNDS 1 & 2
SUN BANK PROPERTY, FT. LAUDERDALE, FLORIDA

			Round 1		Round 1 (duplicate)	Round 2		Round 2 (duplicate)	Exceedances of Criteria
MW 6									
Dioxins	(ng/l)	1,2,3,4,6,7,8-HpCDD				4.1			
		OCDD	3.1			77.3			
		1,2,3,4,6,7,8-HpCDF	0.05			1.6			
		OCDF	0.21			7.3			
		Total TCDD	6	U (1)		6.1	(1)		
		Total HxCDD				0.09	(1)		
		Total HpCDD				7.3			
		Total TCDF	0.37	U (1)		0.2	(1)		
		Total HxCDF				0.95			
		Total HpCDF	0.22			7.5			

NOTES

VOCs Volatile Organic Compounds
SOCs Selected Organic Compounds
BNAs Base Neutral Acid Extractable Organic Compounds
µg/l micrograms per litre = parts per billion
ng/l nanograms per litre = parts per trillion
ND Not detected (the detection limit is in brackets)
(1) Estimated Maximum Possible Concentration (EMPC)

U The material was analyzed for, but not detected. The associated numerical value is the sample quantitation limit.
J The associated numerical quantity is estimated.
(A) Exceedance in based on the Florida Groundwater Guidance Concentrations
(B) Exceedance is based on the TEC's shown in Table 7 for the proposed MCL for 2,3,7,8-TCDD
(C) The mean of detection for round 2 was 47.6 which is less than the TEC of 50 ng/l based on the proposed MCL for 2,3,7,8-TCDD.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Louis Valcarenghi, Southeast District

THROUGH: James J. Crane, Bureau of Waste Cleanup JJC

FROM: John R. Armstrong, Bureau of Waste Cleanup JA

DATE: January 17, 1992

SUBJECT: Sun Bank Properties, Fort Lauderdale, Broward County, CAR Review

---

I have reviewed the December 9, Letter from Mr. Douglas K. Sinclair and have the following comments.

Response to Comment No.1 My original comment stands. An additional well screened below well MW-1A is required. The total VOA concentration in MW-1A is above 50 ug/l and benzene is two to three times the drinking water standard. In addition there appears to be a clear downward concentration gradient with the deep well showing total VOA concentrations up to 5 to 10 times the concentrations in the shallow well. Additional information is needed from deeper zones to insure that the vertical extent of contamination is known. The argument that the upward hydraulic gradient is sufficient to prevent downward migration of contaminants is proven false by the existence of contamination in the deeper well MW-1A between 20 and 25 feet. It appears in this case, the hydrodynamic dispersion is sufficient to overcome the small hydraulic gradient present and move contaminants to deeper zones.

Response to Comment No. 2 The Department agrees with Sun Bank's argument that there is no evidence to link the source of the dioxin/diebenzofurans isomers to past activities on this property. The department therefore withdraws its request to investigate further the source of these contaminants.

With the above comments in mind a monitoring proposal should be submitted for Department approval.

Ref 7 ATTACHMENT

CRA
Consulting Engineers

CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive,
Waterloo, Ontario, Canada N2V 1C2
(519) 884-0510

December 18, 1989 Reference No. 3050

Mr. Les Oakes
King & Spalding
2500 Trust Company Tower
Atlanta, Georgia
U.S.A. 30303

Dear Mr. Oakes:

Re: Responses to Florida Department of Environmental Regulation (FDER) Comments - San Bank Contamination Assessment Plan (CAP)

This letter provides CRA's responses to FDER's November 21, 1989 comments on the Sun Bank CAP (Enviropact, August 7, 1989).

FDER Comment No. 1:

A complete characterization of the plume is required to delineate the extent of the contamination within the soil and groundwater.

CRA Response:

Section 5.0 and Appendix VI of the CAP address the number and location of the proposed monitoring wells.

CRA proposes that the number of groundwater monitoring wells is sufficient as indicated with the following modifications:

1. Monitoring Well #1 (MW1) was installed without benefit of a locking cap on the protective casing. The well was uncovered and unlocked for an unknown period. Accordingly, MW1 will be replaced. MW1 will be retained for water level measurements only.

2. MW1 will be replaced at the location indicated on Figure 1 and will be designated MW1A. MW1A will be installed to a depth of 15 feet.

3. MW-2, MW-4 and MW-5 will be installed at the locations shown on Figure 1. Following installation, relative water level measurments will be taken on MW-1, MW-1A, MW-2, MW-4 and MW-5 to determine groundwater flow direction.

4. MW-3 will be installed approximately 50 feet upgradient of the center of the tank excavation area. The location of MW-3 will be dependent upon groundwater flow data collected in #3 (above).

5. Similarly, MW-6 will be installed approximately 100 feet downgradient of the center of tank excavation area.

FDER Comment No. 2

Methods for determining the rates and mechanisms for contaminant transport should be defined.

CRA Response

CRA proposes to estimate contaminant transport rate through the determination of aquifer properties, groundwater monitoring and groundwater flow information as discussed in CRA's response to FDER Comment No. 4.

FDER Comment No. 3

Determination should be made to accurately define the volume of lost fluid from the overturned tank.

CRA Response

Following the separation and processing of the drummed material stored within the Temporary Drum Storage Area (TDSA) CRA proposes to develop an inventory of water, mineral spirits and sludge. This inventory will be compared with the tank inventory taken when the storage tanks were uncovered. This comparison will provide an estimate of material lost when the tank overturned.

FDER Comment No. 4

Geological and hydrological characteristics of the site need to be addressed.

CRA Response

CRA proposes to assess Geologic characteristics of the site through the collection of split spoon soil samples at five foot intervals during the installation of all monitoring wells. One sample from each monitoring well installation will be submitted to an independent laboratory for grain size analysis.

Hydrogeologic properties of the Site will be assessed through response testing of each developed monitoring well. Groundwater velocity will be estimated based on potentiometric data and the results of response testing.

Response testing of all monitoring wells will be undertaken to determine the in situ horizontal hydraulic conductivity of the screened interval.

This testing involves the displacement of well water by a slug of known volume. Water level measurements are taken as the system stabilizes. Falling head tests are those which monitor a declining water level with time following the introduction of a slug. Following removal of the slug, the water level rises. This comprises a rising head test.

Prior to the introduction of the slug into a well, the slug will be decontaminated by an isopropanol/deionized water rinse.

The methods of analysis of single well response test data are a function of the well configuration, aquifer type and the position of the water table relative to that of the screen. The following data analysis methods will be employed as appropriate:

- Hvorslev (1951)
- Cooper et al (1967)
- Papadopulos et al (1973)
- Bouwer and Rice (1976)

The average linear groundwater velocity (ft/day) can be described by the following equation:

$$V = Ki/n$$

where:

K = the hydraulic conductivity (ft/day) (determined from the slug test data)

i = the hydraulic gradient

n = porosity of soils beneath the Site.

The data determined above will be utilized to estimate groundwater flow and contaminant transport.

FDER Comment No. 5

In what area of the excavated pit did the spillage occur?

CRA Response

The tank that was overturned during the excavation was tank 1. The approximate location of this and the other three unearthed tanks are shown on Figure 2. This figure shows that the spillage referred to occurred in the north end of the excavation.

FDER Comment No. 6

Where was the soil sample, defined as SB-1 in Table 1, taken? Was it taken from the excavation pit?

CRA Response

SB-1 is the soil boring constructed to permit the installation of MW-1. The location of SB-1 is shown as MW-1 on Figure 1.

FDER Comment No. 7

Section 2.0; Site History and Appendix I - Can aerial photos taken prior to 1949 be attained? Can it be determined from the aerial photos, when the tanks were installed? Actual photos and/or their clearly legible copies with accurate scale should be presented.

CRA Response

CRA will attempt to locate further historic aerial photo data by contacting state, federal and local agencies. The photos will be assessed to determine of the installation date(s) of the tanks on the Site. The photos will be reproduced in legible format with accurate scales presented, if available. However, current information indicates that most of the area was paved and built upon. Therefore determining exact tank locations from aerial photographs may not be possible.

FDER Comment No. 8

Section 2.0 - Magnetometer survey indicated several false positive readings. Were any of the "false" anomalies actually investigated?

CRA Response

The false anomalies were investigated through the operation of the magnetometer as described in Section 2.0 of the CAP.

FDER Comment No. 9

Section 3.0 - Preliminary Contamination Assessment indicated that groundwater standards have been violated with respect to benzene, pentachlorophenol and xylene. Concentration levels of total BTEX and toluene are of concern as well. Further assessment is needed to delineate the extent of these contaminants within the site.

CRA Response

Concentrations in groundwater exceed standards established for public water supplies. Since the aquifer being evaluated is not used for public water supply, these standards are not applicable. In any event, further assessment of these contaminants will be addressed through the CAP as proposed.

FDER Comment No. 10

The CAP's soil investigation was based totally upon a field survey. Laboratory analysis of the soils are required to accurately establish the contaminant's concentration(s) within the soil.

CRA Response

As indicated above (CRA response to FDER Comment No. 4), samples will be collected from five foot intervals for geologic characterization. CRA proposes to amend the CAP to include chemical analysis of these split spoon samples collected from MW1A and MW4 from ground surface to the surface of the water table. These samples (one from each boring location) will be analyzed for mineral spirits and for analytes included in EPA methods 602, 625 and 8280.

FDER Comment No. 11

A detailed hydrogeologic investigation should be developed for the site. The investigation should include a survey of the potable private and/or public wells as well as any surface waters within on half mile radius of the site.

CRA Response

CRA proposes that any hydrogeologic investigation related to off-site uses of groundwater be deferred until the CAP has determined the nature and extent of site groundwater contamination, if any.

FDER Comment No. 12

The minimum detection limit for PCBs in groundwater samples were too high and unacceptable.

CRA Response

The method detection limit (MDL) for Aroclor 1242 is 0.065 µg/L (USEPA SW8080). The MDL for Aroclor 1242 is the lowest of the PCB isomers. The Practical Quantitation Limit (PQL) for drinking water is ten times the MDL or 0.65 µg/L for Aroclor 1242. Since the water samples being collected are not drinking water samples and some matrix interference is expected, water samples which are analyzed for PCBs will be analyzed to a detection limit of 5.0 ug/L. This detection limit may not be achievable if the groundwater samples contain matrix interferences in more significant proportions then expected.

FDER Comment No. 13

Due to the high concentration and the fact that the PCB detection limit was too high it is prudent to conduct a soil and groundwater analysis and an accurate assessment for the presence of dioxins.

CRA Response

This comment has been addressed by CRA's response to FDER comments No. 1, 4, and 10.

FDER Comment No. 14

Two additional monitoring wells should be installed, as shown in the attached figure, in order to obtain piezometric data.

CRA Response

Given the small size of the site being studied, additional monitoring wells or piezometers are not likely to provide substantial additional information. CRA purposes that the number and location of the monitoring wells be those shown on Figure 1 with construction details summarized Table 1.

These responses provide CRA's technical interpretation and response to the FDER's comments. CRA does not feet that a revised CAP is necessary. The responses listed above could be included as an attachment to the CAP.

Should you have any questions, please call our office.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

David E Bleiker
for
Stephen M. Quigley, P. Eng.

SMQ/ngy
Encl.

c.c. D. Sinclair, Sun Bank
R. Shepherd, CRA
R. Frehner, CRA

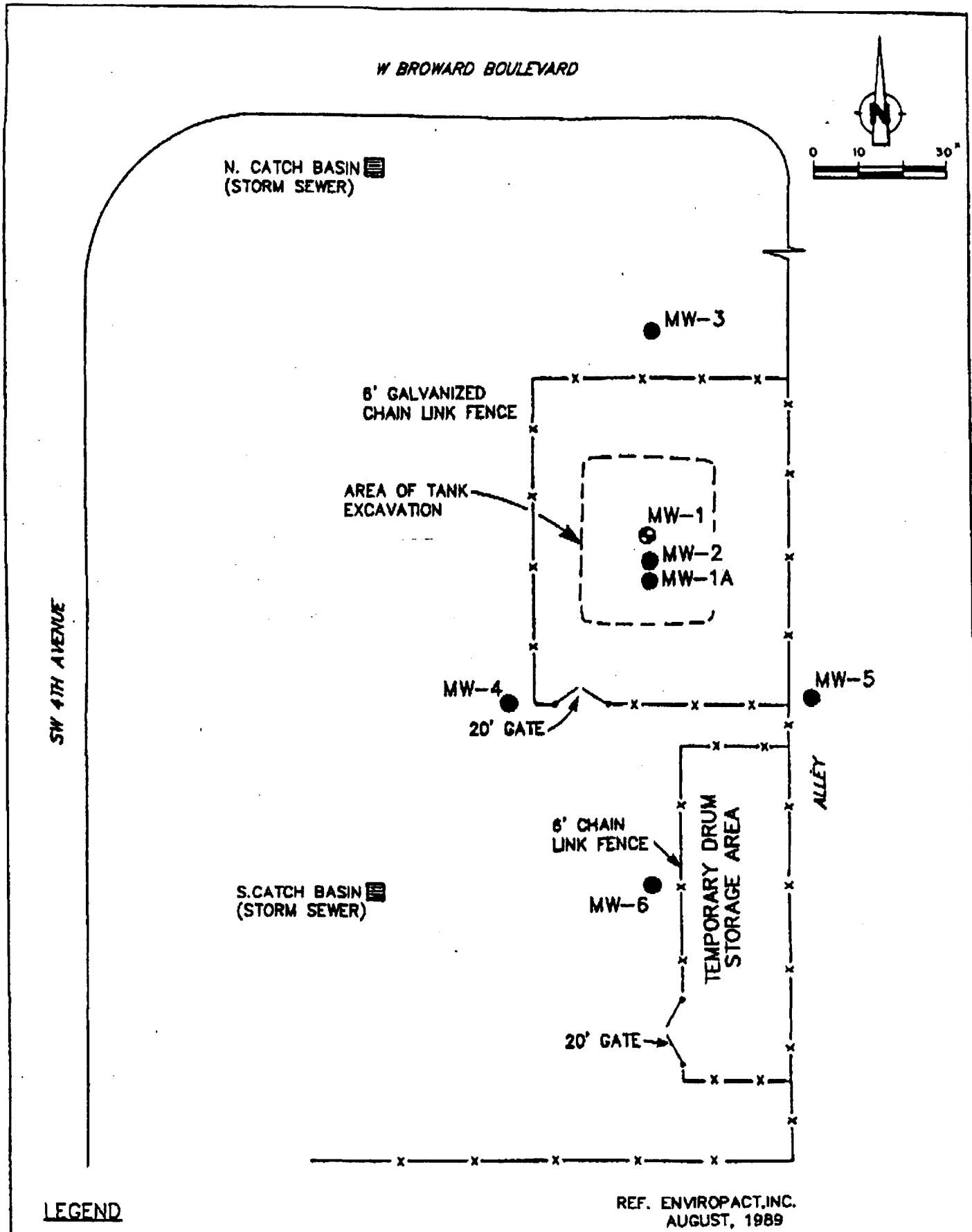

figure 1

PROPOSED MONITORING WELL LOCATIONS

Sun Bank, Ft. Lauderdale, Florida

CRA

3050-18/12/89-L-0

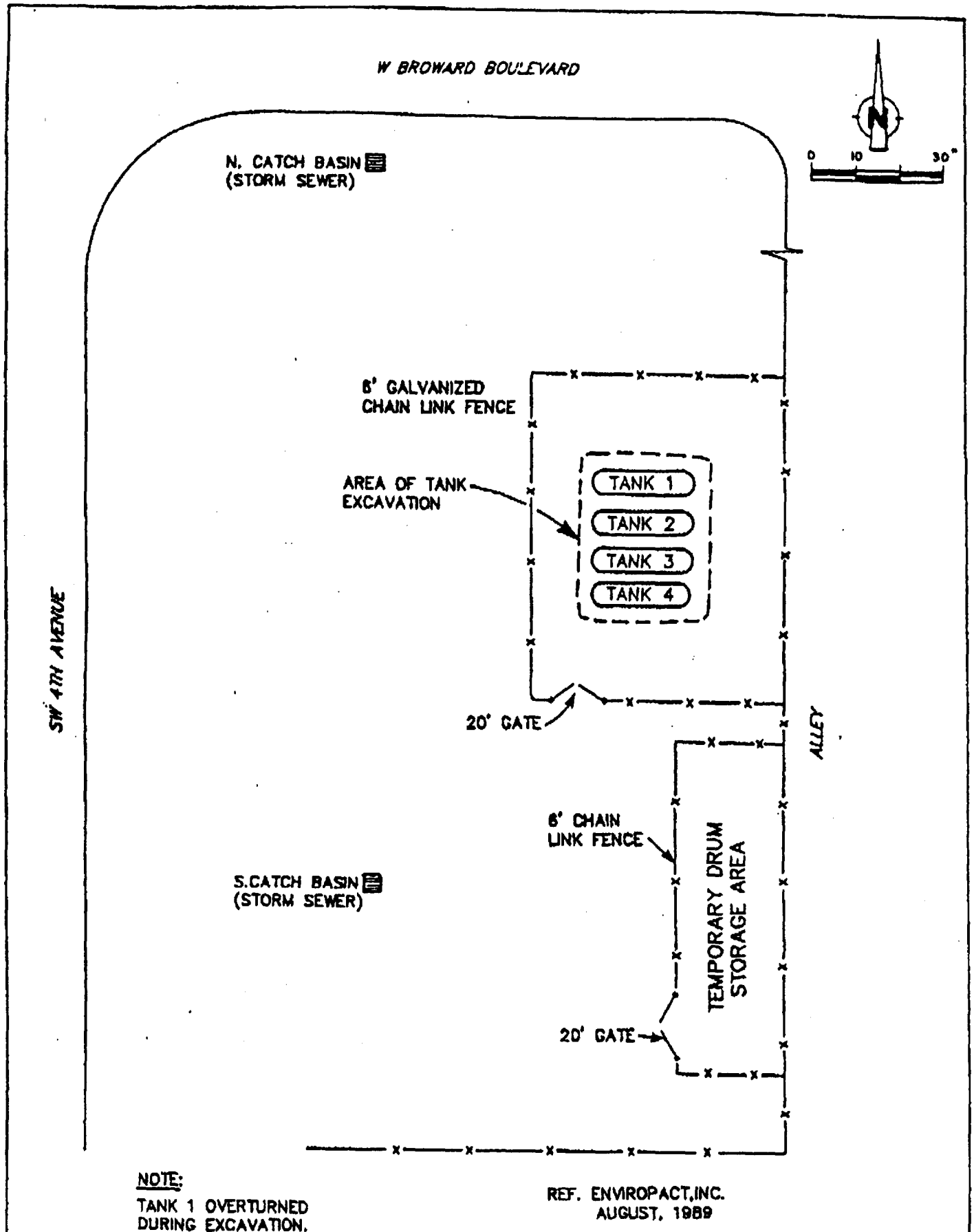

figure 2

FORMER STORAGE TANK LOCATIONS

Sun Bank, Ft. Lauderdale, Florida

CRA

3050-1B/12/89-L-0

CRA
Consulting Engineers

CONESTOGA-ROVERS & ASSOCIATES LIMITED
851 Colby Drive,
Waterloo, Ontario, Canada N2V 1C2
(519) 884-0510

April 24, 1990

Reference No. 3050

Mr. Les Oakes
King & Spalding
2500 Trust Company Tower
Atlanta, Georgia
U.S.A. 30303

Dear Mr. Oakes:

Re: Sun Bank Contamination Assessment Plan (CAP)
OGC Case No. 89-0752

This letter responds to the Florida Department of Environmental Regulation (FDER) responses to CRA's December 18, 1989 responses to the FDER's November 21, 1989 comments on the Sun Bank Cap (Enviropact, August 7, 1989).

FDER Comment No. 1

Responses 1, 2, 3, 5, 6, 7, 10 and 13 are acceptable to us.

CRA Response

Acknowledged.

FDER Comment No. 2

It appears that none of the "false" anomalies were physically investigated and that cross check was made solely on the basis of instrument's response. If the original data are available they should be submitted to us for review, otherwise, we recommend the following alternatives for their investigation:

A. You may consider providing us with historical data (e.g. blue prints, site maps, operations data etc.) for the former Gate City Lumber which can demonstrate that there are no other underground storage tank present at the site or;

B. Consider utilizing another method of investigation (e.g. Ground Penetrating Radar, Geophysical Methods, etc.) to further assess the site for possible presence of storage tanks if any. Considering circumstances surrounding the site regarding discovery of unknown storage tanks and not enough data and documents relating to the operations and facility lay-out of the former Gate City Lumber, we feel that further assessment of the site to delineate any possible presence of storage tanks is warranted.

CRA Response

During the course of the site assessment, a search of records available from Sun Bank and the City will be made to demonstrate that no other underground storage tanks are or were present on site.

FDER Comment No. 3

Despite your claim that the groundwater at the site is not for public use, Florida's public drinking water standards apply to the groundwaters of the state. Hence violations of groundwater standards have occurred with respect to benzene, PCP and xylene. Concentration levels of total BTEX and toluene are also of concern. Please note that further assessment of the above mentioned contaminants should be conducted to delineate their extent.

CRA Response

Comment acknowledged.

FDER Comment No. 4

Based upon the model corrective Actions for Groundwater Contamination Cases (Exhibit I of the Consent Order) the CAP shall address the objectives of our original comment (comment #11).

CRA Response

CRA's December 18, 1989 response was made without the benefit of Sun Bank having received the Exhibit I of the Consent Order. Comment acknowledged.

FDER Comment No. 5

Guidelines for analytical procedures for PCBs by EPA Method 8080 and 8280 are set in Volume 1, Section B, of the EPA document entitled Test Methods for Evaluation of Solid Waste-Laboratory Manual #SW846. All analysis and detection limits should adhere to those guidelines. The detection limit of 5.0 ug/L is too high compared to the detection limit of 0.065 ug/L (EPA 8080), which is the target goal that should be achieved. Although the matrix

interference may prevent achieving this limit, attempt should be made to reach a minimum detection as close to 0.065 ug/L as is physically possible.

CRA Response

The historical data on PCB concentrations in groundwater assembled by Enviropact for Sun Bank indicate that some significant matrix interferences may be present as demonstrated by the high detection limits.

The methods and detection limit guidelines provided in SW846 will be adhered to as much as is feasible, but matrix interferences may raise the detection limits.

FDER Comment No. 6

The current array of monitoring wells is such that contaminant migration to the northeast or to the northwest would go undetected. Response 1, part 3, appears to indicate that groundwater flow direction is unknown at this time. If it can be shown that the groundwater does not ever flow to the northwest or to the northeast, regardless of season, then the additional monitor wells will not be necessary.

CRA Response

Hydrogeologic data obtained through a literature search, will provide the basis for a preliminary assessment of groundwater flow direction. The installation of the site monitoring wells would be sequenced so that the preliminary site groundwater flow direction could be confirmed and the placement of the monitoring wells could be appropriately adjusted.

MW-3 and MW-6, shown on the attached Figure 1, would be installed first. The groundwater surface elevation would be measured to confirm the groundwater flow direction. Following this confirmation, MW-4 and MW-5 would be installed in locations similar to those shown, but the final locations would be adjusted to reflect the local groundwater flow conditions.

CRA has not prepared a Quality Assurance Project Plan (QAPP). Sun Bank has received a copy of a draft QAPP from Enviropact, Inc., which could be submitted as the project QAPP, but it would have to be significantly modified to reflect the changes in project management and the (yet to be selected) analytical laboratory.

April 24, 1990 Reference No. 3050

CRA would prefer to submit a QAPP for approval following approval of the CAP. The QAPP would be developed with the analytical laboratory.

These responses provide CRA's interpretation and response to the FDER's comments. CRA does not feel that a revised CAP is necessary. The responses listed above should be included as an attachment to the CAP.

Should you have any questions, please do not hesitate to contact our office.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Stephen M. Quigley, P. Eng.

SMQ/cz/7
Encl.

c.c. D. Sinclair, Sun Bank
R. Shepherd, CRA

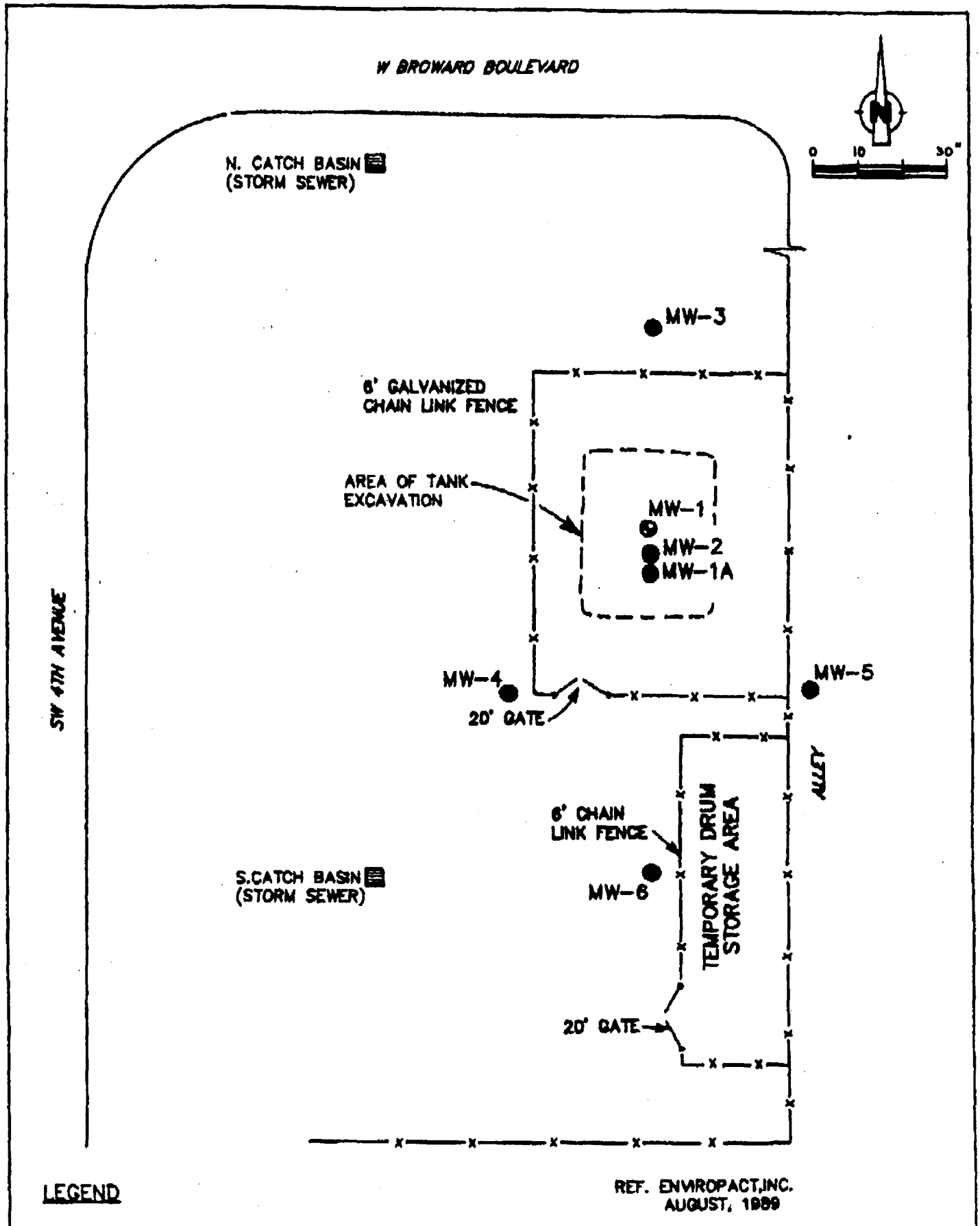

figure 1

PROPOSED MONITORING WELL LOCATIONS
Sun Bank, Ft. Lauderdale, Florida

CRA

3050-18/12/89-L-0

DEPARTMENT OF ENVIRONMENTAL REGULATION

ROUTING AND TRANSMITTAL SLIP

ACTION NO

ACTION DUE DATE

1. TO: (NAME, OFFICE, LOCATION)	Initial / Date
Jim Crane,	
2. Bureau of Waste clean-up	Initial / Date
3. Tallahassee.	Initial / Date
4.	Initial / Date

REMARKS:

Al

Please review.

SUNBANK

INFORMATION	
	Review & Return
	Review & File
	Initial & Forward

DISPOSITION	
	leview & Respond
	repare Response
	or My Signature
	or Your Signature
	et's Discuss
	et Up Meeting
	ivestigate & Report
	itial & Forward
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	ncurrence
	r Processing
	itial & Return

FROM:
S. Motamedi

6-89

PHONE
Sc. 221-5053

[illegible] COUNTY POLLUTION CONTROL BOARD

[illegible] S.W. 14th Court
Fort Lauderdale, FL 33315
(305) 765-4500

RECEIVED
JUN 29 1989

June 26, 1989

Mr. Douglas A. Sinclair, Senior Vice President
Sun Bank/South Florida, N.A.
1401 Northeast 26 Street
Wilton Manors, Florida 33305

RE: Sun Bank Lot, 300 W. Broward Blvd., Ft. Lauderdale

Dear Mr. Sinclair:

The Contamination Assessment Plan for the above referenced site has been received and reviewed. The plan is incomplete. A revised plan should be submitted no later than August 7, 1989. In preparing the revised report the following comments should be considered.

1. All closure plans must be sealed by a P.E. or P.G. For Contamination Assessment Plans and Contamination Assessment Reports a P.G. seal may be substituted.

2. Under what approved generic QA/QC will samples be collected? What is the DER number of the approved plan? Provide a site specific QAPP.

3. Previous information submitted to our office states that no dioxin was detected in any samples. Provide laboratory data sheets to support that statement.

4. We request that all monitoring wells during the assessment phase be sampled for dioxin using EPA Method 8280. The dioxin analyses should be compound specific with detection limits in the ppt range.

5. What happened to the cuttings and development water from the monitoring well and boring. Provide documentation to show that these materials are being handled properly.

JUL 10 1989

BUREAU OF WASTE CLEANUP
Twin Towers

6. How will cuttings and [illegible] water be handled from the proposed monitoring wells?

7. The deep well's screen should not exceed 5 feet in length.

8. The text states that results are best for the soil gas survey when the probe is a few inches above the water table. The text also states that the probe was [illegible] to a depth of 4 feet 8 inches, while the depth to the water table is 8.72 feet. This would mean that the probe was approximately 4 feet above the water table. Please provide a discussion to explain this information.

If any questions arise, then please call me.

Sincerely,

Harvey I. Schneider

Harvey I. Schneider, Ph.D., P.G.
Hydrogeologist II
HS/sr

cc: Janet Peterson (Enviropact)
Kathleen Langley, Esq.(Huebner and Murray)
Scott Benyon (DER/WPB)
c:\wptxt4\DKSinclair.lt

Reference 8

CRA
Consulting Engineers

CONESTOGA-ROVERS & ASSOCIATES LIMITED
651 Colby Drive,
Waterloo, Ontario, Canada N2V 1C2
(519) 884-0510

Bureau of Waste Cleanup

April 13, 1992 Reference No. 3050

APR 28 1992

Mr. Louis Valcarenghi
Florida Department of Environmental Regulations
Southeast Florida District
1900 South Congress Avenue
Suite A
West Palm Beach, Florida 33406

Technical Review Section

ORIGINAL - This document previously Transmitted By Telecopier

Dear Mr. Valcarenghi:

Re: Proposed Additional Monitoring Well and Monitoring Program
Sun Bank Property - 300 W. Broward Blvd. (Property), Ft. Lauderdale, Florida

This letter presents Sun Bank's proposal for the installation of one additional monitoring well at the property and for the implementation of a monitoring program. This proposal is submitted in response to the Florida Department of Environmental Regulation (FDER) February 13, 1992 request and a telephone conversation held between CRA and the FDER on March 24, 1992.

Monitoring Well

The FDER agreed on March 24, 1992 that a new 35-foot deep monitoring well will be installed at the location shown on the attached Figure 1 according to the protocols outlined in Appendix B of the FDER approved Enviropact Quality Assurance Project Plan (Enviropact QAPP) (included as Attachment A). This protocol includes field preparations and geological logs for well installations. The purpose of this deeper well is to determine the vertical extent of possible contamination. The location of the proposed monitoring well is adjacent to MW-1A as agreed to be the FDER in a telephone conversation with CRA on April 8, 1992. All sampling activities and equipment cleaning completed at this new well will also be conducted in accordance with the CRA QAPP enclosed as Attachment B.

Since the monitoring well will be installed immediately adjacent to a location where soil samples were collected during the installation of monitoring well MW2, it is not proposed that additional soil samples be collected during the installation of the new well. The new well would be completed with a flush mounted casing, similar to the existing wells at the Property.

Monitoring Program

The FDER directed that a monitoring program be proposed by Sun Bank for implementation at the Property. Based on discussions with the FDER and the

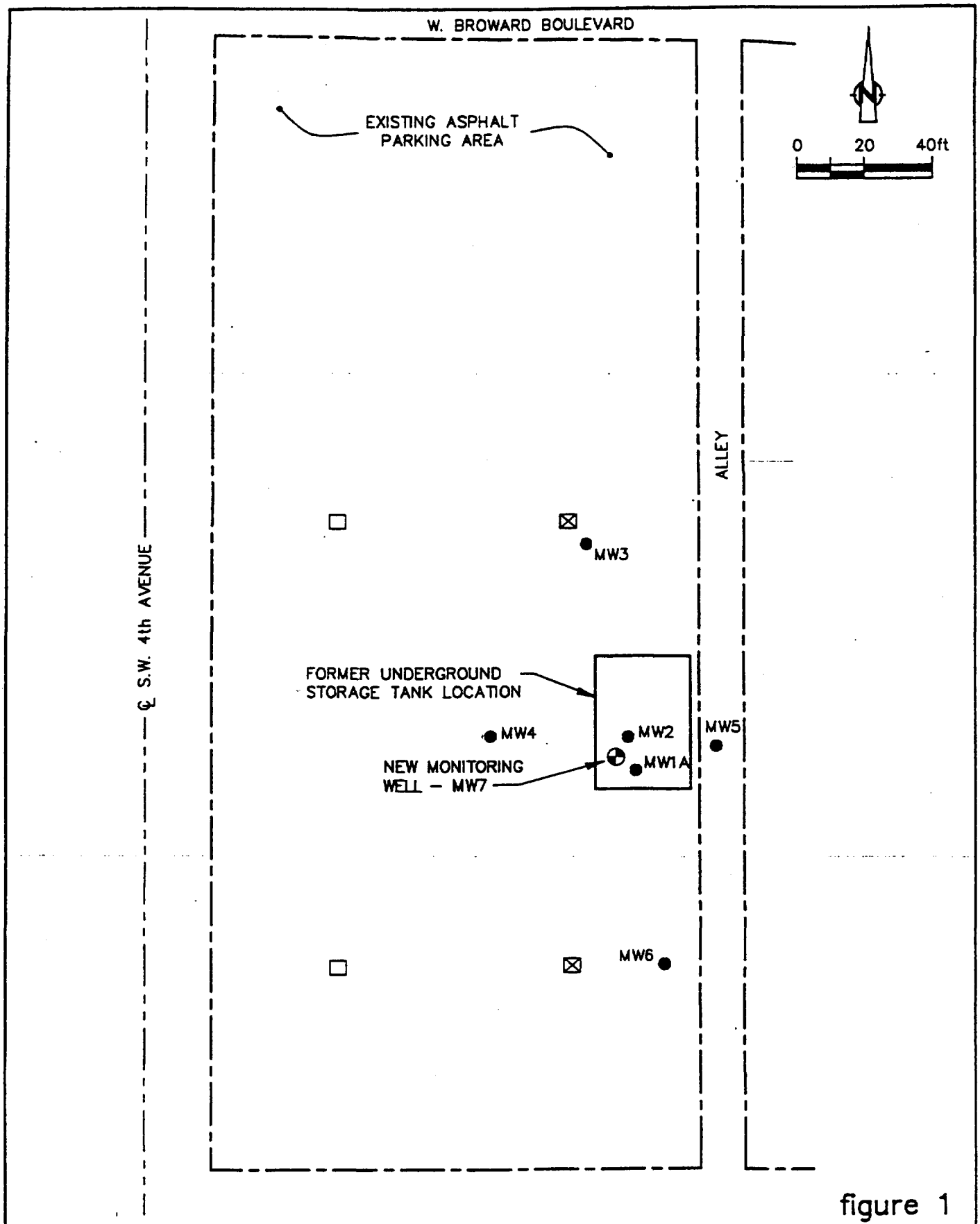

figure 1

NEW MONITORING WELL LOCATION
SUN BANK SITE
Ft. Lauderdale, Florida

CRA

3050(L)_APR 1 /92_REV 0

RECEIVED
APR 15 1992
DEPT. OF ENVIRONMENTAL REG.
WEST PALM BEACH

Attachment A

ENVIROPACT QAPP, 1989

Appendix B

APPENDIX B

MONITORING WELL INSTALLATION AND ASSOCIATED PROTOCOLS

MONITORING WELL INSTALLATION AND ASSOCIATED PROTOCOLS

I. FIELD PREPARATION

A. Check maintenance of field equipment (pumps, meters, drill rig) to be used in the field; calibrate instruments as necessary.

B. SAMPLING PLAN OF ACTION

When installing monitoring wells, plan the order of installation so that the areas of least contamination are sampled first and the areas of greatest contamination are sampled last.

II. GEOLOGICAL LOGS AND NOTES

The geologist and driller must keep detailed notes from which reports and geologic logs can be constructed:

1. Date, start and finish time for each well.
2. Offset distance and direction or location of each well.
3. Footages of high porosity areas, resistent formations, over drilling.
4. Geologic descriptions and classifications.
5. Record Depth to Water.

III. MONITORING WELL DRILLING AND INSTALLATION

This protocol applies to well installation using hollow stem auger methodology.

A. DECONTAMINATION OF DRILLING EQUIPMENT

1. Augers shall be steam-cleaned (hot) prior to well installation. Visqueen or wooden blocks shall be used to protect the clean augers from getting contaminated. The cleaned casing shall be kept from touching the ground until it is lowered into the borehole.

B. INSTALLATION PROCEDURE

1. The monitoring well(s) shall be two (2) inches in diameter (unless otherwise specified) with coupled or threaded joints. The monitoring well casing shall be constructed of stainless steel, PVC (schedule 40 minimum) or black iron or equivalent. The material may be specified as a license condition.

2. The monitoring well screen shall be two (2) inches diameter, with slot size 0.010 inches (unless otherwise specified).

3. Solvents or PVC glue shall not be used. PVC threaded/slip couplings may be secured using stainless steel screws or rivets.

4. The monitoring well casing shall be installed plumb (vertical) in the drill hole.

5. Screen depths shall be based upon site specific hydrologic conditions. Generally, the top of the screen is set one to two feet above the encountered water table. New shallow well screen intervals shall conform to existing well screen intervals for consistency in sampling and analyses of data.

6. A sand pack shall be used. The annular space between the drilled hole and the monitoring well screen shall be sand packed with clean washed quartz sand to a depth of approximately two (2) feet above the top of the well screen. The top of the gravel pack shall be measured with a tape measure to insure that the gravel pack is the proper distance above the top of the screen.

7. Bentonite shall be used as a seal above the sand pack material to avoid grout migration into the sand pack.

8. The remaining borehole shall be filled with cement grout from the top of the bentonite seal to approximately one (1) foot below grade.

9. The well-heads shall be slightly elevated (1 inch) above grade to prevent run-off into the wellhead.

10. The top of the monitoring well shall be protected with a threaded PVC cap containing a vent hole.

11. When necessary, monitoring wellheads may extend two (2) feet above grade and a locking protective steel casing and concrete pad shall be installed around the monitoring well. Otherwise, wellheads shall be flush-mounted and lock capped.

12. A designated identification number shall be clearly visible on each completed monitoring well.

C. WELL COMPLETION AND DEVELOPMENT

1. All completed wells will be developed by purging or interrupted overpumping. A fully developed well should produce water that is free of sand and drilling contaminants.

2. When completed, new monitoring wells will be surveyed at the top of the well casing (measuring point) with reference to the N.G.V.C., 1929.

Attachment B

CRA QAPP, 1991

Section 5.0

5.0 SAMPLING PROCEDURES

5.1 GROUNDWATER SAMPLING

Two rounds of groundwater samples will be collected from the proposed monitoring wells, in accordance with the Work Plan.

The sampling procedures for the monitoring wells are described below. The procedures are used to maintain consistent and reproducible methods in obtaining and analyzing samples from the monitoring wells. The procedures used are based on:

- Procedures Manual for Ground-Water Monitoring at Solid Waste Disposal Facilities, EPA-530/SW-611, August 1977;

- Methods for Chemical Analysis of Water and Wastes, EPA/600/4-79-020, March 1979;

- RCRA Draft Permit Writer's Manual: Ground-Water Protection,: USEPA Contract No. 68-01-6464; and

- Engineering Support Branch - Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, April 1986.

All proposed monitoring wells will be sampled according to the following protocols:

1) New disposable latex gloves will be used when sampling each well. Gloves will be changed prior to collection of each new sample.

2) The sampler will measure and record the depth to water in each well to the nearest 0.01 foot using an electric tape. The electric tape will be decontaminated prior to use in each well as per Section 5.4.

3) Prior to sampling each well will be purged using a stainless steel bottom filling bailer or a submersible pump to remove a minimum of three and a maximum of five times the standing water volume in the well, or until dry. Field measurements of pH, conductivity and temperature (per item 4) shall be used to determine whether to terminate purging upon removal of three times the standing water volume or continue to five times the volume. In the event that a well is bailed dry prior to achieving three well volumes, groundwater will be permitted to recover to a level sufficient for sample collection. The time that the well was bailed dry will be noted and well recovery will be monitored. Upon recovery, one final bailer volume will be removed and discarded prior to sample collection. Prior to use in the initial and all subsequent monitoring wells, bailers will be precleaned as described in Section 5.4. All groundwater not collected for analyses will be contained, sampled and stored for disposal pending the receipt of analytical results.

4) Field measurements of pH and conductivity (i.e. using a DSpH-3 pH/3 RGE Conductivity Meter or equivalent) and temperature (i.e. using a YSI Model 33 SCT meter, or equivalent) will be recorded following

removal of each standing well volume and prior to sample collection. Calibration of field instruments will be undertaken prior to each sampling event.

5) After the required standing well water has been purged, water samples will be collected using a pre-cleaned stainless steel bailer attached by a stainless steel leader to a nylon rope. New nylon rope will be used for each monitoring well.

6) No groundwater samples collected will be field filtered. Samples which are turbid will be noted. Turbid samples will not be decanted in the laboratory to generate sediment free aliquots and will be analyzed on an "as is" basis. In the event that water from a well exhibits turbidity, twice the normal volume for unfiltered samples as outlined below will be collected.

7) Containers for sample collection and preservation requirements will be determined as required by the analytical parameters as detailed in Table 4.1. All samples bottles will be provided by the laboratory and will be prepared using standard laboratory validated washing procedures. The sample bottles will be delivered to the Site in sealed containers.

8) A blind field duplicate sample will be collected at a frequency of one per twenty groundwater and/or surface water samples collected.

9) Samples for matrix spike analysis and matrix spike duplicate analysis will each be collected at a frequency of one per 20 groundwater and/or surface samples collected. The matrix spike and matrix spike duplicate sample will be taken from a well where samples do not require consideration for turbidity, if possible. Samples will be collected from the well as outlined in (7) above, but at three times the normal volume. The analysis request sheets sent to the laboratory will indicate the sample I.D. of the matrix spike samples.

10) Rinsate blank (bailer blank) samples will be collected at the frequency specified in Section 4.1. The bailer blank sample will consist of deionized water poured into, and then sampled out of, a bailer cleaned using the prescribed rinse sequence (see Section 5.4). This will provide a quality assurance check on the field decontamination procedures, employed for the bailers between wells.

11) Field blank samples will be collected at the frequency specified in the QAPP. The field blanks will be prepared by pouring deionized water directly into the appropriate sample bottles in the field as outlined in (7). This will provide a quality assurance check on the sample bottles and the deionized water used.

12) The FDER may provide blind spikes and blind performance evaluation (PE) samples which will be included with the samples collected at the site. At a minimum, it is recommended that one blank and one blind spike PE per environmental media be submitted to the laboratory for analysis.

13) All disposable gloves, rinsings and nylon ropes will be placed in DOT approved 55-gallon drums and stored in a designated storage area on Site.

14) Samples will be labeled noting the well location, date, time and sampler's initials. A separate hard-cover bound field notebook will be maintained describing the sampling history (including: date and time of collection, sample handling and storage, preservation and labeling, field measurements and sample characteristics of each sample taken).

15) Samples will be placed on ice or cooler pack in laboratory supplied coolers after collection and labeling. Samples will be delivered to the laboratory by overnight courier.

16) Samples collected shall be analyzed for the TCL parameter list, polychlorinated dibenzo-p-dioxins and dibenzofurans and mineral spirit analytes.

5.2 SOIL SAMPLING PROCEDURES

A soil sample will be collected at two monitoring well locations to determine the extent of soil contamination. Sampling protocols for the soil samples will be as follows:

Each soil sample will be collected using a continuous soil sampling system or a 3-inch diameter split spoon sampler in conjunction with the hollow stem augering technique. Samples will be obtained at approximately three feet and eight feet below ground surface. Samples will not be collected below the groundwater table. If the groundwater table is encountered at depth above 8 feet, the final sample for chemical analyses shall be collected above this elevation so that the sample interval straddles the water table.

Soil samples will be prepared in the following manner:

1) The sampler will be laid on a clean, flat surface and carefully opened to avoid sample disturbance. A clean pair of disposable latex surgical gloves will be used to handle each sample.

2) Using a precleaned stainless steel knife, a thin section will be removed from the top and bottom of the sample, and discarded.

3) The remainder of the core will then be cut longitudinally with a clean cutting tool. From the centre of the core a continuous soil sample will be taken using a clean stainless steel spatula. The sample will be placed into a 500 ml glass jar. The precleaned jars will be fitted with teflon lid liners.

4) The remainder of the core not used for chemical analyses will be retained in precleaned glass jars for geologic records.

5) A blind field replicate sample will be collected at a frequency of one per 20 samples collected.

6) Samples for matrix spike and matrix spike duplicate analysis will be collected at a frequency of one per 20 soil samples collected. The analysis request sheets sent to the laboratory will indicate the sample I.D. of the matrix spike duplicate.

7) Rinsate blank samples will be collected at the frequency specified in Section 4.1. The rinsate blank will consist of deionized water poured over the sampling equipment after it has been cleaned using the prescribed cleaning sequence (see Section 5.2). This will provide a quality assurance check on the field decontamination procedures employed for the sampling equipment between sampling locations.

8) Field blank samples will be collected at the frequency specified in Section 4.1. The field blank sample will be prepared by pouring deionized water directly into the appropriate sample bottles in the field. This will provide a quality assurance check on the sample bottles and the deionized water used.

9) All disposable gloves and rinsings will be collected and contained in DOT approved 55-gallon drums and stored in a designated storage area on Site.

10) Soil samples will be labeled noting the sampling location, depth, time and sampler's initials. A separate hard-cover bound field book will be maintained to record all sediment samples and sampling events.

11) Samples will be placed on ice or cooler packs in laboratory supplied coolers after collection and labeling. Samples will be delivered to the laboratory by courier under chain-of-custody procedures.

5.3 SAMPLE CONTAINERS, PRESERVATION, SAMPLE HOLDING TIMES AND SHIPPING MEANS

Required sample containers, sample preservation methods, shipping means and required sample holding times are presented in Table 5.1. Sample containers will be provided by WAL, hence the provision for sampling procedures in the WAL approved generic QAPP will apply to this section as noted below.

5.3.1 Sample Containers

Section 6.1 of the WAL approved generic QAPP will apply to sample containers used for this QAPP.

Sections 6.2, 6.3, and 6.4 of the approved generic QAPP will apply to sample preservation, shipping and holding times, respectively.

TABLE 5.1

CONTAINER, PRESERVATION, SHIPPING AND PACKAGING REQUIREMENTS
SUN BANK SITE, FT. LAUDERDALE, FLORIDA

Analysis	*Sample Containers*	*Preservation*	*Maximum(1) Holding Times*	*Volume of Sample*	*Shipping*	*Normal Packaging*
A. Groundwater Samples						
Volatiles	2 x 40 mL VOA vials Teflon lined septum caps	4 drops Conc. HCl to pH <2 cool to 4°C (±2°C)	14 days	Fill completely no air bubbles	Overnight courier	Bubble pack
		cool to 4°C (±2°C)	7 days	Fill completely no air bubbles	Overnight courier	Bubble pack
Base/neutrals & Acid Extractables/ Pesticides/PCBs	1x 1-gal. amber glass or 2x-1/2-gal. amber glass with teflon liner	cool to 4°C (±2°C)	7 days to extraction, 40 days to analysis	Fill to neck of bottle	Overnight courier	Bubble pack
Dibenzo-p-dioxins and Dibenzofurans	1x1-Liter amber glass jar with teflon liner	cool to 4°C (±2°C)	7 days to extraction, 40 days to analysis	Fill to neck of bottle	Overnight courier	Bubble pack
Mineral Spirits (BTXE) (2)	2x40ml VOA vials teflon lined spetum caps	4 drops conc. HCl to pH <2 cool to 4°C (±2°C)	14 days	Fill completely no air bubbles	Overnight courier	Bubble pack
B. Soil						
Volatiles	1x 4-oz. wide mouth glass with Teflon liner	cool to 4°C (±2°C)	10 days	Fill completely	Overnight courier	Bubble pack
Extractables (BNAs, Pesticides/PCBs	1x 8-oz. wide mouth glass with Teflon liner	cool to 4°C (±2°C)	7 days to extraction, 40 days to analysis	Fill 3/4 full	Overnight courier	Bubble pack
Dibenzo-p-dioxins and Dibenzofurans	1x8-oz. amber glass	cool to 4°C (±2°C)	7 days to extraction 40 days to analysis	Fill 3/4 full	Overnight courier	Bubble pack
Mineral Spirits (BTXE) (2)	4-oz. (120ml) widemouth glass with teflon liner	cool to 4°C (2°C)	14 days	Fill completely	Overnight courier	Bubble pack
Grain Size	1x500ml wide mouth glass jar or soil sample bags	cool to 4°C (±2°C)	----	Fill 3/4 full	Overnight courier	Bubble pack

Notes:
(1) All holding times are based on the date of sample collection.
(2) BTXE - Benzene, Toluene, Xylene, Ethylbenzene

5.4 EQUIPMENT CLEANING

The following protocols will be observed for cleaning all equipment and tools used on Site to prevent cross-contamination. Cleaning procedures will be consistent with Appendix B, Section 8.3 of the "Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual".

5.4.1 Drill Rig

Upon mobilization of the drill rig to the Site prior to commencing drilling, the rig and all associated equipment will be thoroughly brushed and steam cleaned to remove oil, grease, mud and other foreign matter. Augers, cutting bits, samplers, drill steel and associated equipment will be cleaned before initiating drilling at each borehole or well location to prevent cross-contamination from the previous drilling locations. Cleaning will be accomplished by flushing and wiping the components to remove all visible sediments followed by a thorough high-pressure wash and rinsing. Special attention will be given to the threaded sections of the drill rods and split spoons.

5.4.2 Sampling Tools and Equipment

Prior to the collection of samples for chemical analysis during the installation of the monitoring wells and field sampling, all sampling equipment and tools will be decontaminated with the following rinse sequence:

i) Clean with tap water and detergent (Alconox) using a brush if necessary to remove particulate matter and surface films;

ii) Rinse thoroughly with tap water;

iii) Rinse thoroughly with deionized water;

iv) Rinse twice with reagent-grade isopropanol;

v) Rinse thoroughly with organic-free water and allow to air dry as long as possible (a minimum of 15 minutes);

vi) If organic-free water is not available, allow equipment to air dry as long as possible (a minimum of 15 minutes). Do not rinse with deionized or distilled water; and

vii) Wrap with aluminum foil to prevent contamination if equipment is going to be stored or transported.

Fluids used for cleaning will not be recycled. All wash water, rinse water and decontamination fluids will be stored in containers on Site.

5.4.3 Well Materials

Prior to installation of the monitoring wells, the riser pipe and screens will be cleaned with a detergent (Alconox) high-pressure wash and water rinse. Equipment will be protected from potential contact with solvents between the final rinse and actual use at the sample sites.

State of Florida

DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Louis Valcarenghi, Southeast District

THROUGH: James J. Crane, Bureau of Waste Cleanup JJC

FROM: John R. Armstrong, Bureau of Waste Cleanup JRA

DATE: May 15, 1992

SUBJECT: Sun Bank Properties, Fort Lauderdale, Broward County, MOP Review

---

I have reviewed the April 13,1992 letter from Conestoga-Rovers & Associates Limited regarding the installation of a new well at the Sun Bank Property in Ft Lauderdale and have the following comments.

1. The letter does not specify the screen length to be installed. I think in this case screening from 30 to 35 feet below ground surface (bgs), or 30 to 40 feet bgs would be acceptable.

2. The analytical methods to be used are not specified. I assume they are proposing EPA Method 602 only? This should be made clear.

If you have any questions, please feel free to contact me at Suncom 228-0190.

NOV. 12 1991

Please provide the proposed monitoring plan and the results of the additional assessment data within sixty (60) days of receipt of this request. If additional time is required, an extension request should be submitted. If you have any questions concerning this review, please contact Mr. Louis Valcarenghi at 407/433-2650.

Sincerely,

A. Padva

Alexander Padva, Ph.D.
Waste Programs Administrator

cc: Office of General Counsel, DER, Tallahassee
Bureau of Waste Cleanup
West Palm Beach DER Files
Broward County Office of Natural Resources
File Reporting, Coordinator

Reference 9

Florida Department of Environmental Regulation

Southeast District • 1900 S. Congress Ave., Suite A • West Palm Beach, Florida 33406 • 407-964-9668

Bob Martinez, Governor | Dale Twachtmann, Secretary | John Shearer, Assistant Secretary | Scott Benyon, Deputy Assistant Secretary

FEB 0 2 1990

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Douglas Sinclair, Senior Vice President
Sun Bank/South Florida National Association
300 West Broward Boulevard
Post Office Box 405100
Fort Lauderdale, Florida 33340-5100

Dear Mr. Sinclair:

RE: DER vs. Sun Bank/South Florida Consent Order; O.G.C. Case No. 89-0752

Enclosed for your implementation is the fully executed and filed Consent Order in the above-styled case. Please familiarize yourself with the compliance dates and terms of the Consent Order so the complete and timely performance of those obligations is accomplished.

Thank you for your cooperation in this matter.

Sincerely,

J. Scott Benyon
Deputy Assistant Secretary

JSB:paw/145

cc: Office of General Counsel, DER, Tallahassee
Broward County Environmental Quality Control Board
US EPA, Region IV, Atlanta
File, Reporting Coordinator
West Palm Beach, DER Files

Bureau of Waste Cleanup

JUL [illegible] 1992

Technical Review Section

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

News Release Requested: YES [✓]
NO [ ]

TO: Wayne Stevens
Office of Legislative and Public Affairs

THROUGH: Larry Morgan
Office of General Counsel

FROM: Scott Benyon
Southeast Florida Deputy Assistant Secretary

SUBJECT: News Release: Sun Bank/South Florida N.A.
Case Name
OGC Case No 89-075

DATE:

Attached is a [X] Consent Order

[ ] Notice of Violation

for the preparation of a news release for the referenced case. This case has been identified as a major enforcement action for the following reasons:

pentachlorophenol waste from underground tanks on property owned by SunB

[X] Case requires undertaking significant environmental corrective measures to protect human health or the environment or to abate imminent hazards.

[ ] Case involves the imposition of significant fines or settlements. $_____ settlement
Amount $_____ $_____ costs and expenses

Formerly a facility that performed wood treating activities occupied the sit

[X] Case requires the responsible party to undertake activities having major impact on the community.

If you require any additional factual information, please contact Scott Benyon of this office.
Suncom 221-5005

enclosure

JSB/

cc: Rick Wilkins (w/o enclosure)

SunBank South Florida, N.A.
P.O. Box 405100
Fort Lauderdale, Florida 33340-5100
305 467-5000

RECEIVED
JAN 29 1990
Dept. of Environmental Reg.
West Palm Beach

January 25, 1990

J. Scott Benyon
Deputy Assistant Secretary
Florida Department of Environmental Regulation
Southeast District
1900 S. Congress Ave., Suite A
West Palm Beach, Florida 33406

Dear Mr. Benyon:

Enclosed are two copies of the Consent Order executed on behalf of Sun Bank/South Florida, N.A.

Please return one copy after execution by the Department (FDER). Sun Bank looks forward to a final resolution to this matter.

Sincerely,

Douglas K. Sinclair
Senior Vice President

DKS/aj
Encls.

cc: Les Oakes, King and Spauling, Atlanta, Georgia

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION, Complainant vs. SUN BANK/SOUTH FLORIDA NATIONAL ASSOCIATION Respondent	IN THE OFFICE OF THE SOUTHEAST FLORIDA DISTRICT O.G.C. CASE No. 89-0752

CONSENT ORDER

Pursuant to the provisions of Section 403.121(2) and 120.57, Florida Statute (F.S.), and Florida Administrative Code (F.A.C.) Rule 17-103.110, this Consent Order is entered into between the State of Florida Department of Environmental Regulation ("Department") and Sun Bank ("Respondent") to reach settlement of certain matters at issue between the Department and Respondent.

The Department finds and Respondent agrees to the following:

1. The Department is the administrative agency of the State of Florida having the power and duty to control and prohibit pollution of air and water in accordance with Chapter 403, F.S., and rules promulgated thereunder. The Department has jurisdiction over matters addressed in this Consent Order. Respondent acknowledges this jurisdiction

2. Broward County Environmental Quality Control Board (BCEQCB) is an agency of Broward County, a political subdivision of the State of Florida which is empowered to control and prohibit pollution and protect the environment within Broward County, pursuant to Article VIII, Section 6 of the Florida Constitution, rules and regulations set forth in Chapter 27, Code of Regulations of the Broward County Environmental Quality Control Board and Section 403.182 of the Florida Statutes (F.S.).

3. Respondent is a National Bank licensed to do business in Florida. Respondent owns property located at 300 West Broward Boulevard, Fort Lauderdale, Broward County, Florida (hereafter "the Site").

4. The Site was purchased by Respondent's predecessor in 1972 and until recently was not utilized by the Respondent. In December 1988, Respondent initiated conversion of a portion of the Site into a parking lot.

5. On Monday February 27, 1989, the Respondent was notified that the top of an underground storage tank was uncovered at the parking lot construction site.

6. On Tuseday February 28, 1989 four (4) underground tanks were uncovered. During the excavation of the tanks, a heavy rainstorm ensued, and one of the tanks floated up and overturned causing some of its contents to be discharged into the excavation pit. At that time BCEQCB was contacted and informed of the incident. BCEQCB requested that Respondent remove the tanks and contain the spill as best as possible. The contents of the tanks were pumped into 55-gallon drums. A total of 189 drums was used to contain the material. Soil and water samples were taken during the operation for analysis. The drums are currently stored at the site.

7. SunBank constructed a temporary containment structure for storage of the 189 drums. The containment area is a bermed wooden structure. The floor, roof and the three sides of the structure are covered by plastic sheeting. The drums are tightly closed, secure and are on top of pallets. The entire containment structure, the excavated tanks and the surrounding property are enclosed in a gated and locked fenced wall.

8. The soil, water and the contents of the tanks were analyzed and the results were reported by Enviropact Inc. ("Enviropact"), a consultant employed by Respondent. The report entitled "Emergency Response and Initial Remedial Action", dated April 14, 1989, indicated the presence of, among other things, the following constituents: pentachlorophenol (PCP) in concentrations of up to 14,000 mg/kg, naphthalene in concentrations of up to 5,000 mg/kg, styrene in concentrations of up to 21,250 mg/kg. These chemicals, under certain circumstances, are defined as hazardous waste in accordance with Title 40 Code of Federal Regulations (CFR), Part 261. The report is incorporated herein by reference.

9. On May 9, 1989, Enviropact informed BCEQCB that Respondent had requested it to conduct a Preliminary Site Evaluation of the Site. Enviropact intended to locate and evaluate the contamination plume and define its extent.

10. In May 1989, Enviropact submitted a Contamination Assessment Report (CAR) to BCEQCB. The said report, based on the test results, indicated the presence of PCP, naphthalene and mineral spirits within the excavated area. The CAR is incorporated herein by reference.

11. On June 12, 1989 the Department in conjuction with Mr. Scott Gordon of the Environmental Protection Agency (EPA) Region IV, Atlanta, Georgia, conducted an investigation at the Site.

12. A meeting was requested by the Respondent to discuss its options with regards to the management, handling and remediation of any contaminated soil, water or groundwater at the Site. Such meetings were held on June 13, July 5, and November 8, 1989.

13. For the purpose of this Consent Order, the Department finds that the mixture of pcp and mineral spirits recovered from the underground storage tanks is a hazardous waste. For the purpose of establishing the Department's jurisdiction for this Consent Order, Respondent accepts this finding.

THEREFORE, having reached resolution of this matter pursuant to F.A.C. Rule 17-103.110(3), Respondent and the Department mutually agree and it is

ORDERED:

14. The Respondent shall comply with one of the following:

A. No later than January 2, 1990, Respondent shall begin work to reduce the volume of the hazardous waste prior to shipping the waste off-site using a hazardous waste manifest. A written volume reduction plan and procedure was submitted on August 28, 1989 and was approved by the Department for implementation. The "REDUCTION" only applies to separation of water from all other

constituents and shall be performed on aqueous phase of the hazardous wastes only. If the Respondent chooses to adopt reduction of the hazardous constituents then:

1. Respondent shall manifest the concentrated portion of the wastes, sludges and carbon packings off-site to a properly permitted Treatment, Storage and Disposal (TSD) facility no later than February 2, 1990.

2. The concentrated materials and carbon packing shall be manifested off-site using the F027 designation as defined in 40 CFR 261.31.

3. The Respondent shall wash and rinse the sludges, generated from the separation process, a minimum of four (4) times with water equivalent to at least three (3) times the volume of the sludge. The washed sludges shall be manifested off-site to a properly permitted TSD facility using K001 designation as defined in 40 CFR 261.32.

4. The Respondent shall demonstrate, by chemical analysis, that the K001 designated sludges are compatible with their proper treatment/disposal method(s) prior to their manifestation to a properly permitted TSD facility. In addition, if the chemical analysis show that the sludges contain pcp and/or dioxins as listed in 40 CFR 268.41(a), then the Respondent shall manage and manifest off-site such sludges according to their compatible treatment/disposal method(s).

5. The Respondent shall have the option of securing a "signed and executed" contract, purchase order or other commercial transaction document acceptable to the Department with a facility which can legitimately use the concentrated materials (excluding the sludges and carbon packings) in accordance with the exemption set forth in 40 CFR 261.2 (e) and (f). At such time when a signed and executed contract, purchase order or other commercial transaction document is secured and presented to the Department, then the Respondent shall have the option to remove and transport the concentrated material (excluding the sludges and carbon packings) from the TSD facility, as usable commercial product, to the facility designated on the contract, purchase order or other commercial transaction document as the user of the material.

6. By April 1, 1990, the Respondent shall comply with the following with regards to the separated waters:

   i. Upon receipt of written permission from a properly permitted Publically Owned Treatment Works (POTW) facility, Respondent may either discharge the separated water, after testing, into the POTW's collection system on-site or if such system is not available on-site then manifest the separated waters to a POTW facility.

   ii. The rinsate water from washing of the sludges shall be introduced to the carbon absorption unit prior to its disposal in the POTW, only after the consent of the POTW is obtained.

   iii. If such a permission is not granted to the Respondent by the POTW (for items i and ii above), then the Respondent shall manifest the separated waters to a properly permitted TSD facility no later than April 1, 1990.

B. If Respondent does not elect to reduce the volume of the hazardous wastes then, within thirty (30) days of the entry of this Consent Order, the Respondent shall manifest all of the hazardous wastes currently being stored at the site, to a properly permitted Treatment, Storage and Disposal (TSD) Faciltiy.

15. Respondent shall manifest all of the wastes generated from the corrective actions and/or remediation processes of the site to a properly permitted TSD facility, to the extent that any such wastes are "hazardous" as defined in 40 CFR Part 261.

16. Respondent shall make payment to the Department in the amount of $1,500.00 for costs and expenses incurred by the Department during the investigation of this matter. This amount shall be made payable to the "State of Florida Department of Environmental Regulation" and shall be submitted to the Department's Southeast Florida District office, 1900 South Congress Avenue, Suite A, West Palm Beach, Florida 33406 within twenty (20) days of entry of this Consent Order.

17. Respondent shall implement corrective actions as set forth in document entitled "Corrective Actions for Groundwater Contamination Cases", attached hereto as Exhibit I.

18. Respondent shall henceforth comply with all applicable hazardous waste management regulations as set forth in F.A.C. Chapter 17-730, 40 C.F.R. Parts 260-271, with regards to the facility which is the subject of this Consent Order.

19. Respondent shall post and keep maintained warning signs such as:

WARNING
NO TRESPASSING
UNAUTHORIZED PERSONNEL KEEP OUT

FOR INFORMATION CALL:
(305) 766-7001

until all of the wastes and cocentrated materials are removed off-site, temporary storage structure is dismantled and removed and until the assessment and remediation processes are complete in accordance with paragraph 17 of this Consent Order.

20. Respondent shall cause to be published the following notice in a newspaper of general circulation in Broward County, Florida. This notice shall be published one time within fourteen (14) days after execution of the Consent Order by the Department. In the event a third party petition for administrative proceeding is filed pursuant to this notice, Respondent's obligations under this Consent Order shall be stayed pending resolution of any and all issues raised in the third-party proceeding.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notices of agency action of entering into a Consent Order with Sun Bank/South Florida N.A., pursuant to Florida Administrative Code (FAC) Rule 17-103.110(3). The Consent Order addresses alleged violations of FAC Rule 17-3 at the SunBank facility located at 300 West Broward Boulevard, Fort Lauderdale, Broward County, Florida.

Persons not parties to this Consent Order whose substantial interests are affected by this Consent Order have a right pursuant to Section 120.57, F.S., to petition for an administrative determination (hearing) on the proposed action. The petition must conform to the requirements of F.A.C. Chapter 17-103 and 28-5, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within twenty one (21) days of receipt of this notice . Failure to file a petition within the twenty (21) days constitutes a waiver of any right such person has to an administrative determination (hearing) pursuant to Section 120.57, F.S.

If a Petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the proposed agency action. Persons whose substantial interests will be affected by any decision of the Department have the right to intervene in the proceeding. A petition for intervention must be filed pursuant to FAC Model Rule 28-5.207, at least five days before the final hearing and be filed with the Hearing Officer if one has been assigned at the Division of Administrative Hearings, Department of Administration, 2009 Apalachee Parkway, Tallahassee, Florida 32399-2400. Failure to petition to intervene within the allowed time frame constitutes a waiver of any determination (hearing) under Section 120.57, F.S.

21. Within forty-five (45) days of the entry of this Order, Respondent shall submit to the Department a detailed, itemized report describing and certifying compliance with paragraphS 14-18 of this Consent Order.

22. The Department reserves the right to split samples with Respondent throughout the sampling program agreed to pursuant to the procedures set forth in Exhibit I, and to take samples on their own initiative, after giving Respondent reasonable notice, in order to verify completion of any or all steps in the sampling and clean-up program.

23. Persons not parties to this Consent Order but whose substantial interests are affected by this Consent Order have a right pursuant to Section 120.57, F.S., to petition for an administrative determination (hearing) on it. The petition must conform to the requirements of F.A.C. Chapter 17-103 and 28-5, and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within twenty one (21) days of receipt of this notice . Failure to file a petition within the twenty one (21) days constitutes a waiver of any right such person has to an administrative determination (hearing) pursuant to Section 120.57, F.S.

24. Respondent waives its right to an administrative hearing on the terms of this Consent Order under Section 120.57, Florida Statute, and its right to appeal this Consent Order pursuant to Section 120.68, F.S.

25. Respondent shall allow authorized representatives of the Department access to the property at reasonable times for the purpose of determining compliance with this Consent Order and with rules and regulations of the Department.

26. The Department for and in consideration of Respondent's complete and timely performance of obligations agreed to in this Consent Order hereby waives its right to seek judicial imposition of civil or criminal penalties against respondent for alleged violations outlined in this Consent Order. The Department expressly reserves its right to seek imposition and recovery of environmental damages. The Department reserves all rights and remedies against any person other that respondent.

27. Nothing herein shall be construed to limit the authority of the Department to undertake any action against Respondent in response to or

to recover the costs of responding to conditions at or from the site which may present an imminent hazard to the public health, wellfare or the environment if:

(A) Either the conditions previously unknown to or undetailed by the Department; or

(B) The conditions result from the implementation of the requirements of this Consent Order; or

(C) Other previously unknown facts arises or are discovered after the entry of this Consent Order.

28. Respondent shall provide within a resonable time and at their expense a permanant drinking water supply meeting all drinking water standards set forth in F.A.C. Chapter 17-550 to replace any potable water well that is shown by chemical and hydrogeological analysis to be contaminated by Respondent's operations.

29. Entry of this Consent Order does not relieve Respondent of the need to comply with the applicable federal, state or local laws, regulations and ordinances.

30. The terms and conditions set forth in this Consent Order may be enforced in a court of competent jurisdiction pursuant to Section 120.69 and 403.121, F.S. Failure to comply with the terms of this Consent Order shall constitute a violation of Section 403.161(1)(b), F.S. Notwithstanding anything in this Consent Order to the contrary, the terms and conditions of this Consent Order shall not be admissible in any action for any purpose by any person or party other than the Department and the Respondent; and by those parties, the terms and conditions shall only be admissible for the purpose of enforcing the terms of the Order, including alleged violations of the Order.

31. Respondent is fully aware that a violation of the terms of this Consent Order may subject Respondent to judicial imposition of damages, civil penalties of up to $50,000.00 per offense and criminal penalties.

32. If Respondent fails to submit any or all of the reports, plans, or data within the specified time periods outlined in this Consent Order or in Exhibit I, Respondent agrees to automatic assessment of a penalty of $250.00 for each day after the due date that such a report, plan, or data is not submitted. This amount shall continue to accrue thereafter

until the reports, plans, or data are submitted. Respondent shall pay such assessed penalties to the Department within fifteen (15) days of receipt of written notification to do so by the Department. Failure or refusal to pay these penalties shall be considered a violation of terms and conditions of this Consent Order. The Department, in its discretion, may waive the penalties provided for herein.

33. The Department hereby expressly reserves the right to initiate appropriate legal action to prevent and prohibit the future violations of applicable statutes, ordinances or the rules promulgated thereunder not covered by the terms of this Consent Order.

34. No modification of the terms of this Consent Order shall be effective until reduced to writing and executed by Respondent and the Department.

35. All reports, plans and data required by this Consent Order to be submitted to the Department should be sent in triplicate to the Administrator of Waste Program, Enforcement Section, Florida Department of Environmental Regulation, 1900 South Congress Avenue, Suite A, West Palm Beach, Florida 33406 and to the Bureau of Waste Cleanup, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

36. With regard to any determination made by the Department pursuant to this Consent Order, including any notice of disapproval or deficiency, Respondent may file a petition for formal or informal administrative proceeding, pursuant to Section 120.57, Florida Statutes and Chapter 17-103, and 28-5, Florida Administrative Code, if Respondent objects to the Department's determination. Respondent shall have the burden to establish the inappropriateness of the Department's determination. The petition must conform with the requirements of Florida Administrative Code Rule 28-5.201 and must be received by the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within 21 days after receipt of a written notice from the Department of any determination Respondent wishes to challenge. Failure to file a petition within this time period shall constitute a waiver by Respondent of its right to request an administrative proceeding under Section 120.57, Florida Statutes. The Department's determination, upon expiration of the 21 day time period if no petition is filed, or the Department's Final Order as a result of the filing of a petition, shall be incorporated by reference into this Consent Order and made a part of thereof. All other aspects of this Consent Order shall remain in full force and effect at all times.

36. This Consent Order is the final agency action of the Department pursuant to Section 120.69, F.S. and F.A.C. Rule 17-103.110(3), and becomes final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with Chapter 120, F.S. Upon the timely filing of petition this Consent Order will not be effective until further orders of the Department.

FOR THE RESPONDENT,

DATE 1/24/90

Douglas Sinclair, Senior Vice President
Sun Bank / South Florida National Association
300 West Broward Boulevard
Fort Lauderdale, Florida

DONE AND ORDERED THIS 1st DAY OF February 1990, IN WEST PALM BEACH, FLORIDA.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

J. SCOTT BENYON
DEPUTY ASSISTANT SECRETARY
SOUTHEAST FLORIDA DISTRICT
1900 SOUTH CONGRESS AVENUE, SUITE A
WEST PALM BEACH, FLORIDA 33406
TELEPHONE 407/964-9668

FILING AND ACKNOWLEDGEMENT
FILED, on this date pursuant to §120.52 Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk

2-1-90
Date

Copies furnished to:

Office of General Counsel, DER, Tallahassee
Broward County Environmental Quality Control Board
File, Reporting Coordinator
West Palm Beach DER Files

CORRECTIVE ACTIONS FOR GROUND WATER CONTAMINATION CASES

1. Within 60 days of the effective date of the Order incorporating these contamination assessment actions, Respondent shall submit to the Department a detailed written Contamination Assessment Plan ("CAP"). If the Respondent has conducted a Preliminary Contamination Assessment, the Respondent shall submit to the Department a detailed written CAP within 60 days of receipt of notice from the Department that a CAP is required. The purpose of the CAP shall be to propose methods for collection of information necessary to meet the objectives of the contamination assessment.

A. The objectives of the Contamination Assessment shall be to:

(1) Establish the areal and vertical extent of soil, sediment, surface water and ground water contamination;

(2) Determine or confirm the contaminant source(s); mechanisms of contaminant transport; rate and direction of contaminant movement in the air, soils, surface water and ground water; and rate and direction of ground water flow;

(3) Provide a complete characterization of the contamination plume(s);

(4) Determine whether interim remedial measures are necessary to abate any imminent hazard.

(5) Determine the amount of product lost, and the time period over which it was lost (if applicable);

(6) If leaking storage tanks may be the source of the contamination, determine the structural integrity of all aboveground and underground storage systems (including integral piping) which exist at the site (if applicable);

(7) Establish the vertical and horizontal extent of free product (if applicable);

(8) Describe pertinent geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones; and

(9) Describe geologic and hydrogeologic characteristics of the site which influence migration and transport of contaminants; and

(10) Provide a site history including description of facility operations, as applicable.

B. The CAP shall specify tasks, which are necessary to achieve the objectives described in subparagraph 1.A. above. The CAP shall include a reasonable time schedule for completing each task. The tasks may include, but are not limited to the following:

(1) Use of piezometers or wells to determine the horizontal and vertical directions of the ground water flow;

(2) Use of electromagnetic conductivity (EM) and other geophysical methods or vapor analyzers to trace extent of ground water contamination;

(3) Use of fracture trace analysis to discover linear zones in which discrete flow could take place;

(4) Use of well points or monitoring wells to sample ground water in affected areas and to determine the vertical and horizontal extent of the ground water plume;

(5) Sampling of public and private wells;

(6) Sampling of surface water and sediments;

(7) Sampling of air for airborne contaminants;

(8) Analysis of soils and drum and tank residues for hazardous waste determination and contaminant characterization.

(9) Use of geophysical equipment such as vapor analyzers, magnetometers, ground penetrating radar, or metal detectors to detect tanks, lines, etc.;

(10) Determination of the horizontal and vertical extent of soil contamination;

(11) Use of soil and well borings to determine pertinent site-specific geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones such as aquifers, confining beds, and unsaturated zones; and

(12) Use of geophysical methods, pump tests and slug tests to determine geologic and hydrogeologic characteristics of affected and potentially affected hydrogeologic zones.

C. The CAP shall provide detailed information as to how proposed tasks are to be carried out. The CAP shall include, as applicable, the following information:

(1) Proposed sampling locations and rationale for their placement;

(2) A description of methods and equipment to be used to identify and quantify soil or sediment contamination;

(3) A description of water sampling methods;

(4) Parameters to be analyzed for, analytical methods to be used, and detection limits of these methods;

(5) Proposed piezometer and well construction details including methods and materials, well installation depths and screened intervals, well development procedures;

(6) A description of methods proposed to determine aquifer properties

(e.g., pump tests, slug tests, permeability tests, computer modeling);

(7) A description of geophysical methods proposed for the project;

(8) Details of any other assessment methodology proposed for the site;

(9) A description of any survey to identify and sample public or private wells which are or may be affected by the contaminant plume;

(10) A description of the regional geology and hydrogeology of the area surrounding the site;

(11) A description of site features (both natural and man-made) pertinent to the assessment;

(12) A description of methods and equipment to be used to determine the site specific geology and hydrogeology; and

(13) Details, including disposal or treatment methods, of any immediate remedial actions proposed for the site such as product recovery, soil removal or treatment.

D. The CAP shall contain as a separate document a Quality Assurance Project Plan ("QAPP"), which shall apply to all sampling and analysis required by this Consent Order. The QAPP shall be prepared in accordance with the requirements set forth in the document titled "DER Guidelines for Preparing Quality Assurance Plans, DER-QA-001/85, January 30, 1986." A copy of the document is available upon request from the Department. A QAPP is required for all persons collecting or analyzing samples. The Department reserves the right to reject all results submitted by Respondent prior to QAPP approval or are not in accordance with the Department approved QAPP.

2. The Department shall review the CAP and provide the Respondent with a written response to the proposal. Any action taken by Respondent with regard to the implementation of the CAP prior to the Respondent receiving written notification from the Department that the CAP has been approved shall be at Respondent's risk.

3. In the event that additional information is necessary for the Department to evaluate the CAP, the Department shall make a written request to the Respondent for the information, and within 20 days from receipt of said request, Respondent shall provide all requested information in writing to the Department unless the requested information requires additional field work in which case the Respondent shall submit to the Department within 14 days of receipt of said request, a written schedule for completing the field work needed to provide the requested information.

4. In the event that the Department determines that the CAP submitted by Respondent does not adequately address the objectives of the Contamination Assessment as

set forth in subparagraph 1.A. above, the Department will notify the Respondent in writing of the CAP's deficiencies. Respondent shall then have 30 days from the Department's notification to submit a modified CAP addressing the deficiencies noted by the Department.

5. If the Department determines upon review of the resubmitted CAP that the CAP still does not adequately address the objectives of the CAP as set forth in subparagraph 1.A. above, the Department, at its option, may choose either to:

A. Draft specific modifications to the CAP and notify Respondent in writing that the Department's modification shall be incorporated in the CAP; or

B. Notify Respondent in writing that Respondent has failed to comply with paragraph four above, in which case the Department may do any or all of the following: take legal action to enforce compliance with the Order, file suit to recover damages and civil penalties, or complete the corrective actions outlined herein and recover the costs of completion from Respondent.

6. Once a CAP has been approved by the Department, it shall become effective and made a part of this Order and shall be implemented within ten days of the Department's written notification to Respondent that the CAP has been approved. The CAP shall incorporate all required modifications to the CAP identified by the Department. Within 10 working days of completion of the CAP tasks, Respondent shall provide written notice to the Department that the CAP tasks have been completed.

7. Within 45 days of completion of the tasks in the CAP, Respondent shall submit a written Contamination Assessment Report ("CAR") to the Department. The CAR shall:

A. Summarize all tasks which were implemented pursuant to the CAP; and

B. Specify results and conclusions regarding the Contamination Assessment objectives outlined in subparagraph 1.A.

8. The Department shall review the CAR and determine whether it has adequately met the objectives specified in subparagraph 1.A. In the event that additional information is necessary to evaluate the CAR, the Department shall make a written request to the Respondent for the information. Within 20 days of receipt of said request, Respondent shall provide all requested information unless the requested information requires additional field work in which case the Respondent shall submit, within 14 days of said request, to the Department a reasonable written schedule for completing the field work needed to provide the requested information. The Department shall provide written approval of the CAR once all of the CAP objectives and tasks have been satisfactorily completed.

9. The Department, at its option, may determine from review of the CAR and other

relevant information, the Site Rehabilitation Levels (SRLs) to which the contamination shall be remediated or may require the Respondent to implement the risk assessment process to develop such SRLs for the site. The SRLs for water as determined by the Department shall be based on Chapter 17-3, F.A.C. standards and the Department's numerical interpretation of the Chapter 17-3, F.A.C. minimum criteria. The Department may also require that a risk assessment be completed to define SRLs for soils or sediments that are sufficiently contaminated to present a risk to the public health, the environment or the public welfare. If the Department does choose to provide SRLs to the Respondent and does not choose to require a risk assessment and the Respondent agrees to remediate the site to those SRLs, the Respondent shall implement the Feasibility Study, if required by the Department as set forth in paragraph 13, or submit the Remedial Action Plan (RAP) as set forth in paragraph 16.

10. After completion and Department approval of the CAR, the Respondent shall prepare and submit to the Department a Risk Assessment/Justification (RAJ) if the Department requires the task, or if the Respondent wishes to develop SRLs other than those determined by the Department or if the Respondent intends to justify a no-action proposal for the site. The RAJ which includes a risk assessment and a detailed justification of any alternative SRLs or no action proposal shall be submitted within 60 days from receipt of the Department's written approval of the CAR and determination of the SRLs for the site, or within 60 days of the Department's written approval of the CAR and notice that a RAJ is required, or within 60 days of the Department's written approval of the CAR. Unless otherwise approved by the Department, the subject document shall address the following task elements, divided into the following five major headings:

A. Exposure Assessment - The purpose of the Exposure Assessment is to identify routes by which receptors may be exposed to contaminants and to determine contaminant levels to which receptors may be exposed. The Exposure Assessment should:

(1) Identify the contaminants found at the site and their concentrations as well as their extent and locations;

(2) Identify possible transport pathways;

(3) Identify potential exposure routes.

(4) Identify potential receptors for each exposure route; and

(5) Estimate or calculate expected contaminant levels to which actual or potential receptors may be exposed.

B. Toxicity Assessment - The purpose of the Toxicity Assessment is to define

the applicable human health and environmental criteria for contaminants found at the site. The criteria should be defined for all potential exposure routes identified in the Exposure Assessment. DER standards shall be the criteria for constituents and exposure routes to which the standards apply. Criteria or constituents and exposure routes for which specific DER standards are not established shall be based upon criteria such as Recommended Maximum Contaminant Levels (RMCLs), Maximum Contaminant Levels, Average Daily Intake values (ADIs), Unit Cancer Risk values (UCRs), organoleptic threshold levels, Ambient Water Quality Criteria for Protection of Human Health and for Protection of Aquatic Life, and other relevant criteria as applicable. If there are no appropriate criteria available for the contaminants and exposure routes of concern, or the criteria are in an inappropriate format, the Respondent shall develop the criteria using equations and current scientific literature acceptable to toxicological experts. Criteria for the following exposure routes shall be defined or developed as applicable:

(1) Potable water exposure route - develop criteria for ingestion, dermal contact, inhalation of vapors and mists, utilizing applicable health criteria such as Recommended Maximum Contaminant Levesl (RMCLs), Maximum Contaminant levels, Average Daily Intake values (ADIs), Unit Cancer Risk values (UCRs), organoleptic threshold levels, and other relevant criteria as applicable.

(2) Non-potable domestic water usage exposure route - develop criteria for dermal contact, inhalation of vapors and mists, ingestion of food crops irrigated with such water, lawn watering, ingestion by pets and livestock, and other related exposure.

(3) Soil exposure route - develop criteria for ingestion, dermal contact, inhalation, ingestion by humans or animals of food crops grown in contaminated soils.

(4) Non-potable surface water exposure - develop criteria for prevention of adverse effects on human health (e.g. dermal contact effects on humans utilizing the resource for recreational purposes) or the environment (e.g. toxic effects of the contaminants on aquatic or marine biota, bio-accumulative effects in the food chain, other adverse effects that may affect the designated use of the resource as well as the associated biota).

(5) Air exposure route - develop criteria for exposure to the contaminants in their unaffected state.

C. Risk Characterization - The purpose of the Risk Characterization is to utilize the results of the Exposure Assessment and the Toxicity Assessment to characterize cumulative risks to the affected population and the environment from contaminants found at the site. Based on contaminant levels presently found at the

site, a risk and impact evaluation will be performed which considers, but is not limited to:

(1) Risks to human health and safety from the contamination including;

(a) carcinogenic risk, and

(b) non-carcinogenic risk.

(2) Effects on the public welfare of exposure to the contamination which may include but not be limited to adverse affects on actually and potentially used water resources.

(3) Environmental risks in areas which are or will be ultimately affected by the contamination including;

(a) other aquifers,

(b) surface waters

(c) wetlands,

(d) sensitive wildlife habitats, and

(e) sensitive areas including, but not limited to, National Parks, National Wildlife Refuges, National Forests, State Parks, State Recreation Areas, State Preserves.

D. Justification for alternative Site Rehabilitation Levels (SRLs) or no action proposal - The purpose of this section is to provide justification on a case-by-case basis for a no action proposal or for alternative SRLs that vary from Chapter 17-3, F.A.C. standards and minimum criteria or from any SRLs determined by the Department at which remedial action shall be deemed completed. Factors to be evaluated shall be, at a minimum:

(1) The present and future uses of the affected aquifer and adjacent surface waters with particular consideration of the probability that the contamination is substantially affecting or will migrate to and substantially affect a public or private source of potable water;

(2) Potential for futher degradation of the affected aquifer or degradation of other connected aquifers,

(3) The technical feasibility of achieving the SRLs based on a review of reasonably available technology;

(4) Individual site characteristics, including natural rehabilitative processes; and

(5) The results of the risk assessment.

Applicable contaminant transport models must be employed to document that human health and environment risks from alternative and less stringent SRLs are acceptable.

11. The Department shall review the Risk Assessment/Justification document and determine whether it has adequately addressed the risk assessment task elements. The Department shall review the justification section and determine whether the Department approves or disapproves of the alternative SRLs or the no action proposal.

12. In the event that additional information is necessary to evaluate any portion of the Risk Assessment/Justification document, the Department shall make a written request and Respondent shall provide all requested information within 20 days of receipt of said request. If the Department does not approve the no action proposal or the alternative SRLs, the Respondent shall use the SRLs as determined by the Department. If the Department and Respondent agree to the remediation levels, either the SRLs determined by the Department or the alternative SRLS, the Respondent shall implement the Feasibility Study, if required by the Department as set forth in paragraph 13, or submit the Remedial Action Plan (RAP) as set forth in paragraph 16.

13. The Department shall also determine from review of the CAR and other relevant information whether the Respondent should prepare and submit a Feasibility Study (FS) to the Department. The FS will be required in complex cases to evaluate technologies and remedial alternatives, particularly if multiple contaminant classes are represented or multiple media are contaminated. The purpose of the FS is to evaluate remedial technologies and remedial alternatives in order to identify the most environmentally sound and effective remedial action to achieve clean up of the site to SRLs or alternative SRLs (if approved). The FS shall be completed within 60 days of written notice that a FS is required, unless the Respondent plans to submit a RAJ pursuant to paragraph 10. The Feasibility Study shall include the following tasks:

(A) Identify and review pertinent treatment, containment, removal and disposal technologies;

(B) Screen technologies to determine the most appropriate technologies;

(C) Review and select potential remedial alternatives using the following criteria:

(1) long and short term environmental effects;

(2) implementability;

(3) capital costs;

(4) operation and maintenance costs;

(5) operation and maintenance requirements;

(6) reliability;

(7) feasibility;

(8) time required to achieve clean-up; and

(9) potential legal barriers to implementation of any of the alternatives;

(D) Identify the need for and conduct pilot tests or bench tests to evaluate alternatives, if necessary;

(E) Select the most appropriate remedial alternative;

(F) Develop soil cleanup criteria such that the contaminated soils will not produce a leachate which contains contaminants in excess of the SRLs or alternative SRLs (if approved).

14. Within 45 days of completing the FS, Respondent shall submit an FS Report to the Department. The FS Report shall:

A. Summarize all FS task results; and

B. Propose a conceptual remedial action plan based on the selection process carried out in the FS.

15. The Department shall review the FS Report for adequacy and shall determine whether the Department agrees with the proposed remedial action. In the event that additional information is necessary to evaluate the FS report, the Department shall make a written request and Respondent shall provide all requested information within 20 days from receipt of said request.

16. If the Department does not approve of the proposed remedial action, the Department will notify the Respondent in writing of the determination. The Respondent shall then have 20 days from the Department's notification to resubmit a proposed alternate remedial action.

17. If the Department determines upon review of the resubmitted remedial action proposal that it does not agree with the proposal, the Department at its option, may choose to either:

A. Choose a remedial action alternative for the Respondent to carry out; or

B. Notify the Respondent that Respondent has failed to comply with paragraph 16 above, in which case the Department may do any or all of the following: take legal action to enforce compliance with the Order, file suit to recover damages and civil penalties, or complete the corrective actions outlined herein and recover the costs of completion from Respondent.

18. Within 45 days of receipt of written notice from the Department, Respondent shall submit to the Department a detailed Remedial Action Plan ("RAP"). The RAP shall be signed and sealed by a registered professsional engineer in accordance with Chapter

471, Florida Statutes. The objective of the remedial action shall be to achieve the clean up of the contaminated areas to the SRLs or the approved alternative SRLs. The RAP shall include:

A. Rationale for the remedial action proposed which shall include at a minimum:

(1) Results from any pilot studies or bench tests;

(2) Evaluation results for the proposed remedial alternative based on the following criteria:

a. long and short term environmental impacts;

b. implementability, which may include, but not be limited to, ease of construction, site access, and necessity for permits;

c. operation and maintenance requirements;

d. reliability;

e. feasibility; and

f. costs.

(3) Soil cleanup criteria such that the contaminated soils will not produce a leachate which contains contaminants in excess of State Water Quality Standards or minimum criteria established in 17-3, F.A.C. Subparagraph A requirements can be omitted if a Feasibility Study was required and approved by the Department.

B. Design and construction details and specifications for the remedial alternative selected;

C. Operational details of the remedial action including the disposition of any effluent, expected contaminant concentrations in the effluent, an effluent sampling schedule if treated ground water is being discharged to ground water or to surface waters, and the expected concentrations and quantities of any contaminants discharged into the air as a result of remedial action;

D. A separate QAPP document;

E. Details of the treatment or disposition of any contaminated soils or sediments;

F. Proposed methodology including post remedial action ground water monitoring as applicable for evaluation of the site status after the remedial action is complete to verify accomplishment of the objective of the RAP; and

G. Schedule for the completion of the remedial action.

19. The Department shall review the proposed RAP and provide Respondent with a

written response to the proposal. Respondent shall not implement the RAP until Respondent receives written notification from the Department that the RAP has been approved.

20. In the event that additional information is necessary for the Department to evaluate the RAP, the Department shall make a written request to Respondent for the information, and Respondent shall provide all requested information in writing to the Department within 20 days from receipt of said request unless the requested information requires additional field work in which case the Respondent shall submit in writing to the Department a reasonable schedule for completing the field work needed to provide the requested information.

21. In the event that the Department determines that the RAP submitted by the Respondent does not adequately address the objectives set forth in paragraph 16, the Department will notify the Respondent in writing of the RAP's deficiencies. The Respondent shall then have 20 days from the Department's notification to submit a modified RAP addressing the deficiencies noted by the Department.

22. If the Department determines upon review of the resubmitted RAP that the RAP still does not adequately address the objectives of the RAP, the Department, at its option, may choose to either:

A. Draft specific modifications to the RAP and notify the Respondent in writing that the Department's modifications shall be incorporated in the RAP; or

B. Notify the Respondent that Respondent has failed to comply with the paragraph 19 above, in which case the Department may do any or all of the following: take legal action to enforce compliance with the Order, file suit to recover damages and civil penalties, or complete the corrective actions outlined herein and recover the costs of completion from Respondent.

23. Once a RAP has been approved by the Department, it shall become effective and made a part of this Order and shall be implemented within ten days from receipt of the Department's notification to the Respondent that the RAP has been approved. The RAP shall incorporate all required modifications to the RAP identified by the Department.

24. Following termination of remedial action (clean up of the Oontaminated area to the SRLs or the approved alternative SRLs), designated monitoring wells shall be sampled on a schedule determined by the Department.

25. Following completion of the remedial action and post-remedial action monitoring, the Respondent shall submit a Site Rehabilitation Completion Report (SRCR) to the Department for approval. The SRCR shall be signed and sealed by a registered

Professional Engineer in accordance with Chapter 471, F.S., unless "no further action" or "monitoring-only" was proposed and was approved by the Department. The SRCR shall contain a demonstration, with supporting documentation, that site cleanup objectives have been achieved.

26. Within sixty (60) days of receipt of the SRCR, the Department shall approve the SRCR or make a determination that the SRCR does not contain sufficient information to support the demonstration that cleanup objectives have been achieved.

27. If the Bureau determines that the SRCR is not adequate based upon information provided, the Department will notify the Respondent in writing. Site rehabilitation activities shall not be deemed completed until such time as the Department provides the Respondent with written notice that the SRCR is approved.

28. On the first working day of each month, after beginning implementation of a CAP or RAP, Respondent shall submit written progress reports to the Department. These progress reports shall describe the status of each required CAP and RAP task. The reports shall be submitted until planned tasks have been completed to the satisfaction of the Department.

29. Respondent shall provide written notification to the Department at least ten days prior to installing monitoring or recovery wells, and shall allow Department personnel the opportunity to observe the location and installation of the wells. All necessary approvals must be obtained from the water management district before Respondent installs the wells.

30. Respondent shall provide written notification to the Department at least ten days prior to any sampling, and shall allow Department personnel the opportunity to observe sampling or to take split samples. Raw data shall be exchanged between the Respondent and the Department as soon as the data is available.

31. The Respondent is required to comply with all applicable local, state and federal regulations and to obtain any necessary approvals from local, state and federal authorities in carrying out these corrective actions.

32. If any event occurs which causes delay or the reasonable likelihood of delay in the achievement of the requirements of these Corrective Actions, Respondent shall have the burden of proving that the delay was or will be caused by circumstances beyond the reasonable control of Respondent, and could not have been or can not be overcome by due diligence. Upon occurrence of the event Respondent shall promptly notify the Department orally and shall, within seven calendar days, notify the Department in writing of the anticipated length and cause of delay, the measures taken or to be taken to prevent or minimize the delay, and the time table by which Respondent intends to implement these

measures. If the parties can agree that the delay or anticipated delay has been or will be caused by circumstances beyond the reasonable control of Respondent, the time for performance hereunder shall be extended for a period equal to the delay resulting from such circumstances. Such agreement shall be confirmed by letter from the Department accepting or if necessary modifying the extension request. Respondent shall adopt all reasonable measures necessary to avoid or minimize delay. Failure of Respondent to comply with the notice requirements of this paragraph shall constitute a waiver of Respondent's right to request an extension of time to complete the requirements of these Corrective Actions. Increased costs of performance of any of the activities set forth in these Corrective Actions or changed economic circumstances shall not be considered circumstances beyond the control of Respondent.

33. Respondent shall immediately notify the Department of any problems encountered by Respondent which require modification of any task in the approved CAP or RAP, and obtain Department approval prior to implementing any such modified tasks.

34. Should the Department conclude that clean up of the contaminated area to SRLs or approved alternative SRLs, is not feasible; or should Respondent not completely implement the RAP as approved by the Department; the Department may seek restitution from Respondent for environmental damages resulting from pollution as a result of Respondent's actions. Within 20 days of receipt of Department written notification of its intent to seek said restitution, Respondent may pay the amount of the damages or may, if it so chooses, initiate negotiations with the Department regarding the monetary terms of restitution to the state. Respondent is aware that should a negotiated sum or other compensation for environmental damages not be agreed to by the Department and Respondent within 20 days of receipt of Department written notification of its intent to seek restitution, the Department may institute appropriate action, either administrative, through a Notice of Violation, or judicial, in a court of competent jurisdiction through a civil complaint, to recover Department assessed environmental damages pursuant to Section 403.141, Florida Statutes.

Reference 10

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SITE SCREENING SUPERFUND SUBSECTION
CONVERSATION RECORD

Date: July 24, 1992 & August 25, 1992
Time:

File Name: Gate City Door & Sash

Contact Person: Terry Hilliard/Lou Valcarenghi-FDER SoutheastDistrict

From: Jim McCarthy, P.G.
Environ. Specialist III

Title: Envir. Specialist I (both)

To: Eric S. Nuzie
Environ. Manager

Phone No.: (407) 433-2650

Subject: Enforcement/Site Status

Ms. Terry Hilliard of the FDER Southeast District office in West Palm Beach has reviewed the Gate City/Sun Bank file and informed me that FDER is awaiting additional comments and implementation of the additional assessment work at the Sun Bank site. Terry is sending me a copy of the final Sun Bank (OGC Case 89-0752) Consent Order.

Mr. Lou Valcarenghi, the former FDER District Sun Bank Site Manager, has informed me that the site is not completely paved but is fenced.

Reference 11

GROUNDWATER MONITORING PARAMETERS

AND

POLLUTION SOURCES

THIRD EDITION, MAY 1989

GEOFFREY B. WATTS

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

BUREAU OF WASTE CLEANUP

Table 5.1

Ground Water Quality Standards

Primary Standards

	Parameter	Maximum Concentration Limit (MCL) (mg/l unless otherwise noted)
Inorganics	Arsenic	0.05
	Barium	1.0
	Cadmium	0.010
	Chromium	0.05
	Lead	0.05
	Mercury	0.002
	Nitrate (as N)	10.0
	Selenium	0.01
	Silver	0.05
	Sodium	160.0
	Fluoride	4.0
Organic Pesticides	Endrin	0.0002
	Lindane	0.004
	Methoxychlor	0.1
	Toxaphene	0.005
	2,4-D	0.1
	2,4,5-TP, Silvex	0.01
	Trihalomethanes (total)	0.10
Volatile Organics	Trichloroethylene	3.0 ug/l
	Tetrachloroethylene	3.0 ug/l
	Carbon Tetrachloride	3.0 ug/l
	Vinyl Chloride	1.0 ug/l
	1,1,1-Trichloroethane	200.0 ug/l
	1,2-Dichloroethane	3.0 ug/l
	Benzene	1.0 ug/l
	Ethylene Dibromide	0.02 ug/l
	p-dichlorobenzene	75.0 ug/l
	1,1-dichloroethylene	7.0 ug/l
	Turbidity	1 T.U. Monthly Avg. 5 T.U. 2-day Avg.
Radionuclides	Microbiological	Total Coliform (MF) 4/100 ml
	Radium-226 and Radium-228	5 pCi/l
	Gross Alpha	15 pCi/l

Table 5.1 (continued)

Ground Water Quality Standards

Primary Standards

	Parameter	Maximum Concentration Limit (MCL) (mg/1 unless otherwise noted)
Inorganic	Iron	0.3
	Copper	1
	Manganese	0.05
	Zinc	5
	Chloride	250
	Sulfate	250
	Total Dissolved Solids (TDS)	500 (may be if no other MCL is exceeded)
	pH (at collection point)	6.5 (min. allowable-no max)
	color	15 color units
	corrosivity	neither corrosive nor scale forming
	foaming agents	0.5
	odor	3 (threshold odor number)

7.10 Pollution Source - Wood Preserving Industry

Historically there have been three types of chemical mixtures used as wood preservatives: coal tar creosote, pentachlorophenol/diesel fuel mixtures and copper, chromium and arsenic salts. The typical treating process (Troutman, et. al., 1984) involves initially removing the bark from poles which are then placed in airtight cylinders and steam heated under pressure to burst the wood cells. A vacuum is then applied to remove the cellular moisture, etc. The airtight chamber is then flooded with wood preservative which impregrates the wood for a period of several hours. Preservative that is not sorbed by the wood is normally pumped from the chamber to a recirculation pond.

Coal tar creosote is a byproduct of the coal gasification industry (Section 7.5). Diesel fuel (Section 7.3) is used with pentachlorophenol to increase the solubility and penetration of PCP into the wood fiber (Troutman, 1984). Table 7.10.1 shows the recommended monitoring parameters for wood treating chemicals.

Table 7.10.1

Monitoring Parameters - Wood Preserving Industry

Coal Tar Creosote

Volatile Organics

Benzene*
Ethylbenzene*
Toluene*
Xylenes*
Indene
Indan

Base/Neutral Extractables

Naphthalene*
Methylhaphthalenes*
Dimethylnaphthalenes
Acenaphthene*
Fluorene
Phenanthrene
Fluoranthene
Dibenzofuran
8-Quinolinol

Acid Extractables

Phenol*
2,4-Dimethylphenol*
4-Methylphenol
3-Methylphenol
3,5-Dimethylphenol

PCP/Diesel Fuel

Base/Neutral Extractables

Acenaphthene*
Naphthalene*
Methylnaphthalenes*
Dimethylnaphthalenes
Fluorene
Phenanthrene
Anthracene
Subst. Alkylbenzenes

Acid Extractables

Pentachlorophenol*
Tetrachlorophenol
Trichlorophenol
Dichlorophenol
Chlorophenol

Cupra Chrome

Metals

Copper*
Chromium*
Arsenic*

*Key indicator parameter

OVERSIZED

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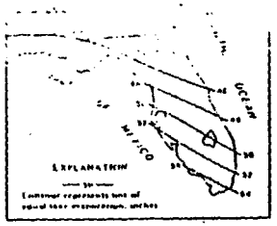

AVERAGE ANNUAL LAKE EVAPORATION

THE DIFFERENCE BETWEEN RAINFALL AND POTENTIAL EVAPORATION IN FLORIDA

By

F. W. Visher and O. M. Hughes

Prepared by
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
BUREAU OF GEOLOGY
FLORIDA DEPARTMENT OF NATURAL RESOURCES
TALLAHASSEE, FLORIDA

1969
SECOND EDITION 1975

Rainfall in Florida is generally abundant, but most generally has little opportunity to control or detect the use of a large part of the total rainfall. Evaporation from land, water and plant surfaces has first call on most of the rainfall. Treatment of the amount and areal variation of rainfall in excess of all evaporation losses is a necessary factor in appraising the outflow of water from an area. Outflow is the total surface and ground water flow from an area, and is equal to the difference between rainfall on an area and actual evaporation from an area.

Present technology does not permit accurate determination of evaporation from large areas of unexplored soils and vegetative cover where the availability of water may differ and vary both in time and in space. Thus, outflow is not determined directly, but is evaluated by determining the incremental outflow that results from the excess rainfall in the area. Both an approach capable is practicable in areas where the total outflow occurs in well-defined surface channels. In Florida, however, many areas are undefined by permeable limestone aquifers which transcend surficial drainage divides and which transmit large quantities of water underground. Even though part of the water transmitted through aquifers may reappear in springs or seepage at some downstream point, the areas or points of recharge of all the underground water cannot be determined, nor can all of the underground flow be measured and dealt with accurately. Thus, every analytical tool must be used to evaluate the outflow of an area. One concept which provides a convenient basis for appraising outflow from an area is the difference between rainfall and potential evaporation.

Outflow from an area can equal the difference between rainfall and potential evaporation only if water is maintained continually available over the entire surface of the area. In Florida, some surface areas are largely covered by bodies of swamps. Furthermore, the rainfall pattern in Florida tends to maximize the overall availability of water generally in accord with the evaporative demand. Rainfall occurs during unfavorable storm events throughout the year and is usually greatest during the warm months of the year, when evaporative demand is greatest, and least during the cold months, when evaporative demand is least. Consequently, in Florida the areal distribution of outflow should be greatly unequal to the distribution of the difference between rainfall and potential evaporation—large where the difference between rainfall and potential evaporation is large, and small where the difference is small.

Outflow cannot be less than the difference between rainfall and potential evaporation because, by definition, potential evaporation represents the maximum amount of water that can leave the area by this process. If rainfall exceeds potential evaporation, outflow must occur in an amount at least equal to the difference between the two. Although the difference between rainfall and potential evaporation may not define precisely the outflow from an area, it does indicate the lower limit of outflow from an area.

Potential evaporation herein is considered equivalent to evaporation occurring naturally from an extensive water surface of little thermal mass; thus, the yearly potential evaporation for an area essentially equals evaporation from natural lakes within the area. The two may differ seasonally because most lakes have some capacity to store energy temporarily rather than dissipate it immediately by evaporation, or by other heat transfer processes, or would a net surface having an appreciable thickness. However, yearly lake evaporation provides a useful estimate of potential evaporation because within a year energy, storage, and advance are balanced.

The areal distribution of potential evaporation in Florida (see inset map) is from a map of lake evaporation in the United States by Kohler, Nordenson, and Baker (1959, plate 3). The lake evaporation map provides a regional expression of average yearly lake evaporation during the period 1946-55. As two evaporation stations in Florida (Florida and Belle Glade Experiment stations), average evaporation for the period 1946-55 was virtually the same as for a longer period (1946-65); thus, evaporation for the period 1946-55 probably provides a representative long-term average for Florida.

The general reliability of the evaporation map has not been widely tested in Florida because few determinations of lake evaporation have been made since the map became available. One such determination, based on mass transfer techniques similar to those described by Harbeck (1962), was made during 1963 at Lake Hefner in central Florida (Pride and others, 1966). Measured lake evaporation at Lake Hefner was 53 inches compared to an average of 49 inches shown by the evaporation map for the general area involved.

During 1962, rainfall in central Florida was about 25 percent less than normal. Such a large deficiency in rainfall usually would be accompanied by a relative decrease in cloud cover and humidity as well as a relative increase in air temperature, all of which would tend to promote evaporation. Consequently, lake evaporation during 1963 was probably greater than the long-term average for the area. The difference between the two values is within the range of probable yearly variation.

The values shown by the evaporation map depend on meteorological factors such as solar radiation, wind movement, air temperature, and humidity, all of which are importantly related to lake evaporation. Thus, the values are applicable to undisturbed lakes as long as the lakes are openly exposed to wind movement, a requirement met by most large lakes in Florida. The same requirement may not be met by some small lakes occurring only a few acres that may be at the bottom of deep and have depressions or that may be severely restricted by tall and dense vegetation.

Yearly potential evaporation varies only slightly compared to yearly rainfall, which at many areas of Florida ranges from about 50 percent greater than normal to about 50 percent less than normal. Although some of the excess rainfall of wet years may be carried over as soil moisture or stored in lakes or in a shallow water table, much of the excess rainfall flows out of the area and does not remain available for evaporation in subsequent years. Similarly, but to a somewhat lesser extent, the energy represented by potential evaporation that cannot be used because of a lack of water during a dry year is not moved for later use but rather is dissipated. Because the yearly and seasonal overpatterns between the supply and demand of water for evaporation are not smoothed by storage, the average outflow of water tends to be greater than the difference between average rainfall and average potential evaporation—substantial outflow can occur during a year when rainfall may be much less than the yearly potential evaporation.

The topography and geology of an area also cause the outflow to deviate from the difference between rainfall and potential evaporation. Of prime importance are the slope of the land surface, the type of vegetative cover, and the permeability of the soil and underlying materials. These factors affect the ease of the rainfall to be readily concentrated into streams and drained from the area, such as steep land slopes and poorly permeable soils, for example, tend to make outflow greater than the difference between rainfall and potential evaporation. Permeable soils, which permit water to quickly reach a deep water table that feeds streams or springs also tend to make outflow greater than the difference between rainfall and potential evaporation simply because the water does not remain on or near the land surface to evaporate. Factors which promote ponding and retention of water on plants, such as flat land with surface depressions, tend to reduce outflow and make it more nearly equal to the difference between rainfall and potential evaporation.

The accompanying map shows the approximate areal distribution of the differences between yearly rainfall and yearly potential evaporation for Florida. Rainfall data used were for the most part U.S. Weather Bureau normal rainfall values for the period 1931-60. For stations where "normal" values were lacking, the average rainfall for the period of record at the station was used; however, all stations so included have at least 25 years of record.

Average yearly rainfall varies appreciably in Florida—ranging from about 60 inches at Miami Beach in south Florida to about 46 inches at Tallahassee in north Florida—but the variations do not follow a single systematic trend. In contrast to rainfall, average yearly potential evaporation decreases only slightly and somewhat uniformly from 54 inches at south Florida to about 48 inches at north Florida, as shown on the small inset map. Consequently, on the accompanying large map, the somewhat cellular pattern of the isopleths is due more to variations in rainfall than to variations in potential evaporation. The relatively uncommensurate data for all but a few rainfall stations but the configuration of the isopleths is not accurately or adequately defined in several areas of the state. As additional rainfall data become available, the configuration of the isopleths may be more closely defined. Thus, the map should be interpreted only in terms of broad areas where the average differences between rainfall and potential evaporation can be reasonably well established.

As mapped, rainfall exceeds the potential evaporation over most of Florida, but the differences vary greatly. The distribution of the differences is somewhat in some ways with outflow, which also varies appreciably across the state. However, no simple or direct relations between the two is apparent. The effect of other hydrologic and geologic variables is great enough in some areas to obscure the effect of the differences between rainfall and potential evaporation on outflow.

The greatest differences between rainfall and potential evaporation occurs in the panhandle area of northwest Florida, where the greatest outflow in the state occurs and where the difference is from 15 to 18 inches. Surface runoff averages about 29 inches over several basins that lie entirely or almost entirely within the panhandle area west of the Choctawhatchee River. This area is well drained by a network of streams whose basins are steep sloped relative to streams in some parts of Florida. Much of the area is covered by sandy materials of variable thickness which readily passes rainfall to the shallow water table, which in turn maintains the high base flow of the streams. An equivalent underlying the shallow sand aquifer in this area assures that most of the outflow of the area appears in streams.

In northeast Florida, the difference between rainfall and potential evaporation ranges from 5 to 9 inches or about half that for the panhandle area. In the part of the Suwannee River basin that lies entirely or almost entirely in northeast Florida, surface runoff averages about 14 inches. Large areas of northeast Florida are swampy and evaporation losses are almost equal to potential evaporation. On the other hand, larger areas are not swampy and have no defined network of surface streams. Much of the rainfall on these areas apparently moves downward to the water table and reaches the main through-going stream without large evaporation losses.

Over a large part of central Florida, the difference between rainfall and potential evaporation is from 3 to 5 inches. In the northernmost part of this area, including primarily Lake County and the northern half of Polk County, there are numerous lakes and swamps. Thus, for most of this area, evaporation and transpiration should approach the evaporation potential and runoff should approach zero closely the difference between the rainfall and potential evaporation. Surface runoff from the area, as measured by gaging stations on the upper Withlacoochee River, the Little Withlacoochee River, and the Ocklawaha River, averages about 3 inches. Outflow is somewhat greater than the surface runoff because there is known recharge area for the Floridan Aquifer. Pride and others (1966) showed that for the Lower Ocklawaha area, which includes an appreciable part of central Florida, recharge to the Floridan aquifer averages about 3 inches annually. Thus, outflow from this part of central Florida may be about 9 inches.

The same general area of central Florida is drained to the south by the Peace River. The Peace River basin is an area of confluence for the Floridan Aquifer, but only most of its length the river has reverse discharge from the Floridan aquifer. Surface runoff from the basin averages about 12 inches at the most downstream gaging station, which probably represents the outflow from the basin, because, at the upstream 30 percent of the basin where most of the recharge occurs, natural surface runoff still averages about 10 inches. Thus, from the same general area where the difference between rainfall and potential evaporation ranges from 3 to 5 inches, outflow ranges from 9 inches to a maximum estimate to about 12 inches in a downstream section. Part of this difference is probably due to greater actual evaporation from lakes and swamps in the northern section.

In the southernmost part of the state, which includes the Caloosahatchee River basin, Lake Okeechobee, and the Everglades, the difference between rainfall and potential evaporation ranges from less than zero in the western part to 12 inches in the eastern part. The terrain in this part of the state is so flat that, for the five streams which are identifiable, drainage basins are for the most part indeterminable. Thus, the streamflow data available for this region cannot be evaluated readily in terms of runoff per unit area.

Outflow from other areas of the state was found to be always greater than the difference between rainfall and potential evaporation; consequently, this same general relation should apply in the southern part of the state. The dumping between outflow and the difference was greatest where surface drainage by streams was efficient and where lakes and swamps were poorly shown, and least where drainage was poor and where lakes and swamps were prevalent. Outflow from the swamp and lake country in central Florida was estimated to be 9 inches for an area where the difference between rainfall and potential evaporation ranged from 3 to 5 inches. The disparity should be appreciably less for the southern part of the state where the availability of water to evaporate is much more complete for the entire area. Thus, for southern Florida, outflow probably does not exceed the difference between rainfall and potential evaporation by more than 3 inches.

Actual outflow cannot be determined directly from the map. In general, the map portrays by maximum outflow from an area. Actual outflow will almost never exceed the maximum, because basin characteristics and variance in rainfall limit the availability of water for evaporation.

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EXPLANATION

Rainfall station. Number represents the difference in inches between rainfall at the station and potential evaporation in the general area of the station.

6

The line marks the approximate boundary of area where the difference between rainfall and potential evaporation is generally the same within a range of 3 inches. The three represents one of the extreme values of the range of variation for adjacent areas serving as an upper limit for one area and the lower limit for the other.

Reference 13

Reference 14

WEATHER BUREAU
F. W. REICHELDERFER, Chief

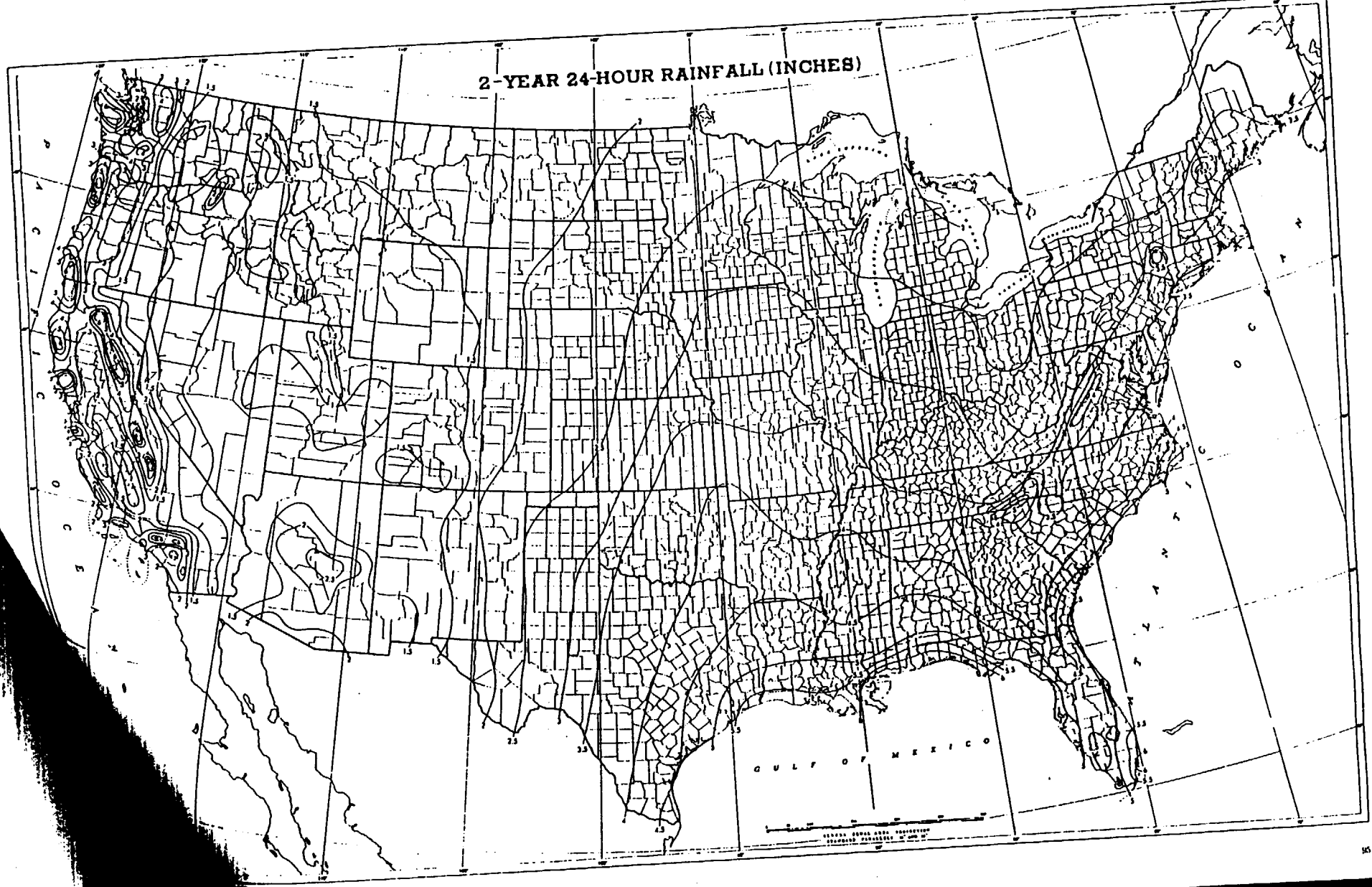
...ENT OF COMMERCE
..., Secretary

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO

Reference 15

STATE OF FLORIDA
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Randolph Hodges, *Executive Director*

DIVISION OF INTERIOR RESOURCES
Robert O. Vernon, *Director*

BUREAU OF GEOLOGY
C. W. Hendry, Jr., *Chief*

Report of Investigation No. 65

WATER RESOURCES OF BROWARD COUNTY, FLORIDA

By
C. B. Sherwood, H. J. McCoy, and C. F. Galliher

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in Cooperation with the
BUREAU OF GEOLOGY
FLORIDA DEPARTMENT OF NATURAL RESOURCES
and
BROWARD COUNTY

TALLAHASSEE
1973

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WATER RESOURCES OF BROWARD COUNTY, FLORIDA

By

C. B. Sherwood, H. J. McCoy, and C. F. Galliher

ABSTRACT

Broward County has large potential supplies of fresh water because of its almost 60-inch annual rainfall and its massive man-made surface-water management system integrated with the highly permeable Biscayne aquifer. However, the rapid urbanization of the area has been accompanied by major natural and man-made water problems, most of which intensify with mushrooming population. Natural problems of flood and drought are caused by extreme variations in rainfall that range from as much as 20 inches per day during the rainy season to little or none for extended periods in the dry season. Man-made problems include contamination by sea-water intrusion or by man-made wastes and management of water resources so that maximum long-term supplies can be developed. Although the development of adequate supplies for all needs will become a more critical problem in the future, contamination is the chief threat to present supplies.

Surface water is derived from rainfall, ground-water inflow, and releases and seepage from interior water conservation areas. The quality of the surface waters is initially good but variable; mineral content generally does not exceed 500 mg/l (milligrams per liter).

Although the surface-water supply is large it is variable because of the seasonal nature of the rainfall. Also losses from the system are high: of the 60 inches of annual rainfall, an average of 42 inches is lost by evapotranspiration, and during 1963-68, 1,300 cfs (cubic feet per second), about 840 mgd (million gallons per day), was lost by seaward flow from the eight primary canals. However, since the late 1950's, water management has greatly reduced the seaward flow. The average annual flow from the Hillsboro and North New River Canals reduced by approximately 260 cfs and 375 cfs, respectively.

The unconfined Biscayne aquifer is the source of all fresh ground water in Broward County. The aquifer is composed chiefly of limestone, sandstone, and sand which range in age from late Miocene through the Pleistocene. The aquifer extends from the surface to a depth of about 200 feet along the coast, thins westward to a depth of about 70 feet in central Broward County and pinches out near the west county line. Wells that tap the thick limestone in the deep part (100 or more feet) of the aquifer near the coast yield more than 1,000 gpm (gallons per minute). The transmissivity of the aquifer ranges from 0.4 mgd per

foot in the northern part of the county to 2.5 mgd per foot near the southern part. The quality of the ground water is generally within the standards for potable water. It is a hard, calcium bicarbonate type, and in the southeastern part of the county it contains iron in objectionable concentrations.

Aquifer replenishment is by local rainfall and seepage from controlled canals and from the water conservation areas. Losses are by evapotranspiration, by ground-water flow to canals and the sea and by pumping from wells. Of the 60 inches of annual rainfall approximately 17 inches enters the aquifer, of which less than 2.5 inches is withdrawn by water users, and about 14.5 inches is discharged to the sea -- 13.5 inches through the canals and about 1 inch by ground-water outflow along the coast. During extended dry periods when withdrawals are greatest recharge is only available from the canals.

The confined Floridan aquifer extends from a depth of about 900 feet to more than 3,000 feet and is overlain by a 500-to 600-foot section of clay, silt and marl of low permeability. Although water in wells tapping the Floridan aquifer will rise almost 40 feet above msl (mean sea level) and flow as much as 2,000 gpm, the water is not potable. Nevertheless, the water quality is adequate for such purposes as cooling or desalination and the aquifer has potential for storing fresh water or for effluent disposal.

The greatest inland penetration of sea water into the Biscayne aquifer is in the vicinity of the greatest concentration of tidal canals. This intrusion can be effectively controlled by the construction of salinity control structures in the canals and maintaining adequate fresh-water levels upstream.

Man-made contamination has occurred in both ground and surface waters. Surface-water contamination appears more serious because of the introduction of large quantities of effluent waste into the waterways. Although evidence of man-made contaminants was detected in all canals, levels of nutrients, BOD (biochemical oxygen demand), and pesticides were highest and levels of dissolved oxygen were lowest in the North Fork New River-Plantation Canal (C-12) system which receives large quantities of treated sewage effluent and has a relatively low flow. Coliform bacteria in most canals sampled during June 1968 were above the criterion of the Florida Pollution Control Department for recreational waters (2,400 coliform colonies per 100 milliliters). The dissolved oxygen content ranged from 0.2 to 8.2 mg/l. Generally, relatively low levels of dissolved oxygen are common throughout the Broward canal system. More than half the 45 area-wide samples contained less than 4 mg/l, and nine samples less than 2 mg/l. Levels of pesticides detected in water in the canal network are extremely low; however, pesticides are concentrated manyfold in the bottom sediments.

Water use in Broward County is increasing at a faster rate than population, and complete urbanization will ultimately require the development of the maximum possible water supplies. More than 32 municipal and privately owned water utilities furnish about 32 billion gallons of water per year (88 mgd on the average) for a permanent population of 500,000, a peak tourist season population of 890,000, and most commercial use in the county. The largest utility, Ft. Lauderdale's, furnishes a peak supply of more than 60 mgd to a maximum population of 160,000. Urban water use is greatest, about 150 mgd, during the winter tourist season which coincides with the dry season when domestic and recreational use is maximum and lawn irrigation is heavy. Irrigation use is little noted because of the booming urban activity. However the total irrigation use is high, almost equal to the 32 billion gallons per year urban use. Most of the industrial water used, more than 1.5 bgd (billion gallons per day) is salty water for cooling at the two power plants; fresh-water industrial use is estimated to be 35 mgd. Public water needs by 1985 may be as much as 80 billion gallons per year, an average of about 220 mgd. Current data (1971) indicate that peak day needs are commonly as much as twice the average daily demand. If use by agriculture and industry increases in proportion to public use it would amount to 330 mgd in 1985 and total water use would average about 550 mgd.

INTRODUCTION

The explosive urbanization of Broward County has been accompanied by numerous natural and man-made water problems. Natural problems of flood and drought are caused by extreme variations in rainfall that may range from as much as 20 inches per day during hurricanes in the rainy season, to little or none during many months in the dry season. Man-made water problems include: sea-water intrusion that resulted from overdrainage of the area; obtaining adequate water supplies for the mushrooming population; and pollution caused by the disposal of increasing quantities of wastes.

The threat of sea-water intrusion into municipal well fields is a historic problem. As large amounts of fresh water were removed by drainage for ubanization, regional fresh-water levels declined and sea water advanced up the canals and moved inland through the aquifer during dry periods. This insidious invasion of salt water is an ever-present danger to the fresh-water supply of well fields near the coast.

The demand for water in Broward County is constantly increasing, owing to the rapid growth in population. State and County planners indicate this growth is destined to continue, and if projections are reasonably accurate, the demand for fresh water will more than double within the next 15 years.

HYDROLOGIC SETTING

CLIMATE

The climate of Broward County is semi-tropical marine, characterized by warm humid summers and mild dry winters. Mean annual temperature is 73° F, with infrequent extremes of temperature ranging from 29° F to 96° F (U. S. Department of Commerce, 1968). The climate is tempered by prevailing southeast winds, which bring warm moist air from the ocean, and by the Gulf Stream which passes within a few miles of the shoreline. January is usually the coldest month, averaging about 68° F and August is usually the hottest, averaging 83° F.

The average annual rainfall in the county ranges from about 52 inches in the western sector to as much as 60 inches along the coast. Wide differences in yearly totals have been recorded; in some years the rainfall is only 30 inches, in others, more than 100.

Rainfall is unevenly distributed throughout the year; about 75 percent of the rain falls in June - October. January is usually the driest month with an average rainfall of about 2 inches; September is usually the wettest month with an average rainfall of about 8.5 inches. For example, the average monthly rainfall at Fort Lauderdale and Boca Raton in January is 2.20 and 2.62 inches; in September, 8.98 and 8.16 inches (table 1). Rainfall is often unevenly distributed geographically. For example, on October 14-15, 1965, 25 inches of rain fell at a coastal yacht basin in Fort Lauderdale and less than 5 inches fell at an agriculture station 8 miles inland.

Annual rainfall at North New River Canal at Palm Beach - Broward County line (pumping station S-7) during a 26-year period averaged 52.10 inches; was 76.47 inches in 1947 and 30.40 inches in 1949 (fig. 3). Rainfall during that time was above average 57 percent of the time, and exceeded 70 inches 10 percent of the time (fig. 4).

TOPOGRAPHY AND DRAINAGE

The land surface slopes almost imperceptibly to the southeast. Land surface ranges from about 13 feet above msl (mean sea level) in the northwestern part of the county to less than 5 feet in the southern part. Most of the land is 5 to 10 feet high; some is higher along the coastal ridge which parallels the seacoast 2 to 3 miles inland. The coastal ridge is about 22 feet above msl in the Pompano Beach - Deerfield Beach area. West of the coastal ridge, the Everglades extends some 40 miles inland and covers the western two-thirds of the county.

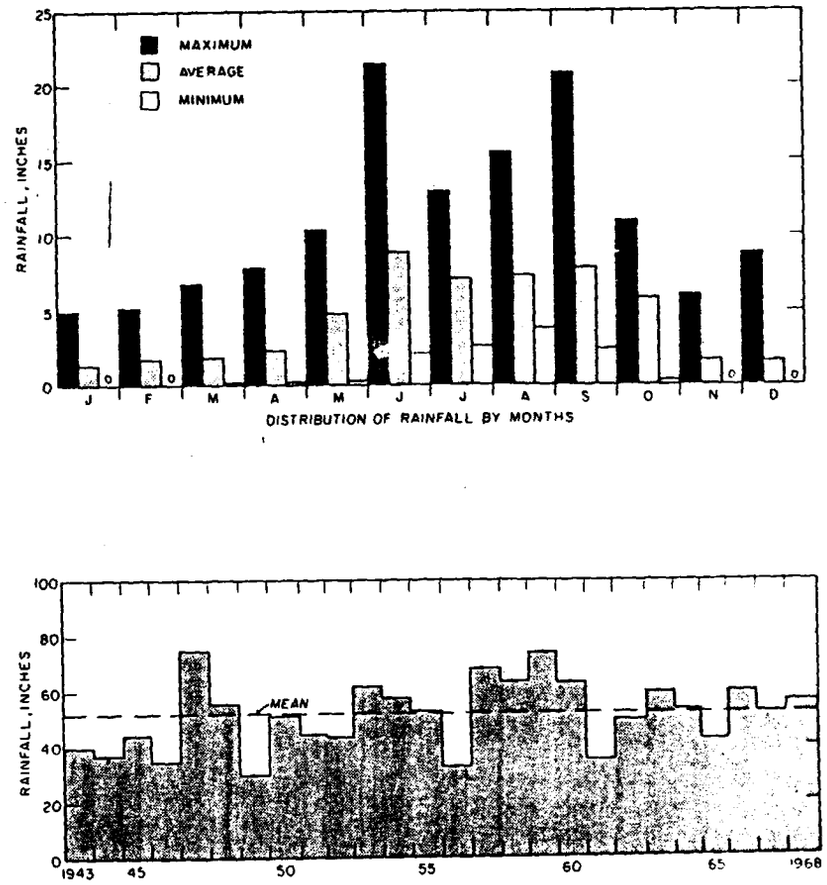

Figure 3. Distribution of rainfall by months and the annual rainfall, 1943-68, at the North New River Canal at the Broward - Palm Beach County line.

The present day drainage is largely controlled by the system of canals of the FCD (fig. 5), the Broward Water Resources Department, and the various local drainage districts. In 1953, with the completion of the FCD levee barrier along the east border of the Everglades, the county was divided into two distinctly different land use areas; a 410-square-mile area east of the levee, suitable for urban use and agriculture, and an area of 810 square miles west of the levee, suitable only for water conservation, recreation, and as a wildlife refuge.

The primary canals of the FCD are, generally, controlled improvements to natural drainageways that have been extended to Lake Okeechobee. Secondary canals affect smaller areas between primary canals and the direction of drainage in these areas is dependent on local topography and water control.

GEOLOGY

The most common materials in Broward County to a depth of approximately 300-400 feet are sand and limestone, which range in age from Pleistocene to late Miocene. This 300-to 400-foot section is called the Biscayne aquifer and it contains all the fresh-water-bearing materials in Broward County. The Biscayne aquifer is discussed in detail in the section on ground water (p. 85). Underlying the Biscayne aquifer is a 500-600 foot section of marl and clay of Miocene age. Below this bed is the Floridan aquifer. This aquifer, composed chiefly of limestones, dolomites, and evaporites which range in age from early Miocene to early Eocene, extends to depths of more than 3,500 feet, and contains highly mineralized water. Similar materials which are not generally considered part of the Floridan aquifer extend to depths of more than 15,000 feet.

SURFACE-FLOW SYSTEM

In Broward County large quantities of surface water flow seaward in a system of controlled canals or are stored in the FCD conservation areas. Flow to the ocean from eight primary canals (fig.1), for 1963-1968, averaged more than 1,300 cfs (cubic feet per second), or more than 306 billion gallons per year.

The supply is variable because of the seasonal nature and annual variability of rainfall (fig. 3). In addition, losses from the system are very high. Evapotranspiration losses account for as much as two-thirds of the annual

rainfall. Although little surface water is used directly, except for irrigation, large quantities replenish the aquifer in coastal areas during the long dry periods.

WATER MANAGEMENT

HISTORY

Maps of the 1850's show the Broward County area as a vast swampy wilderness, virtually uninhabited except for a narrow strip along the coast. This coastal ridge acted as a natural barrier to the seaward flow of water from the Everglades. Drainage of the eastern part of the Everglades was started as early as the 1850's. However, drainage was not effective until 1906, when the EDD (Everglades Drainage District) began a dredging program. Between 1906 and 1927, under the direction of EDD,440 miles of canals were dug, 47 miles of levees were constructed, and 16 dams and locks were installed.

When the EDD project was completed in 1928, four of the major drainage canals connecting Lake Okeechobee to the ocean and numerous secondary canals formed the framework of the present drainage system for Broward County. The four major canals included the Hillsboro, Miami, and the North and South New River Canals, and the secondary canals included Pompano, Middle River, Plantation, and Snake Creek Canals. This network of canals did much to open up new land in the eastern part of the county, but it was apparent that natural flow was inadequate to prevent flooding from rainstorms of high intensity.

Because of this inadequacy and more directly because of the public reaction to the flood of 1947, the Florida Legislature created the FCD in 1948 as a public corporation with jurisdictional control over the surface-water resources of the 17 counties comprising the district. In addition to the primary objectives of flood control and water conservation, the project was designed to prevent overdrainage, permit additional urban and agricultural development, prevent salt-water intrusion, provide ground-water recharge, and improve fish and wildlife conservation. The FCD has been in the process of attaining these objectives since it was formed and although still incomplete, their effects have been noted in all of the 17 counties.

A major project was the construction of a levee from Lake Okeechobee to South Dade County to divert interior flood waters away from the coastal areas and prevent a recurrence of conditions which existed during the 1947 flood.

MIDDLE RIVER CANAL (C-13)

Middle River Canal extends eastward from Canal C-42, near Conservation Area 2B, to the Intracoastal Waterway through the northern part of the Fort Lauderdale area (fig. 8). Seaward flow in the canal is regulated by S-36, 1.5 miles east of U. S. Highway 441 and 5 miles west of the Intracoastal Waterway. Approximately 1.5 miles downstream from S-36, the canal enters the headwaters of the South Fork of the Middle River. Flow downstream of the control structure is subject to tidal fluctuations.

A by-pass feeder canal is connected to the north side of the Middle River Canal 1 mile west of the control structure. Flow in the feeder canal replenishes the aquifer in the area of the Prospect well field of the city of Fort Lauderdale.

Proposed modifications to the Middle River Canal system include the connection of Canal C-42 with the levee system on the east boundary of Conservation Area 2B and the improvement of the channel in the western reach of the Middle River Canal. Completion of this construction will enable more water to flow eastward in Middle River Canal during dry periods to replenish the aquifer in coastal areas. Flow in the Middle River Canal is small (fig. 11) because of its poor connection to the regional canal system.

NORTH NEW RIVER-PLANTATION CANALS

North New River Canal is one of the major drainage arteries constructed by the EDD in its program to reclaim the upper Everglades (p. 34). It is 60 miles long (fig. 5) extending from the lower eastern tip of Lake Okeechobee, south and east to New River and thence to the ocean (fig. 8). At Lake Okeechobee its headwaters join those of the Hillsboro Canal, and like the Hillsboro, the interchange of flow between the lake and the canal is regulated by HGS 4 and S-2. Thirty miles downstream from the lake, at the Broward - Palm Beach County line, the canal is joined by Levee 5 and Levee 6 Canals (fig. 5). There, flow is regulated by S-7, which expedites the removal of flood waters from the agricultural area to the north, and transfers the excess runoff into Conservation-Area 2A.

Inside Area 2A the North New River Canal is divided into an upper and lower segment; the upper is cut off from the lower by levees and the lower (fig. 8) acts as a collector and distributor for flow between 2A and 3A. Water released from Area 2A must pass eastward through S-34. Along the southern perimeter of Area 2B, flow is augmented by seepage and by inflow from several lateral canals as it travels some 14 miles to the Sewell Lock (fig. 8). The perimeter canal outside of Levee 35A, the east boundary of 2B, joins North New River Canal about 5 miles east of S-34.

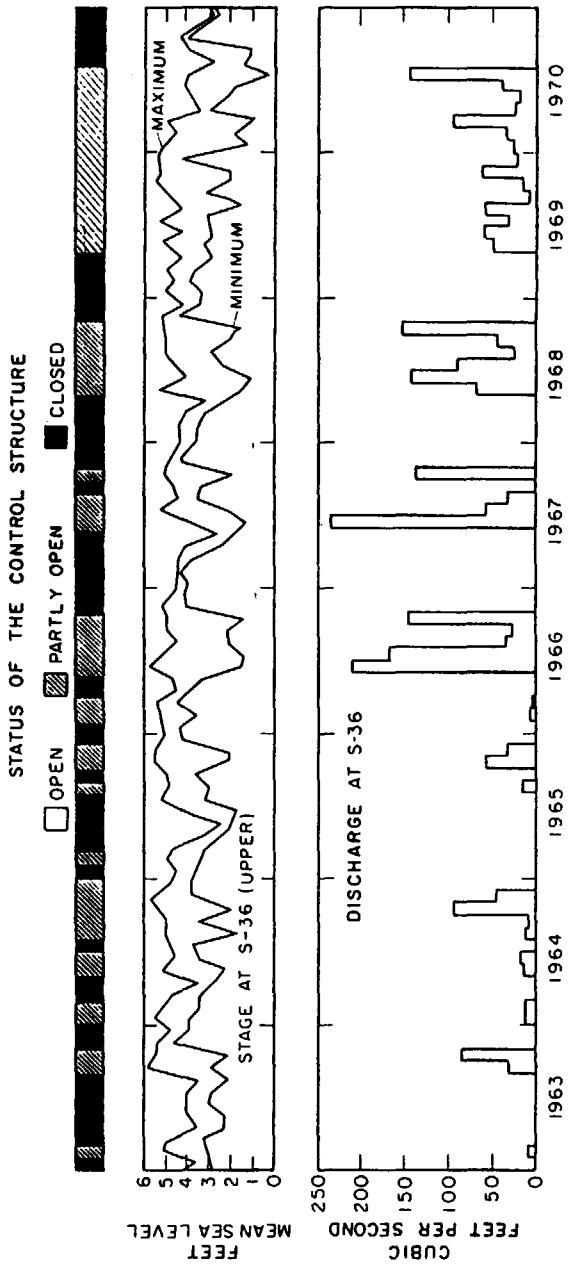

Figure 11. Monthly mean discharge and monthly extremes in stage in the Middle River Canal at S-36 (2827) and a record of gate operations, 1963-70.

Levee 35A Canal and Canal C-42 (fig. 8), 5 miles to the east, drain a recently established residential area on the north side of North New River Canal. Flow into North New River Canal from the Levee 35A Canal is regulated. The northern extension of Snake Creek Canal (Flamingo Road Canal) is connected to North New River Canal by a gated culvert under State Road 84, 8 miles east of S-34. Water control for two separate urban areas is provided by canals and pump stations north of the lower reach of North New River Canal. Water levels in the west urban area, 3 miles west of Sewell Lock, are controlled by a 245-mgd pump station established in 1969 by the developer. The east development is part of the Old Plantation Water Control District which includes the city of Plantation and was probably the earliest community in Broward County dependent on controlled water levels. Water in the district is controlled chiefly by the Holloway Canal and a 260-mgd pump station and control structure which is designed to pump or drain into North New River Canal downstream of Sewell Lock. At the Sewell Lock flow in the North New River Canal is subject to further regulation as it passes through the eight spillways controlled by stoplogs. The lock chamber is permanently closed by an earthen dam. Flow beyond of South New River Canal and acts as a divide between the drainage areas of S-9 and S-13.

Hydrographs for North New River Canal (fig. 12) indicate that flow during 1940-60 was related almost entirely to rainfall and the resultant runoff. During the 1960's a reduction of seaward flow resulted from the use of S-34 to hold water in storage in the conservation areas. During this period the flow through Sewell Lock was derived chiefly from runoff east of the levees, ground-water inflow and seepage along L-35 and L-35A.

The North Fork New River extends, as an improved natural waterway, about 3 miles northwest from the junction with New River, then joins the Plantation Canal (C-12) which extends westward to Holloway Canal. Flow in Plantation Canal is regulated by S-33, 0.5 mile east of U. S. Highway 441. Seaward flow in Plantation Canal at S-33 (fig. 13) is generally low because the area drained by the canal is small. During low flow effluent wastes concentrate in upstream reaches of the canal and stagnant conditions prevail. Construction is underway to connect the upstream reach of Plantation Canal with Middle River to provide adequate flow from the management system.

SOUTH NEW RIVER CANAL (C-11)

The South New River Canal begins at the Miami Canal in Conservation Area 3A in western Broward County (fig. 5) and flows due east for 23 miles to the junction with the Dania Cut-off Canal and the South Fork New River (fig. 8). The South Fork New River flows northeastward and joins the New River

system; the Dania Cut-off Canal continues eastward to the Intracoastal Waterway. Numerous drainage and irrigation canals and ditches enter the South New River Canal from both the south and north sides along the reach between the Florida Turnpike and Levee 33 (fig. 8). East of the Turnpike, along the Dania Cut-Off Canal, numerous navigable canals have been connected to develop waterfront property. The Hollywood Canal (C-10) flows northward about 3.5 miles and enters the Dania Cut-Off Canal less than a mile west of U. S. Highway 1.

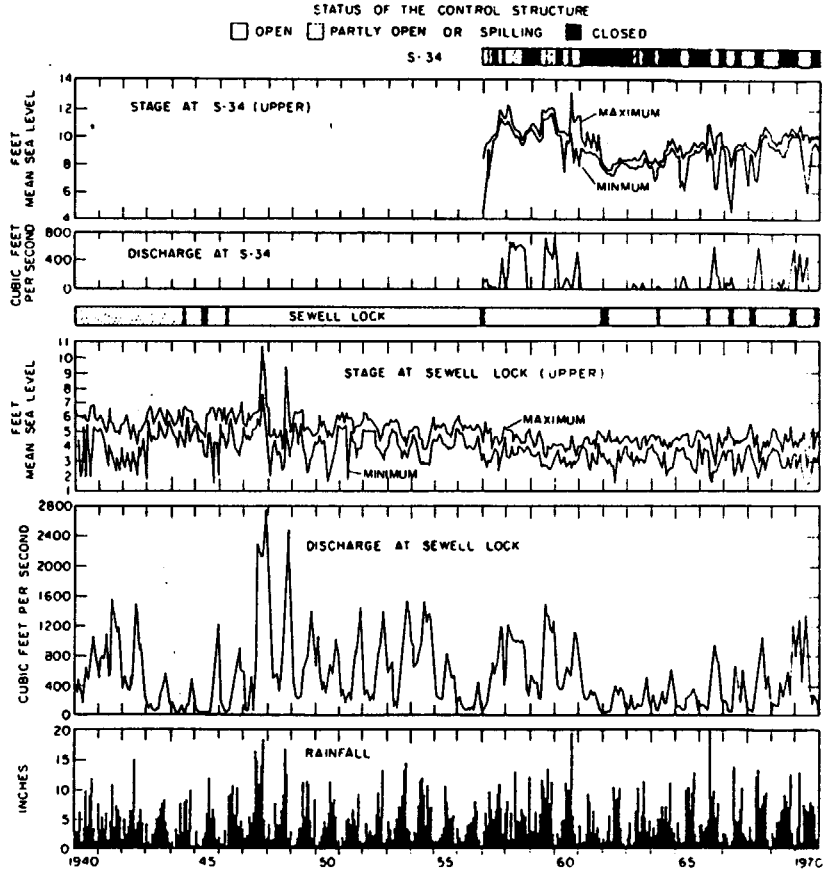

Figure 12. Monthly mean discharge and monthly extremes in stage in the North New River Canal at Sewell Lock (2850) and S-34 (2847), the average monthly rainfall at Fort Lauderdale, Belle Glade and Dania, and a record of gate operations for the periods of record.

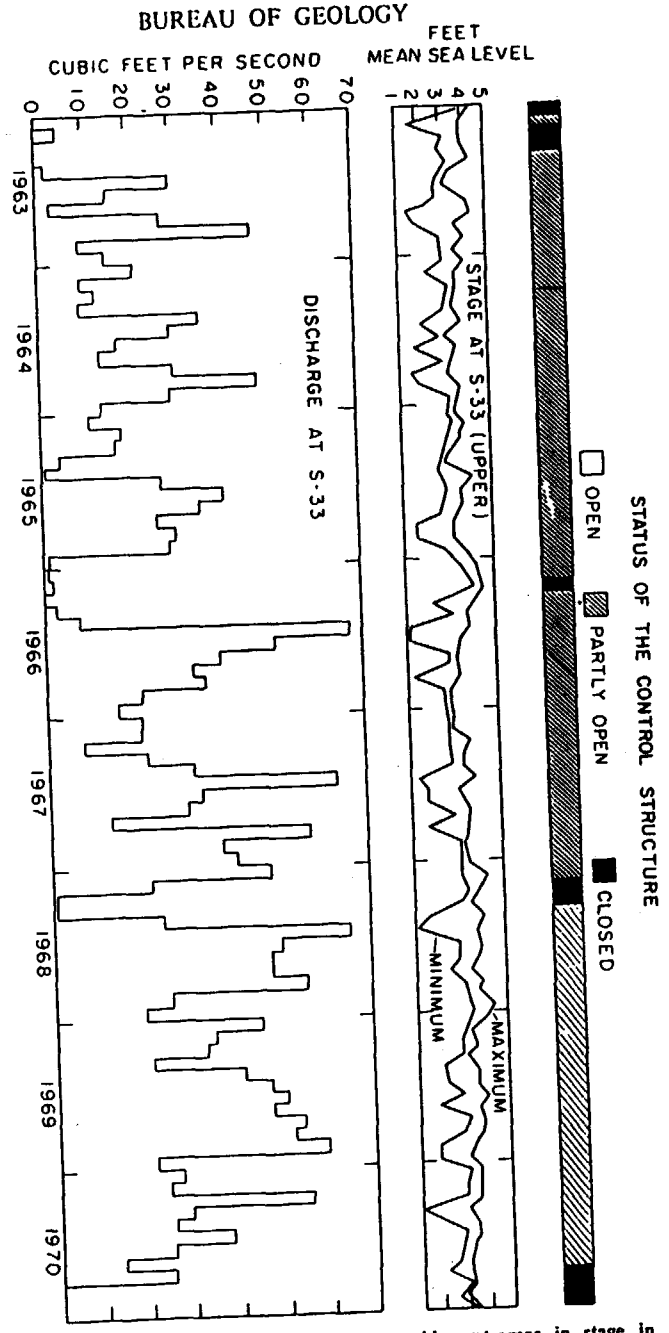

Figure 13. Monthly mean discharge and monthly extremes in stage in Plantation Canal at S-33 (2832) and a record of control operations, 1963-70.

The direction and amount of flow of South New River Canal are regulated by three control structures. S-9, about 0.5 mile west of U. S. Highway 27, is the only back-pumping station on the southeast boundary of the conservation areas. The pumping station is designed to remove flood waters from 71 square miles along the canal and discharge it into Conservation Area 3A for use during dry periods. Pumping station S-13, west of U. S. Highway 441, is designed to assist gravity flow by pumping seaward during flood periods and to regulate discharge during dry periods. Control structure S-13A regulates flow in the central reach of South New River Canal and acts as a divide between the drainage areas of S-9 and S-13.

A fourth control is located 0.25 mile east of U. S. Highway 441 at the Florida Power and Light Company's power plant. The power plant withdraws water from the Dania Cut-Off Canal for cooling condensers. The control retards salty tidal water from entering the intake area.

The dissimilarity between the hydrographs at S-9 and S-13 (fig. 14) is the result of the operations of the two pumping stations and the regulation at S-13A. When rainfall is excessive S-13A is closed and S-9 diverts water westward to Conservation Area 3A; at the same time pumping at S-13 assists gravity flow eastward to the ocean. During the growing season when irrigation water enters the western reach of the canal, S-13A is closed, S-9 diverts water westward to Conservation Area 3A and flow to the ocean east of S-13A is by gravity flow. When S-9 is not pumping and S-13A and S-13 are partly or completely open, flow is seaward throughout the entire reach.

SNAKE CREEK CANAL (C-9)

Snake Creek Canal, the primary drainage channel for the coastal area along the Dade - Broward County boundary (fig. 8), forms the south hydraulic boundary for Broward County. Flow in the canal is maintained chiefly by ground-water inflow, however, considerable surface runoff is introduced during rainy periods and water can be introduced from the conservation areas by manipulating S-30, 0.75 mile east of Levee 33. Submerged sluice gates at S-29 are manipulated to provide maximum discharge for flood protection during heavy rainfall and to prevent sea-water intrusion into the aquifer and into the upper reaches of the canal during dry periods. The hydrographs in figure 15 indicate that as much as half the flow at S-29 is derived from ground-water inflow or from lateral canals from Broward County upstream from the gaging station at 67th Avenue. Little water enters the canal from Conservation Area 3 except by levee seepage.

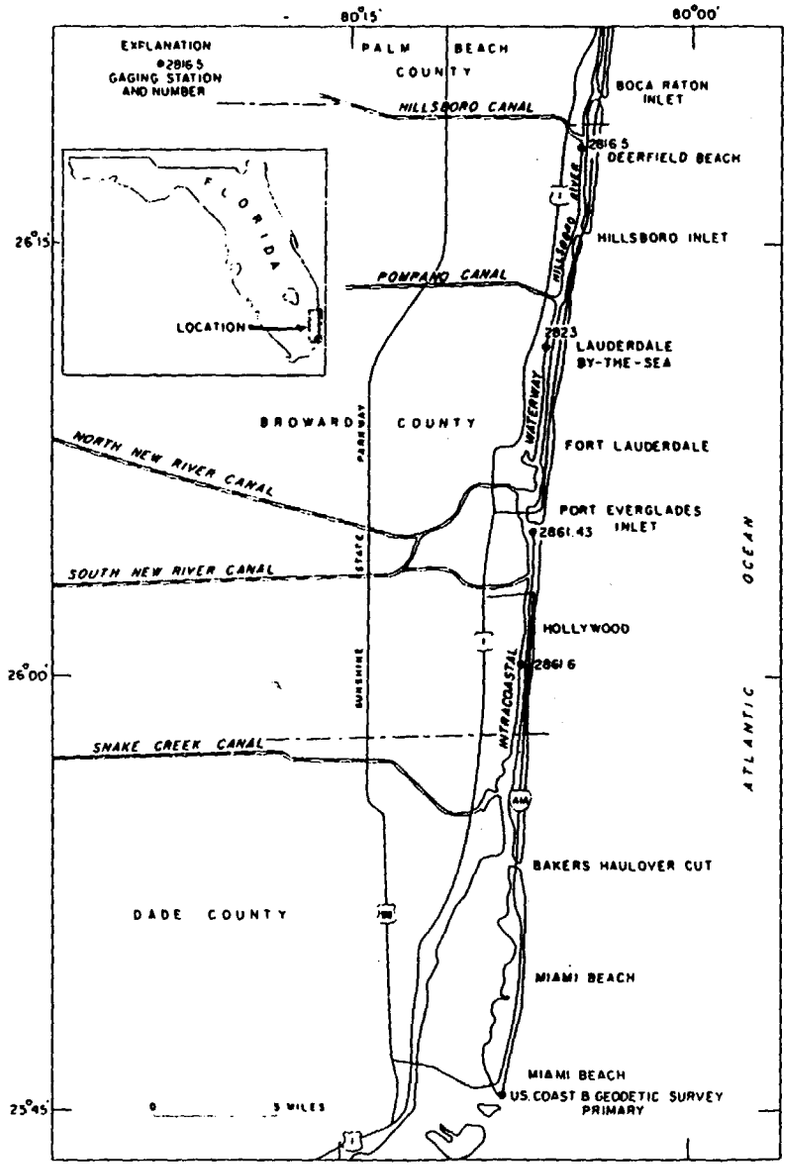

Figure 21. Location of recording tide gages in the Intracoastal Waterway.

INTRACOASTAL WATERWAY

The Intracoastal Waterway (fig. 21) borders the coast in Broward County and is separated from the ocean by a narrow offshore bar locally known as the beach. Tidal interchange between the waterway and the ocean is through the relatively narrow Port Everglades and Hillsboro Inlets in Broward County, Boca Raton Inlet in southern Palm Beach County and Bakers Haulover Cut in northern Dade County.

Tidal interchange between the ocean and the waterway through the Port Everglades Inlet and then northward along the waterway is good. Seaward flow from all the primary canals discharges into the waterway. Fresh water entering the waterway from the mainland canals affects the water levels and salinity in the waterway during high fresh-water discharge.

The Intracoastal Waterway is used extensively for boating and water sports and shipping in Port Everglades. In addition, some of the most intensely developed urban and tourist areas in the nation border its 30 miles of low lying shoreline.

Tidal data are available from four stations in Broward County and from the U. S. Coast and Geodetic Survey Primary Tide Gage at Miami Beach (fig. 21). Tidal data are also available from stations maintained by the U. S. Geological Survey or the Flood Control District at the salinity control structures on the primary canals (fig. 8).

The tidal ranges at Port Everglades and Lauderdale by-the-Sea are comparable with the range at Miami Beach (table 2). The range at Deerfield Beach is less because of the distance from the nearest inlets and the small size of the inlets. The range at Hollywood is less because of channel constrictions and the distance from an inlet. Typical tidal fluctuations at Port Everglades, Deerfield Beach and Hollywood are shown in figure 22.

The seasonal variation of monthly mean high water was less than 0.1 foot along the waterway (fig. 23). The tides were highest in September and October, the prime hurricane season. The elevation of mean half tide was higher along the waterway than at Port Everglades Inlet due primarily to an increase in the height of mean low water. The maximum difference between mean half tide (the average of mean high and mean low waters) and mean water level at the five stations was found to be 0.03 foot during the investigation.

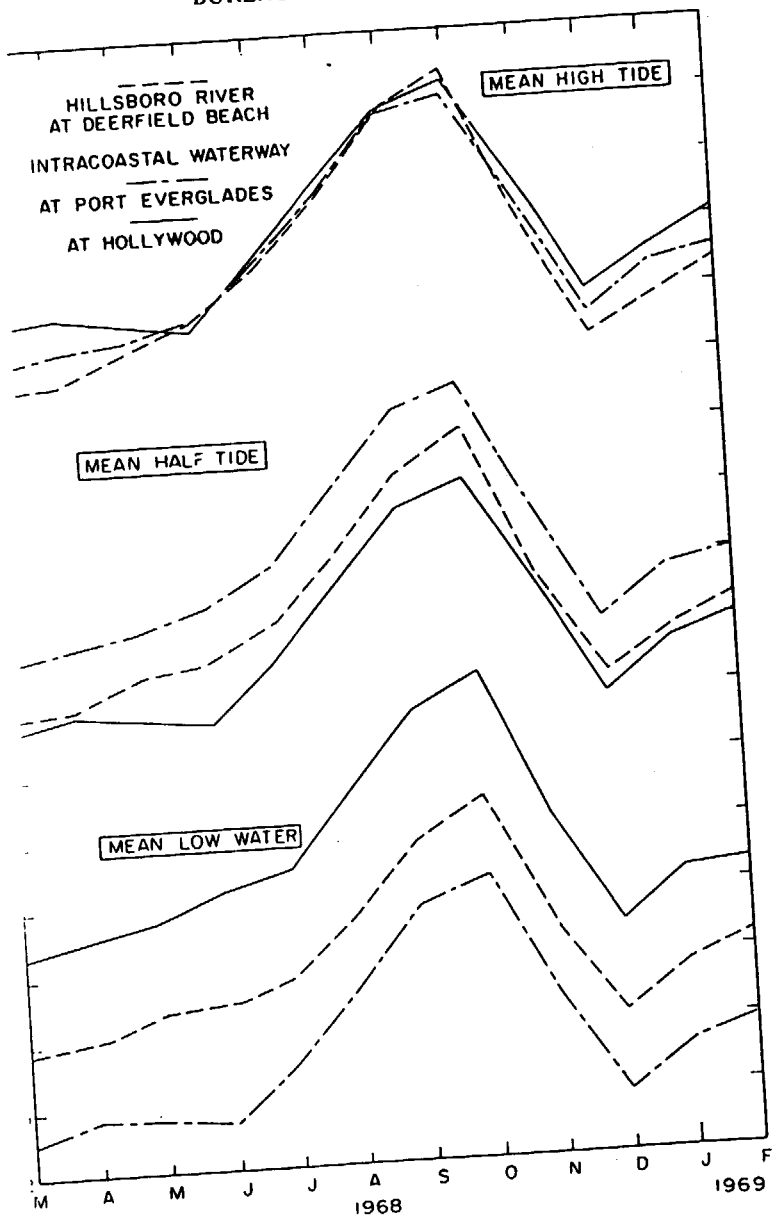

Figure 23. Seasonal changes of the monthly mean high and low-tide and half tide at selected sites in the Intracoastal Waterway (after Schneider, 1970, figs. 3 and 4).

To determine the time of high or low tide at a selected station, the correction shown in table 2 should be added to the time of predicted high or low tide at Miami Beach (U. S. Coast & Geodetic Survey Tide Tables). The time lag at Port Everglades was negligible. The time lags for selected stations (fig. 8) in the canal system are shown below.

		TIME LAG	
		High Tide	Low Tide
Hillsboro Canal	below control	1 h 00 m	1 h 45 m
Middle River Canal	below S-36	1 h 30 m	2 h 00 m
Plantation Canal	below S-33	35 m	1 h 15 m
North New River Canal	below Sewell Lock	1 h 40 m	2 h 50 m
South New River Canal	below S-13	2 h 10 m	3 h 00 m

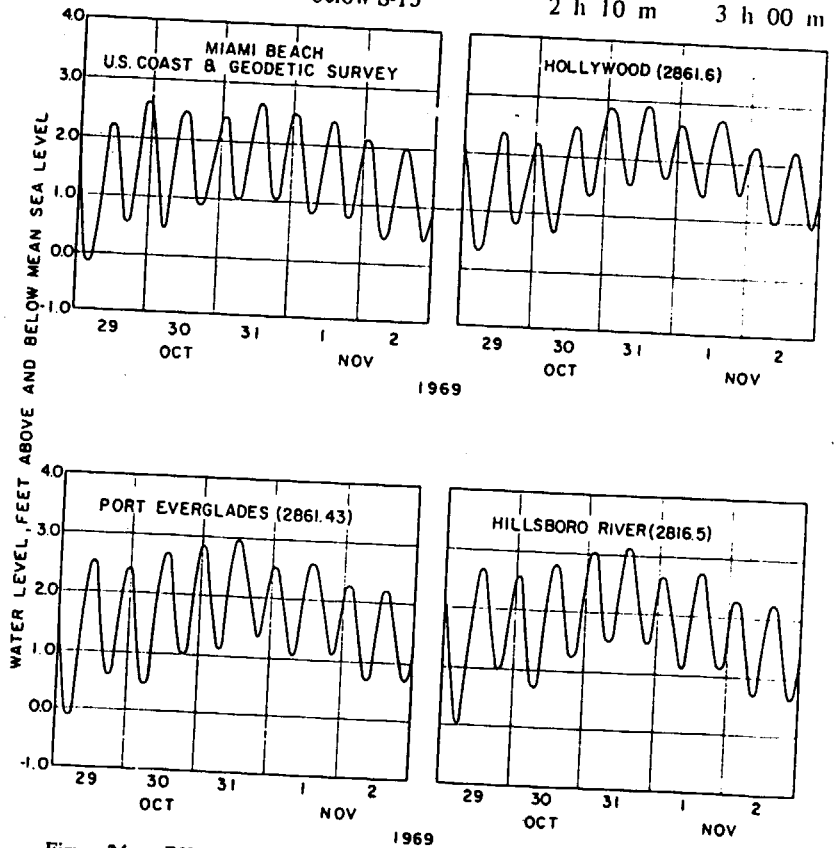

Figure 24. Effects of strong easterly winds Oct. 29-31, 1969 on tide patterns at selected sites in the Intracoastal Waterway (Schneider, 1970, fig. 5).

BISCAYNE AQUIFER

The Biscayne aquifer is the source of all fresh ground water in Broward County and is composed chiefly of limestone, sandstone and sand (figs. 26-28) of marine origin which range in age from (oldest to youngest) late Miocene through Pleistocene. The aquifer is generally more than 200 feet thick along the coast in Broward County, and 350 feet at one point in Pompano Beach. The thickness of the consolidated limestone sections and the permeability of the aquifer as a unit generally decrease to the north. The aquifer also thins westward to about 70 feet at U. S. 27 in central Broward County and wedges out at the surface near the Collier - Broward County line.

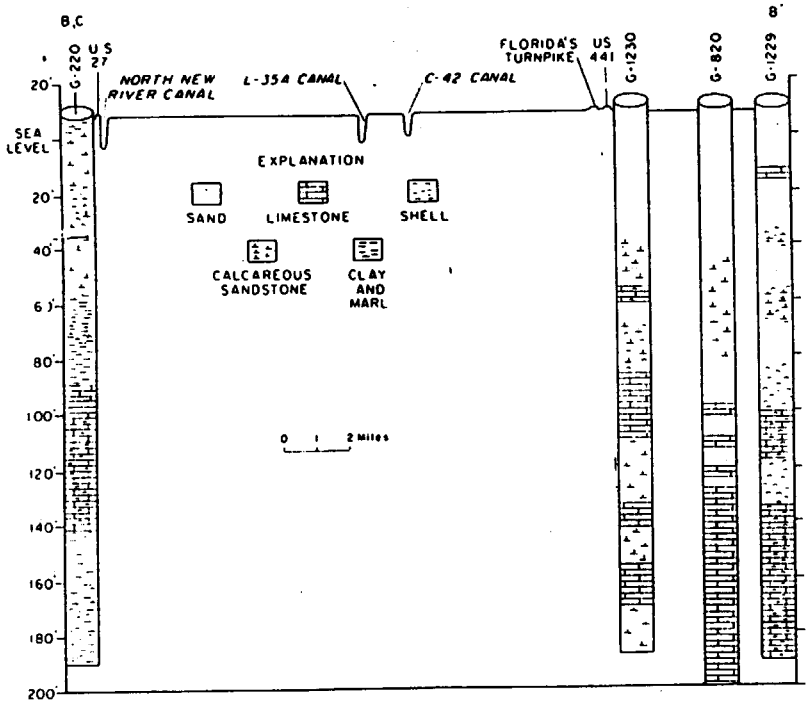

Figure 27. Lithologic logs along line B-B' in figure 29.

Most of the limestone beds in the Biscayne aquifer are capable of yielding large amounts of water to wells. Wells that tap the thick limestone in the deepe part (100-foot depths or more) near the coast, commonly yield more than 1,00(gpm (gallons per minute). Most of the municipalities obtain water from th deeper part of the aquifer.

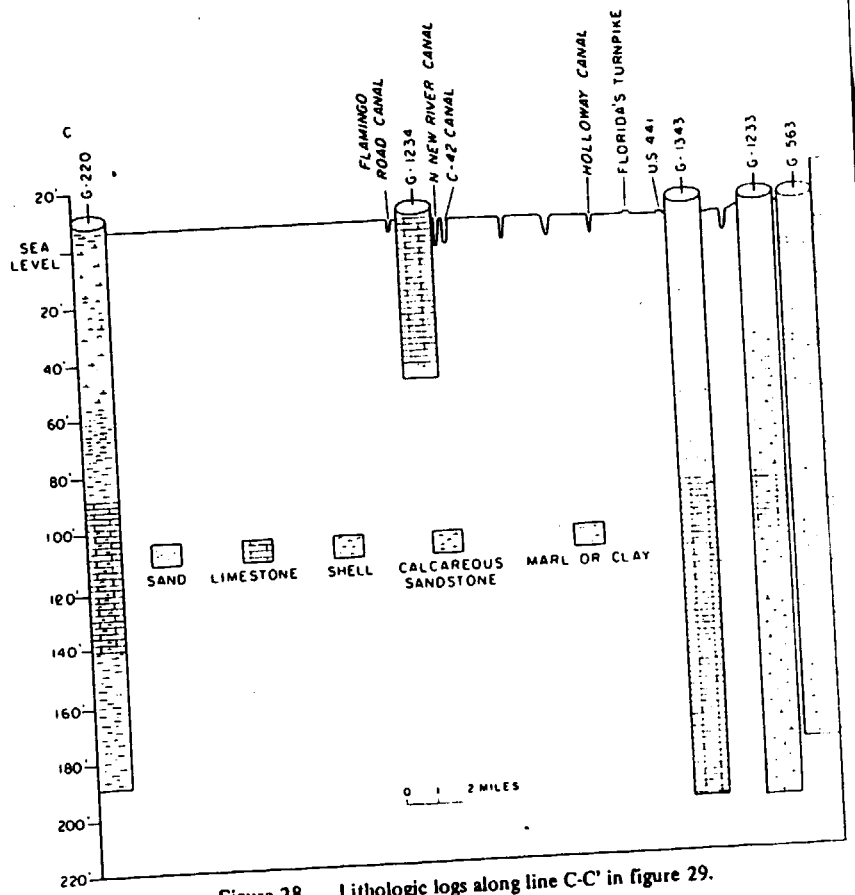

Figure 28. Lithologic logs along line C-C' in figure 29.

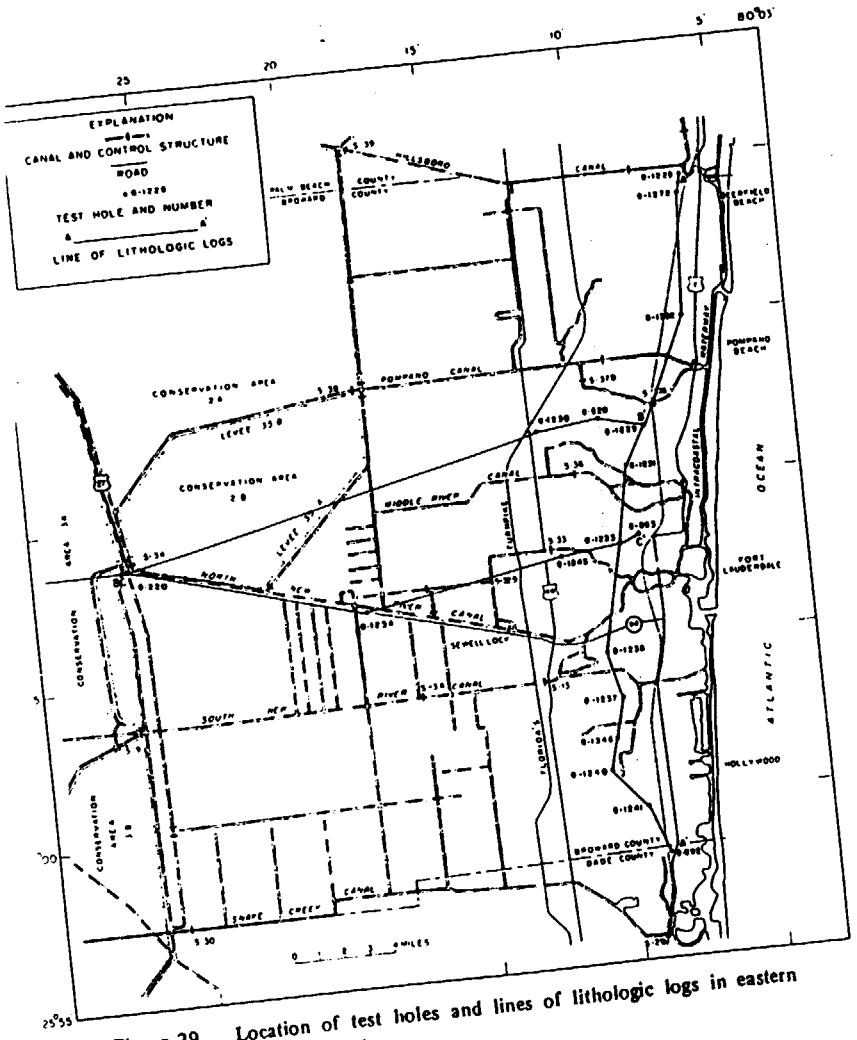

Figure 29. Location of test holes and lines of lithologic logs in eastern Broward County.

RECHARGE AND DISCHARGE

Infiltration of rainfall through surface materials and seepage from controlled canals and the conservation areas are the principal means of recharging the Biscayne Aquifer. Recharge by rainfall is greatest during the rainy season from June to November. Recharge from canals is greatest during the dry season, December to May, when canal levels are higher than adjacent water levels

in the aquifer. Discharge from the aquifer is by evapotranspiration, by ground-water flow to canals and to the sea, and by pumping from wells. Discharge by ground-water flow and by evapotranspiration are greatest after periods of rainfall when water levels are high; discharge by pumping from wells is greatest during the dry season as a result of the influx of tourists and heavy irrigation use when water levels are low. Well yield is only a small part of the total discharge from the aquifer, but during the dry season its importance is amplified because it occurs when total recharge and aquifer storage are smallest.

The average annual rainfall of about 60 inches if distributed evenly over the county would be equivalent to about 3,400 mgd. Evapotranspiration from surface waters would return about 22 inches (1,250 mgd) to the atmosphere. Evapotranspiration from the water table would return an additional 20 inches (1,130 mgd) to the atmosphere (fig. 30). A very small part, probably little more than 1 inch (60 mgd), would run off directly to the canals. Of the remaining 17 inches of water that enters the aquifer less than 2.5 inches is withdrawn for use and about 14.5 inches is discharged to the sea by coastal canals (13.5 inches) or ground-water outflow (1 inch). These figures are highly generalized and do not take into account variations in rainfall due to both location and time and minor changes in aquifer storage. Also, although not shown in the diagram, water imported into the county by canals of the FCD system and introduced to the aquifer plays an increasingly important part in the total flow system.

The foregoing summary indicates that much more water flows through the aquifer than is withdrawn for all types of use. However, it should be noted that water use is concentrated near the coast where supplies are most limited and that conditions depicted in the diagram do no persist throughout the year; during extended dry periods, when withdrawals are greatest, the only recharge available is from canals of the water-management system.

WATER-LEVEL FLUCTUATIONS

Water levels in the Biscayne aquifer fluctuate over a wide range in response to recharge or discharge and to a lesser extent to other factors such as tides, earthquakes, and changes in atmospheric pressure. The greatest fluctuations, as much as 5 to 10 feet per day, are caused by recharge from rainfall and by pumping; but gradual changes in water levels caused by evapotranspiration and normal ground-water outflow have an important effect on the amount of water in storage in the aquifer.

Ground water is continually moving at rates dependent on the hydraulic gradient and the permeability of materials through which it moves. Ground water flows by gravity from areas of high water levels to areas of low water levels. In a restricted sense, low water levels are associated with discharge areas.

irrigation range in depth from 40 to 60 feet. Drilling wells to these depths insures an adequate supply of water when water levels decline regionally and also less contamination from the land surface.

Most wells 3 to 6 inches in diameter are drilled by jet percussion, cable tool, or rotary methods. Wells completed in unconsolidated material, are usually finished with screens or slotted well casing. However, most wells are drilled until a consolidated zone is reached, generally between 60-150 feet because the yields from these zones are higher than from unconsolidated zones. In the consolidated zones, wells are finished with 10 or 15 feet of open hole and yield as much as 1,000 gpm with about 3 to 6 feet of drawdown.

Large diameter wells (8 to 12 inches) are usually drilled in municipal well fields and on large farms. When these wells tap the lower limestones of the Biscayne aquifer near the coast, they generally yield more than 1,500 gpm with only 3 to 6 feet of drawdown. Some of the municipal wells are finished with as much as 40 feet of slotted casing surrounded by gravel packing to insure maximum yield and long-term use of the well.

HYDRAULIC PROPERTIES

The principal hydraulic properties of an aquifer are its capacities to transmit and store water, which are generally expressed as transmissivity (Theis, 1938, p. 892) and the storage coefficient. The most commonly used method for determining these properties is an aquifer test, whereby the lowering of water levels by pumping is related both to distance and to time.

Aquifer tests have been made near the coastal reach of the Snake Creek Canal (Leach & Sherwood, 1963), and along Levee 30 (Klein and Sherwood, 1961), in north Dade County, and in the Fort Lauderdale Dixie (Vorhis, 1948) and Prospect (Sherwood, 1959) well fields, and the Pompano Beach and Deerfield Beach well fields (Tarver, 1964).

Transmissivity and storage coefficient were computed from the Snake Creek Canal tests as 2.0 to 2.5 mgd per foot and 0.1 to 0.2, respectively, and the leakage coefficient (Hantush, 1956, p. 702) ranged from 20 to 30 gpd per square foot per foot of head differential. The magnitude of the leakage coefficient indicates that infiltration would occur readily from surface water sources such as the Snake Creek Canal. Underseepage tests made in a small area along Levee 30 near the inland end of Snake Creek Canal indicate a transmissivity of 3.6 mgd per foot. The aquifer in this area is composed chiefly of solution-riddled limestone which extends to a depth of about 55 feet below land surface.

An early aquifer test using supply wells in the Fort Lauderdale Dixie well field indicated a transmissivity of 1.2 mgd per foot. In the Prospect well field test, selected municipal supply wells were pumped and other supply wells were used for observation of the water level responses; transmissivity ranged from 2 to 3 mgd per foot. The apparent storage coefficient was approximately 0.015, and the leakage coefficient was about 1 gpd per square foot per foot of head differential.

Muncipal supply wells were also used for tests in the Pompano Beach and Deerfield Beach aquifer tests. In the Pompano Beach test, transmissivity and storage coefficients were 1.4 mgd per foot and 0.34, respectively. The leakage coefficient was not computed. At the Deerfield Beach test, transmissivity and storage coefficients were 0.4 mgd per foot and 0.0004, respectively. Geologic data indicates that the low values for the hydraulic characteristics in the Deerfield Beach test were due to the development of the supply wells in a relatively thin limestone bed in the upper part (80 feet) of the aquifer which is overlain by calcareous sands of low permeability. Additional wells, nearby bottomed in a deeper (110 feet) and thicker limestone yield greater quantities of water with considerably less drawdown indicating higher values for the hydraulic characteristics. Thus it appears that the Deerfield Beach test is only representative of a small area, where the upper limestone aquifer is confined while the aquifer in general is unconfined.

The differences in tranmissivity for the four tests indicates that the potential for development of the Biscayne aquifer generally decreases in a northerly direction in Broward County. This is due primarily to a decrease in the permeability of the consolidated section of the aquifer as both the porosity and interconnection of the pores spaces decrease with increased sand content in the limestone beds. The aquifer is thickest in the northeastern part of the county but conversely, the transmissivity is the smallest.

Water-level and aquifer-test data indicate that the Biscayne aquifer exhibits different characteristics under static conditions (nonpumping) than under pumping conditions. Under static conditions, the water level in a shallow well will be at the same elevation as the water level in an adjacent deep well suggesting that the entire aquifer is under unconfined conditions. However when the deep (100-150 feet), highly permeable zones of the aquifer are pumped, water levels in deep wells as much as 1,000 feet away show an immediate rapid decline and the levels in shallow wells much closer to the pumping wells show no immediate effect. Levels in these shallow wells do show a long-term drawdown of several feet. Thus, in aquifer tests of short duration (less than 24 hours) the zone in which the supply wells are developed reacts as a confined aquifer overlain and partly confined by a leaky roof of less permeable beds.

The high leakage and storage coefficients in the test at Snake Creek Canal indicates that the overlying semiconfining beds are more permeable than are similar beds in central and north Broward County and that the aquifer in south Broward responds to pumping much more as nonartesian aquifer than it does in other parts of the county.

FLORIDAN AQUIFER

The Floridan aquifer is a thick section of carbonate and evaporite rocks underlying all of Florida and parts of Georgia and Alabama. In southeastern Florida the aquifer underlies a thick section of impermeable marl and clay at depths below 900 feet and extends to depths of more than 3000 feet. It is composed primarily of a system of limestones of varying permeability which dip eastward and southward and are thought to intersect the ocean bottom several miles offshore along the Continental Slope.

The aquifer is confined except in the recharge area where the overlying confining materials are very thin or absent.

In Broward County, water in wells that tap the Floridan aquifer will rise almost 40 feet above msl. Flows range from 75 gpm to over 2,000 gpm and average about 750 gpm (Parker, 1955, p. 191). The water is highly mineralized, containing more than 1,500 mg/l (milligrams per liter) of chloride, 3,500 mg/l dissolved solids, and is sulfurous, hard, and corrosive. These characteristics greatly limit the use of the water from this aquifer for most purposes. Nevertheless, study is being directed toward determining the feasibility of using the aquifer for fresh-water storage and as a source of water for desalination in the upper less mineralized zones. One well near Lake Okeechobee is currently disposing of industrial wastes in the highly permeable "boulder zone" of the Floridan aquifer with apparent success. A similar well in Miami is used as a disposal well for treated sewage effluent. Current studies are designed to more accurately define the zonation and hydraulic characteristics of the Floridan aquifer in the hydrologic system of southeastern Florida.

WATER QUALITY

The chemical or physical quality of water generally is as important for most uses as its availability. Rainfall, the original source of water supplies, contains fewer impurities than water in most other parts of the hydrologic cycle. It contains only minute quantities of dust, dissolved gases, and wind-blown salt from the atmosphere. When rain strikes the ground, it comes into contact with many soluble materials and, aided by carbon dioxide absorbed from the air and soil, it begins to dissolve and pick up a wide variety of chemical and organic

constituents. The type and amount of dissolved matter in natural waters, depends on the materials contacted and the length of time involved in the movement of water through the rocks and soil and down the streams. Domestic and industrial wastes as well as sea water are also sources of mineral or biological contamination of streams and ground water.

NATURAL CONSTITUENTS

The chemical quality of the water in the interrelated surface and ground-water flow system in Broward County is generally good. The source of the water in the system is local rainfall or rainwater conveyed into the area by the regional canal network. The water often shows a mixture of ground-and surface-water characteristics because of the free interchange of water between the canals and the permeable limestone of the Biscayne aquifer.

GROUND WATER

The chemical characteristics of ground water in the county are influenced chiefly by soluble limestones and calcareous sand in the Biscayne aquifer. The water is generally hard, calcium bicarbonate in type with varying quantities of iron in most areas. Mineralization generally increases inland and with depth in the aquifer. Water of the best quality occurs in coastal areas where the aquifer has been flushed by the infiltration of rainfall. This is especially true along a low coastal ridge in the Pompano area where a thick section of permeable sand occurs in the upper part of the aquifer.

The chemical characteristics of water at different depths throughout the county were determined by the analysis of water samples from existing wells at known depths and from samples collected at different depths during the drilling of test wells. Table 3, adapted from Grantham and Sherwood (1968), summarizes the results of analyses of samples from the wells shown on figure 43.

Dissolved solids, hardness, and iron in ground water vary with depth in eastern Broward County as shown on the maps in figure 44 (adapted from Grantham and Sherwood, 1968). The relatively low dissolved solids and hardness in water in the Ft. Lauderdale area indicates the effects of flushing by the circulation of ground water caused by drainage to the canals and recharge by rainfall. The consistently high concentrations of dissolved solids at depths below 200 feet indicates that there is much less circulation at those depths and thus more time for the water to dissolve minerals from the aquifer materials. The similarity between dissolved solids and hardness illustrates that calcium and bicarbonate dissolved from the limestone are the major constituents of natural waters in the county. The ground water of Broward County ranges from hard to

very hard and is hardest in the northern part of the county. The iron content of ground water varies areally and with depth in the aquifer. As seen on the map, the iron concentration increases to the south and west and with depth. Also, it is apparent that the iron content in water throughout most of the county is higher than the concentration (0.5 mg/l) required to stain plumbing fixtures.

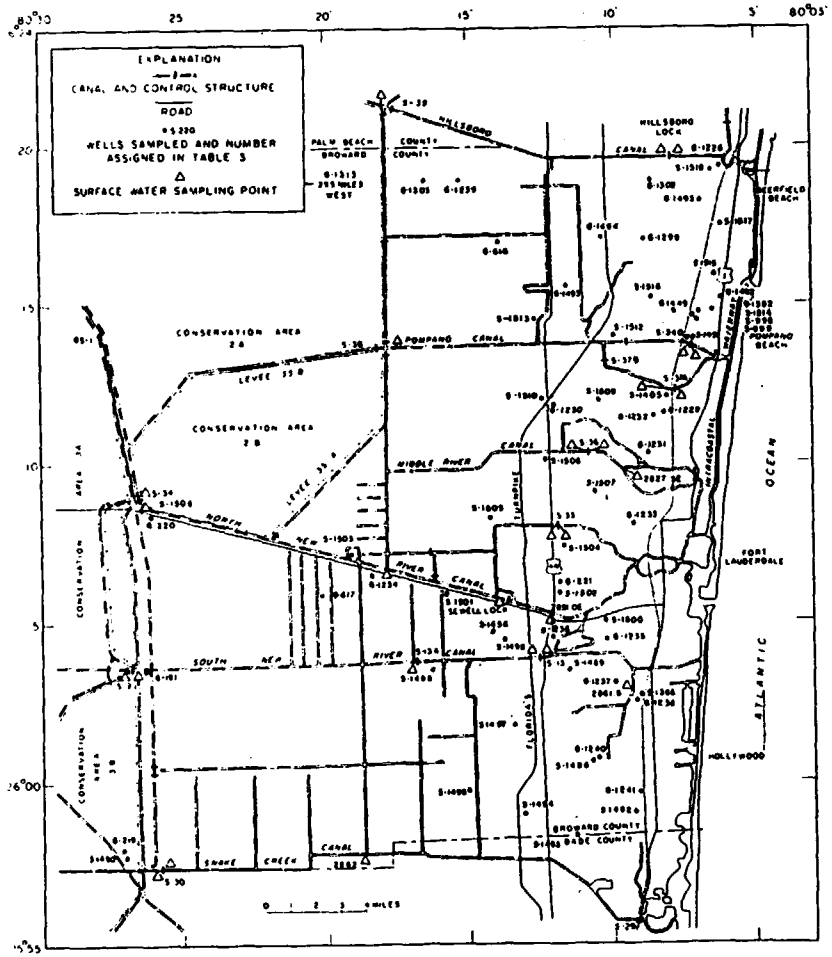

Figure 43. Location of water sampling stations shown in tables 3 and 4.

Table 3. Chemical analyses of ground water in Broward County - (adapted from Grantham and Sherwood, 1968, table 1). (results in *milligrams per liter* except pH, specific conductance, temperature and color)

Well number	Date of collection	Depth of well (ft.)	Specific conductance (micromhos at 25°C)	pH	Temperature (°F)	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (NA)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Iron (Fe)	Dissolved solids: Residue at 180°C	Dissolved solids: Calculated	Hardness: Calcium, magnesium	Hardness: Noncarbonate	Color
S-1493	04-06-62	116	553	7.9	77	9.1	98	7.4	15.	0.6	310	0	14.	22	0.0	0.0	0.56	338	319	275	21	35
S-1494	04-06-62	166	551	7.6	73	8.9	96	7.4	16.	.6	292	0	24.	21	.0	1.1	1.7	346	319	270	30	55
G-219	09-18-41	32	398	-	83	-	61	10.	5.0	-	214	-	1.0	19	-	-	-	-	202	193	-	110
G-219	09-19-41	56	426	-	77	-	70	8.3	8.2	-	242	-	1.0	19	-	-	-	-	236	209	-	110
G-219	09-23-41	90	877	-	77	-	50	26.	91.	-	321	-	25.	105	-	-	-	-	457	240	-	20
G-219	09-24-41	134	1430	-	76	-	48	48.	202.	-	444	-	26.	230	-	-	-	-	763	276	-	20
G-219	09-25-41	173	1640	-	76	-	42	42.	257.	-	458	-	33.	282	-	-	-	-	875	249	-	20
G-219	09-26-41	198	2130	-	77	-	33	33.	378.	-	518	-	39.	408	-	-	-	-	1150	218	-	20
S-1490	04-24-64	45	660	7.3	72	5.8	94	8.1	40.	.8	304	0	5.2	66	.3	.0	1.3	371	370	268	19	60
S-1492	04-06-62	82	563	7.7	77	5.7	101	2.4	19.	2.0	282	0	24.	27	.0	.5	.24	324	321	262	31	20
G-1241	04-13-64	80	583	7.8	76	13.	66	21.	35.	1.3	284	0	0.4	56	.2	.1	1.5	314	333	252	20	20
G-1241	04-20-64	215	540	8.2	-	8.8	97	5.4	14.	.6	286	0	29.	22	.2	.2	3.9	338	318	264	30	20
S-1495	04-06-62	121	564	7.7	70	11.	102	9.8	13.	.7	314	0	20.	20	.0	1.9	1.6	360	333	295	38	50
S-1496	04-06-62	65	535	7.9	77	6.3	100	2.6	16.	.8	292	0	22.	19	.0	.1	.54	320	311	260	20	12
G-1240	04-05-64	20	563	8.0	75	8.2	82	16.	18.	2.2	298	0	27.	28	.3	.0	.68	320	326	272	28	25
G-1240	04-16-64	122	544	8.0	-	8.2	92	0.6	21.	.7	288	0	8.4	47	.2	.1	2.0	-	322	232	0	30
G-1240	04-07-64	167	411	7.8	-	11.	52	4.5	31.	1.6	174	0	4.	62	.2	.7	1.6	-	353	148	6	5
G-1240	04-08-64	200	1020	7.8	-	11.	41	70.	86.	6.3	204	0	10.	223	.3	.2	.23	604	550	390	223	10
S-1497	04-06-62	200	335	7.7	78	8.8	59	3.6	7.5	.6	172	0	13.	14	.1	.1	.74	194	192	162	21	35
S-1366	04-06-62	90	603	7.9	78	2.6	110	1.3	22.	1.0	306	0	24.	36	.0	.0	.65	374	350	280	34	25
G-1238	03-19-64	75	4400	7.9	-	8.2	166	79.	700.	18.	288	0	180.	1320	.5	3.0	-	3080	2620	740	504	20
G-1238	03-20-64	115	1130	8.0	-	6.2	123	33.	76.	2.5	248	0	40.	230	.3	.0	.82	926	632	440	237	20
G-1237	03-16-64	201	11200	7.9	-	13.0	61	53.	180.	9.2	300	0	39.	285	.3	.2	1.20	786	778	370	124	15
G-1237	03-17-64	62	464	8.1	-	6.6	85	7.8	15.	1.5	312	0	15.	24	.2	.0	.70	-	309	244	0	30
G-1237	03-17-64	280	2750	7.9	-	7.1	119	44.	405.	6.8	132	0	104.0	820	.2	2.4	2.3	1940	1580	490	382	20
S-1499	04-06-62	67	439	7.6	73	8.0	74	6.2	15.	1.2	226	0	10.	30	.0	2.9	.80	262	245	310	23	55
S-1498	04-06-62	170	610	7.7	77	9.9	110	8.6	17.	.7	326	0	27.0	24	1.6	1.6	2.3	410	360	310	43	55
G-1191	12-06-40	66	518	-	74	-	101	9.1	A12	-	336	-	3.5	25	-	-	-	-	318	289	-	170
G-1191	12-07-40	158	2640	-	77	-	83	67.	A618.	-	389	-	206.	950	-	-	-	-	2130	530	-	35
G-1191		159	4190	-	-	-	-	96.	A693.	-	358	-	243.	1050	-	-	-	-	2330	520	-	25
G-1191	12-09-40	284	4110	-	76	-	74	82	A675	-	371	-	237.	1020	-	-	-	-	2270	532	-	25
G-1235	03-23-64	61	496	8.0	-	5.6	111	5.7	3.7	.7	320	0	14.	6	.3	.4	1.4	314	301	284	22	50
G-1235	03-24-64	145	471	8.1	-	12.	66	5.7	-	.8	304	0	0	52	.1	.1	.11	-	263	188	21	5
G-1235	03-03-64	197	499	7.9	-	14.	90	12.	26.	3.6	172	0	19.	75	.2	.1	3.2	-	303	164	23	5
G-1235	03-04-64	206	751	7.9	-	9.4	50	33.	74.	5.6	250	0	14.	116	.3	.3	4.4	408	426	266	55	20
G-1236	03-26-64	63	530	7.7	-	6.8	70	15.	32.	.8	256	0	4.8	48	.4	.6	4.4	344	304	238	28	40

Water in the Floridan aquifer is highly mineralized, has hydrogen sulfide gas in solution, and thus of slight value for normal use; however, the large quantities of water available and the excellent storage capacity of the aquifer seem to warrant much further investigation of potential uses. The aquifer yields artesian water whose chloride content ranges from about 1,500 mg/l in the upper producing zones to 18,000 mg/l sea-water concentrations near the bottom. The water is corrosive to metal. However, because wells in the Floridan aquifer flow freely and the water temperature is constant, the salty water has been used for industrial cooling and air-conditioning as well as for swimming pools, flushing wastes, and for irrigation of golf courses. Although it may not be feasible at present to use this water for more purposes than those just stated it has an excellent potential for use in future years when maximum growth is attained and all fresh-water resources are fully managed in the county.

In the Pompano Beach area a utility company uses two 18-inch wells more than 1,000 feet deep for effluent disposal. About 500,000 gallons of treated sewage are pumped into these wells each day against a head of about 30 feet. This same technique is being used or planned for use in other sections of the State to dispose of municipal and industrial wastes to prevent pollution of the streams and shallow ground water.

Because of the excellent storage capacity of the aquifer, especially the cavernous zones (boulder zone) below the 2,500 foot depth, the Floridan aquifer may have excellent potential for storing fresh water for retrieval. Depending upon the confining characteristics of intervening beds in the aquifer it is conceivable that fresh water could be safely stored in the upper low chloride zones and waste effluent injected into the lower cavernous zones. Safe use of the aquifer for this purpose would depend on detailed knowledge of its hydraulic properties.

SURFACE WATER

The chemical quality of the water in the canal system varies widely with extremes in discharge caused by rainfall and operation of water-control structures. During high discharge most of the water is surface runoff from inland areas and is highly colored but only slightly mineralized. During low discharge much of the water is derived from the more mineralized ground-water inflow and the amount of dissolved solids increases. Upstream from the salinity controls, the water in the canals is fresh and is therefore a major source of water; downstream, the water is generally salty except during periods of high discharge.

Water in the controlled canals is not used directly for municipal or domestic supplies, but infiltration from the canals supplies replenishment to

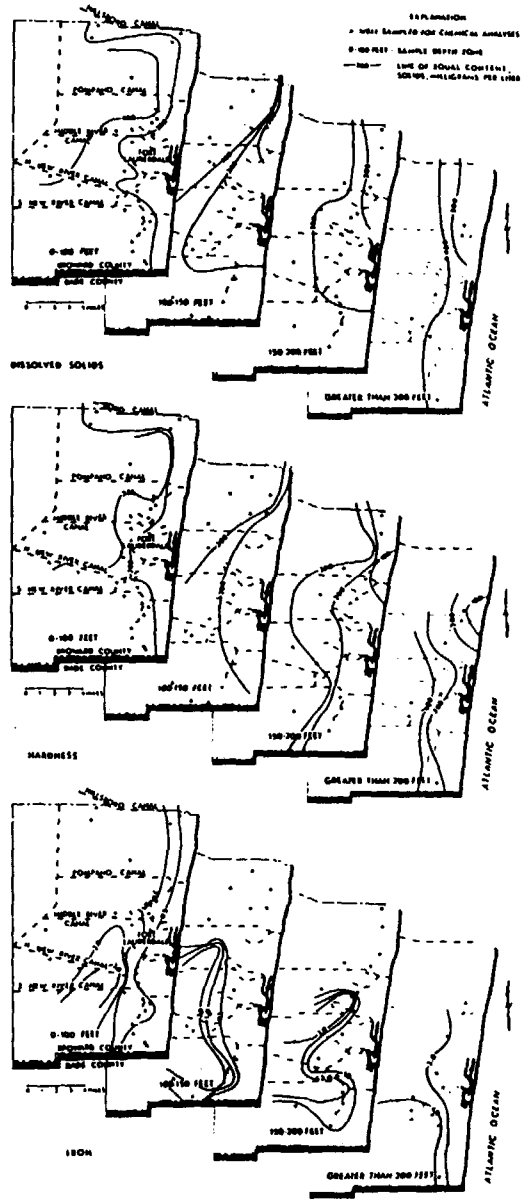

Figure 44. Variation in dissolved solids, hardness and iron in ground water of eastern Broward County, 1964 (adapted from Grantham and Sherwood, 1968).

Reference 16

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STATE BOARD OF CONSERVATION
DIVISION OF GEOLOGY

FLORIDA GEOLOGICAL SURVEY

Robert O. Vernon, *Director*

REPORT OF INVESTIGATIONS NO. 36

HYDROLOGY OF THE BISCAYNE AQUIFER IN THE POMPANO BEACH AREA, BROWARD COUNTY, FLORIDA

By
George R. Tarver

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
CITY OF POMPANO BEACH
and the
FLORIDA GEOLOGICAL SURVEY

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HYDROLOGY OF THE BISCAYNE AQUIFER IN THE POMPANO BEACH AREA, BROWARD COUNTY, FLORIDA

By
George R. Tarver

ABSTRACT

The Biscayne aquifer is the only source of fresh ground water in northeastern Broward County, Florida. The aquifer extends from the land surface to a depth of about 400 feet and is composed of quartz sand, calcareous sandstone, and sandy to nearly pure limestone. Replenishment to the aquifer is chiefly by local rainfall. The permeable rock zones are erratic in their occurrence within the aquifer, but they are generally more prevalent and thicker at greater depths. Small water supplies can be obtained from thin permeable lenses that generally occur at depths less than 60 feet. Large water supplies can be obtained from wells drilled to thick permeable layers that occur at greater depths. Many of the large wells yield 2,000 gpm (gallons per minute) with less than 4 feet of drawdown.

Chemical analyses of ground-water samples show that the water is hard and is high in iron content, but is easily treated. Periodic analyses of the chloride content of the ground water show that some areas near the Intracoastal Waterway and uncontrolled reaches of major canals become increasingly salty when water levels are lowered. Data collected from test wells indicate that during 1960-61 salt-water encroachment was of no major significance to the Pompano Beach well field.

Aquifer test data indicate that the coefficient of transmissibility is about 1,500,000 gpd (gallons per day) per foot and the coefficient of storage is about 0.30. The test data also indicate that the more permeable rock layers act initially as an artesian system, but with continued development change to water-table conditions, at which time the entire aquifer reacts as a hydrologic unit.

Water-level, rainfall, salinity, and quantitative data indicate that much larger quantities of water can be obtained from the ridge area provided that well spacing is adequate, pumping is regulated, and salt water in canals is controlled.

GEOGRAPHY

LOCATION AND GENERAL FEATURES

The Pompano Beach area in this report includes the area of study shown in figure 1. The area comprises about 60 square miles and is bounded on the north by the Hillsboro Canal, on the west by the Everglades and Conservation area 2, on the south by Canal C14 (Pompano Canal), and on the east by the Atlantic Ocean (fig. 2).

POPULATION

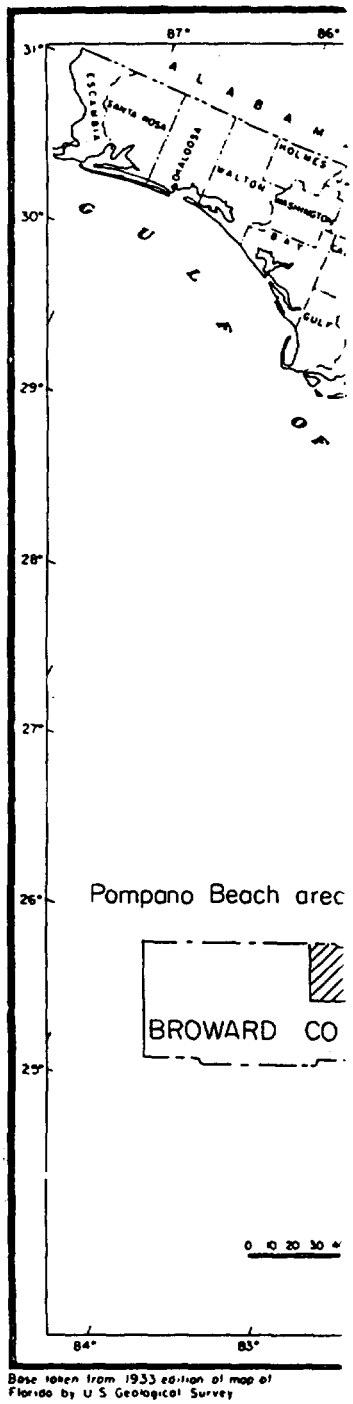
The area has experienced a tremendous influx of people since 1950. In 1950, Pompano Beach and Deerfield Beach had a combined population of 7,770 and the entire study area probably had less than 10,000 people. The area has changed from a rural economy to a tourist and retirement center with a population of 60,000 in 1960, an increase of 600 percent in 10 years. The projected population increase has been estimated at about 12 percent per year during the 1960's.

CLIMATE

The climate of Pompano Beach is subtropical and generally quite humid. The average monthly temperature ranges from 65.4°F to 81.7°F. During the period 1950-60 the average temperature was 74°F, and the average monthly rainfall was 64 inches. The highest temperature and heaviest rainfall generally occur during May through October, and the lightest rainfall occurs during the winter. The average temperature and rainfall data given in table 1 were furnished by the U.S. Weather Bureau.

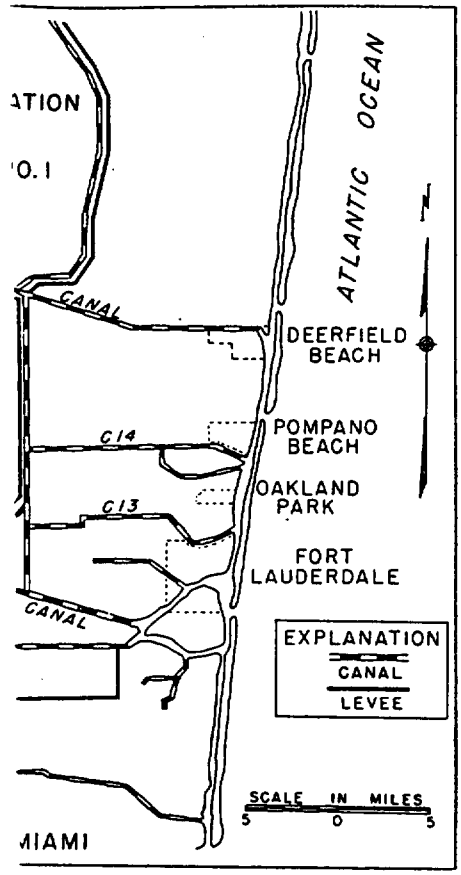
TOPOGRAPHY AND DRAINAGE

The study area is part of the Atlantic Coastal Ridge, which is bounded on the east by the Atlantic Ocean and on the west by the Everglades. The land surface rises to about 22 feet above msl (mean sea level) at the crest of the ridge, which is about 2 miles inland and is parallel to the coast. The ridge is mantled by white quartz sand, which is thickest at the crest and thins to less than 5 feet in the backswamp area where it is underlain by a thin permeable limestone layer.



Base taken from 1933 edition of map of Florida by U S Geological Survey

Figure 1. Peninsular Flor



n Beach counties showing canals and
n Florida Flood Control District.

of the ridge the land surface
o area, which is about half a mile
ıp area slopes gently to the west
sists of swampy sloughs and low

a remained wet for long periods,
toward the west and by under-
bsequently, it was developed for
series of canals, ditches, dams,
l water levels. Presently, the
rained through secondary canals
o Canal on the north and the

TABLE 1. Average Monthly Temperature and Rainfall at Pompano Beach, 1950-60

Month	Temperature °F	Rainfall (inches)
January	65.4	2.02
February	67.6	2.34
March	69.5	3.00
April	73.7	4.25
May	76.9	5.49
June	79.8	7.19
July	81.2	5.99
August	81.7	6.90
September	80.6	10.60
October	76.6	9.10
November	72.1	3.48
December	67.1	3.40
Yearly average	74.4	63.76

Pompano Canal on the south. These major canals flow eastward to the ocean (fig. 2).

The Hillsboro and Pompano canals drain water from the Pompano Beach area and they are also a part of the Central and Southern Florida Flood Control District network of canals that drain parts of the Everglades. The flow of the Pompano Canal is controlled by a spillway structure a short distance east of the Florida East Coast Railroad, and a gated dam 2 miles farther upstream (fig. 3). During periods of heavy rainfall, these structures are adjusted to prevent local flooding; however, during most of the year they are operated to hold high stages in the canal. Major floodwaters in the western area are removed by the diversion canal south of the Pompano Canal (fig. 3), and through the Hillsboro Canal in the northern part of the area. The Hillsboro Canal is controlled 2 miles upstream from the Florida East Coast Railroad.

The west slope of the ridge area drains to the backswamp area; the east slope of the ridge drains to the Intracoastal Waterway. In recent years drainage east of the ridge divide has been highly developed to accommodate urbanization, and the area now drains to the Intracoastal Waterway through storm sewers, streets west of U. S. Highway 1, and by a massive system of finger-canals east of U. S. Highway 1 (fig. 3).

BISCAYNE AQUIFER

The Pompano Beach area is underlain by the Biscayne aquifer which is composed chiefly of permeable limestone, sandstone, and sand that range in age from late Miocene through Pleistocene. The

Biscayne aquifer is thickest near the coast, where its base is about 400 feet below msl, and it thins to the west. Hydrologically the aquifer is a unit, but geologically it comprises the following formations: Tamiami Formation, upper Miocene; Anastasia Formation, Pleistocene; Miami Oolite, Pleistocene; and Pamlico Sand, Pleistocene. The entire section of sediments in this area probably is of marine origin. The Biscayne aquifer is underlain to a depth of 950 feet by a massive section of marine sediments of middle and early Miocene age that are predominantly greenish sandy clay and marl of low permeability. This material forms the upper confining layers for the Floridan aquifer, a regional artesian system which, in the Pompano Beach area, yields salty water to flowing wells.

Detailed lithologic logs of four test wells in the Pompano Beach are a are given in the section of well logs.

GEOLOGIC FORMATIONS COMPOSING THE BISCAYNE AQUIFER

TAMIAMI FORMATION

The Tamiami Formation is the oldest and lowest formation in the Biscayne aquifer. As redefined by Parker (1951, p. 823), it includes all the upper Miocene material in southern Florida. The Tamiami Formation ranges in composition from pure quartz sand to nearly pure limestone, which is generally white to gray in color. Rock layers are formed at random depth but they cannot be correlated over large areas because wedging and lensing of the sediments is common. The percentage of carbonate material in the sediments shows a general increase with depth.

The numerous indurated zones are quite permeable, and open-end wells in the limestone layers are capable of yielding large quantities of water. The formation is tapped by only a few wells because equally good water and comparable yields can be obtained from wells that penetrate shallower limestones in the Anastasia Formation.

ANASTASIA FORMATION

The Anastasia Formation of Pleistocene age was named by Sellards (1912, p. 18) after studying coquina pits at St. Augustine, Florida. Since 1912, the formation has been noted along the coastal ridge as far south as Dade County. In the Pompano Beach area

the formation overlies the Tamiami Formation and is covered by the Pamlico Sand and the Miami Oolite. The Anastasia Formation, as defined by Schroeder (1958, p. 21), includes all pre-Pamlico marine deposits of Pleistocene age along the coastal areas. It consists of heterogeneous mixtures of very fine to very coarse quartz sand, finely broken shells, and redeposited calcium carbonate either in the form of calcite crystals or as cryptocrystalline cementing materials. The colors range from white to gray or tan.

The indurated zones are generally highly permeable and yield very large quantities of water (2,000 gpm) to open-end wells. The Anastasia Formation is the most important component of the Biscayne aquifer in the Pompano Beach area.

MIAMI OOLITE

Miami Oolite was named by Sanford (1909, p. 211-214) and redefined by Cooke and Mossom (1929, p. 204-207) to include all the oolitic limestone in southern Florida. The Miami Oolite of Pleistocene age, overlies the Anastasia Formation in the Pompano Beach area and is covered by the Pamlico Sand. It is fairly persistent west of the coastal ridge but occurs discontinuously in the ridge area along the Pompano and Hillsboro canals. The formation is a sandy, oolitic limestone containing many pelecypod shells. It is a white thin-bedded to massive, very permeable limestone which may occur locally as a solid rock to a depth of 40 feet below the land surface.

Where the rock is appreciably thick it is an excellent aquifer, but because it is discontinuous very little water is derived from it. The Miami Oolite is strip mined and used extensively as road base building material, and decorative building stone.

PAMLICO SAND

The Pamlico Sand is a late Pleistocene terrace deposit of marine origin. Parker and Cooke (1944, p. 74-75) extended the term Pamlico Sand from North Carolina to southern Florida, and defined it to include all the marine Pleistocene deposits younger than the Anastasia Formation. The Pamlico Sand blankets the study area except in the north-central part, where the Miami Oolite crops out. The sand west of the ridge is generally 2 to 5 feet thick, and on the ridge it attains a maximum thickness of 18 feet. It is very fine to coarse, mostly of medium size, subangular, and contains varying amounts of iron oxide.

Numerous sand-point wells completed in this material will yield small quantities of water (50 gpm or less), which commonly has a high iron content.

GROUND WATER

Ground water is the subsurface water in the zone of saturation, the zone in which all pore spaces are filled with water under greater than atmospheric pressure. The chief source of ground-water replenishment in the Pompano Beach area is local rainfall. Part of the rainfall is evaporated, part is absorbed by plants and transpired, and a part is lost by surface runoff; the remainder infiltrates downward to the zone of saturation. After entering the zone of saturation, ground water flows by gravity from areas of recharge, where water levels are high, to areas of discharge, where water levels are low. A formation, group of formations, or part of a formation within the zone of saturation that is capable of transmitting water in usable quantities is called an aquifer.

OCCURRENCE OF GROUND WATER

Ground water in the Pompano Beach area occurs under both water-table (nonartesian) conditions and artesian conditions. Where water occurs in an unconfined aquifer and its upper surface is free to rise and fall, the aquifer is referred to as a water-table aquifer and its upper surface is the water table. In the Pompano Beach area all fresh ground-water supplies are derived from the Biscayne aquifer, a water-table aquifer.

Ground water contained in an aquifer that is confined by impermeable beds, and that is under sufficient pressure to rise above the top of the aquifer, is defined as artesian water. The height to which the water will rise in a tightly cased well that penetrates an artesian aquifer is the pressure, or piezometric, surface. Artesian ground water occurs beneath the area but the top of the artesian (Floridan) aquifer is about 950 feet deep and contains salty water.

RECHARGE AND DISCHARGE

The Biscayne aquifer is recharged by rainfall and by surface water pumped into the area through canals. About 50 percent of the rainfall (estimated by Parker and others, 1955, p. 221, for a

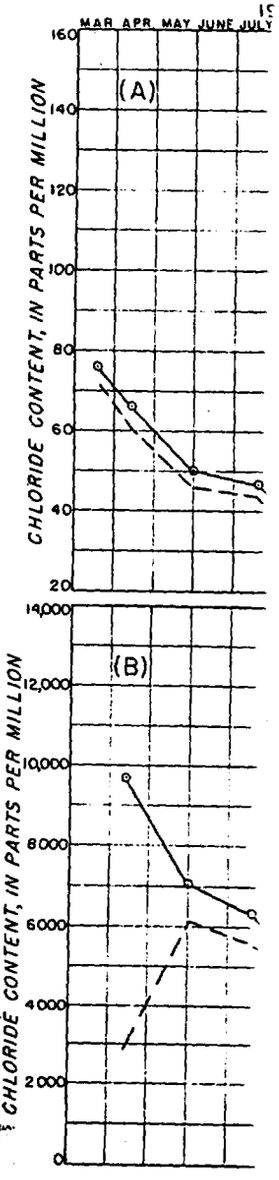


Figure 4. Graphs of
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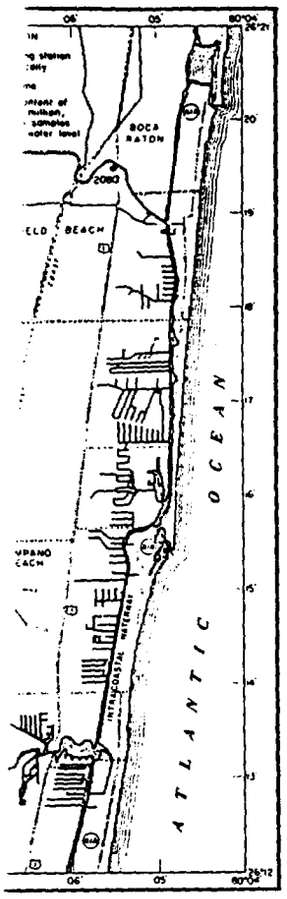

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) percent of the total

discharge. The losses are greatest during the rainy season in late spring to early fall when temperatures and water levels are highest.

Evidence of the discharge of ground water into canals is shown by the periodic changes in the quality of the water in several canals in the area. Figure 4 compares the chloride content of the water from two observation stations (613-007-SW1 and 613-008-SW2) along the lower controlled reach of the Pompano Canal during 1960-61. Throughout most of the sampling period the water at station 613-007-SW1 had a slightly lower chloride content than the water at station 613-008-SW2. The chloride content is lowest during the rainy seasons and highest during dry seasons. Water moving from the west in the Pompano Canal generally contains more salt than does the ground water in the Pompano Beach area. During wet periods, such as July to October 1960, a large part of the increased flow of the Pompano Canal was the result of heavy ground-water discharge into the canal in the Pompano Beach area which caused dilution of the canal water as it moved to the ocean. During the ensuing dry season of 1961, a large part of the canal flow was contributed by areas west of Pompano Beach, as a result the chloride content of the canal water increased.

Figure 5 shows the chloride content of the surface water at points in major canals, irrigation laterals, and ponds or rock pits June 5-6, 1961. The distribution shows that the chlorides are higher in the western areas than they are near the coast. In the Hillsboro Canal, water entering the area from the west contained 74 ppm (parts per million) of chloride and was diluted by ground-water discharge along the lower reach to 64 ppm at the control dam. Similarly, the water in the Pompano Canal was diluted from 80 ppm of chloride at the western edge to 30 ppm above the control in Pompano Beach.

WATER USE

The greatest use of ground water in northeastern Broward County is for public supplies. During 1960-61 the total pumpage for public supplies in the area was 7 to 8 billion gallons (fig. 6). In 1961 the municipalities pumped about 4.3 billion gallons, at a rate of about 12 mgd (million gallons per day); about one-half was used for lawn irrigation.

The maximum withdrawals normally are during the winter season. when the population is greatest, when the rainfall is least, and when irrigation is heaviest. The normal condition seldom exists; therefore, during some years the largest withdrawals are

QUALITY OF WATER

The chemical quality of ground water depends upon the amount and type of constituents contained in the recharge, the composition and solubility of the rocks through which the recharge moves, and the presence of connate water in the aquifer. In the Pompano Beach area rainfall is the principal source of recharge. As the rainfall infiltrates to the water table it acquires organic acids and dissolves calcium carbonate from the rocks which imparts hardness to the water. The occurrence of connate water and the encroachment of sea water into the aquifer will be discussed under another section.

Ground-water samples were collected from wells at several locations and from different depths in some wells in the Biscayne aquifer. The samples were analyzed by the U. S. Geological Survey and are presented in table 2. Included also are other analyses made by the General Development Corporation and the Florida State Board of Health. The analyses show that the ground water is hard, but is suitable for most uses, without being treated, or with relatively simple treatment.

Iron derived from iron-bearing minerals within the aquifer or from the action of iron-fixing bacteria is the most noticeable and objectionable constituent in the ground water of this area. Untreated ground water used for lawn irrigation has caused iron staining on shrubs, trees, sidewalks, and houses. In the samples analyzed iron was present in amounts ranging from 0.01 to 4.3 ppm. Iron in concentrations in excess of 0.3 ppm is objectionable in water used for public supply, and in concentrations in excess of about 0.5 ppm it imparts a noticeable taste to the water. The amount of dissolved iron in ground water in the area is very erratic and cannot be predicted with any accuracy even for short distances horizontally or vertically. Iron is most easily and inexpensively removed by aeration and filtration in the large volumes used by municipal supplies.

Hardness is caused by calcium and magnesium dissolved from shell material, limestone, and dolomite in the aquifer. Water having a hardness in excess of 120 ppm is considered hard. Hardness of the water samples ranged from 22 to 316 ppm. The hardness is generally low in the sand ridge area at shallow depths and generally high in the west and at greater depths in the aquifer. This is compatible with the character of quartz sand which is the main component of the aquifer at shallow depths in the ridge area and

TABLE 2. Analyses of Water from Wells in Northeastern Broward County

Analyses by U. S. Geological Survey. Chemical constituents are expressed in parts per million, except pH and color.

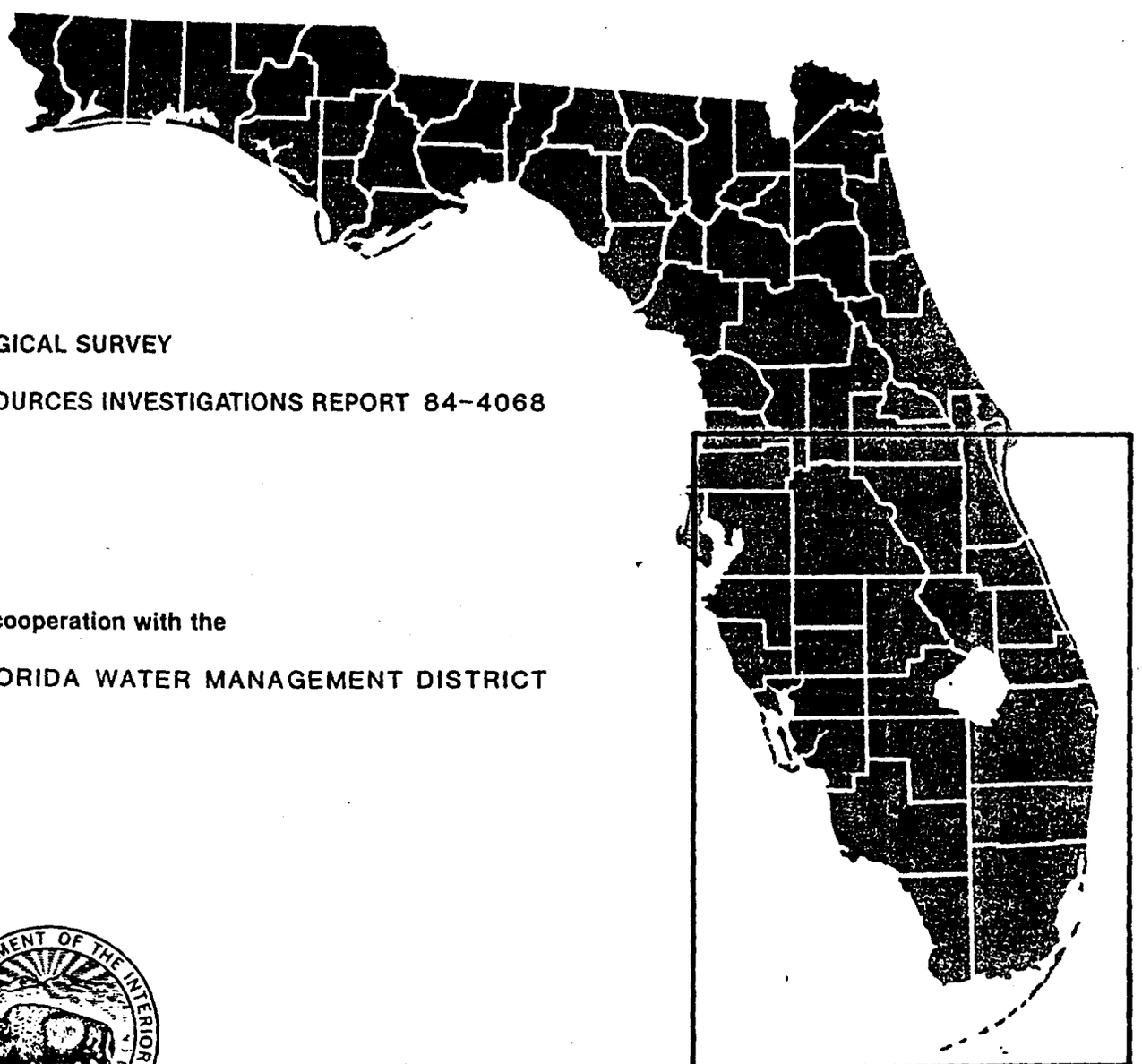
Reference 17

Property of
A. JAMES McCARTHY, JR

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GEOLOGY OF THE SURFICIAL AQUIFER SYSTEM, BROWARD COUNTY, FLORIDA

By Carmen R. Causaras



U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS REPORT 84-4068

Prepared in cooperation with the

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Tallahassee, Florida

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

INTRODUCTION

The principal source of freshwater in southeast Florida is the surficial aquifer system. The Biscayne aquifer, the major and only formally named aquifer of this system, is a highly permeable limestone and sandstone unit that occurs at or near land surface in most of Broward County (Parker and others, 1955). In Broward County, unnamed hydrogeologic units of low to relatively high permeability were penetrated below the Biscayne aquifer and laterally where it pinches out. These unnamed hydrogeologic units are hydrologically contiguous with the Biscayne aquifer and, together, they constitute the surficial aquifer system. The base of the surficial aquifer system is delineated at the top of a thick sequence of a relatively impermeable clay and silt unit in the lower part of the Tamiami Formation or in the Hawthorn Formation.

This report describes the geologic framework of the surficial aquifer system in Broward County, Fla. (fig. 1). It is part of a long-term intensive study begun by the U.S. Geological Survey in 1979, in cooperation with the South Florida Water Management District, to describe the geology, hydrologic characteristics, and the ground-water quality of the surficial aquifer system in southeast Florida.

Twenty-seven test wells were drilled completely through the surficial aquifer system and into the underlying, relatively impermeable, units of the Hawthorn Formation to obtain the data needed to describe the geology of the surficial aquifer system. The test wells were drilled by the reverse air, dual wall method. This method provided geologic samples superior to those obtained by most other methods in that the samples were uncontaminated by drilling fluid and were large enough for describing sedimentary and petrographic characteristics. Detailed lithologic logs were made from rock cuttings and cores obtained from these wells and are presented in this report. These logs were used to prepare geologic sections that show the lithologic variations, thickness of the lithologic units, and different geologic formations that comprise the aquifer system.

METHODS

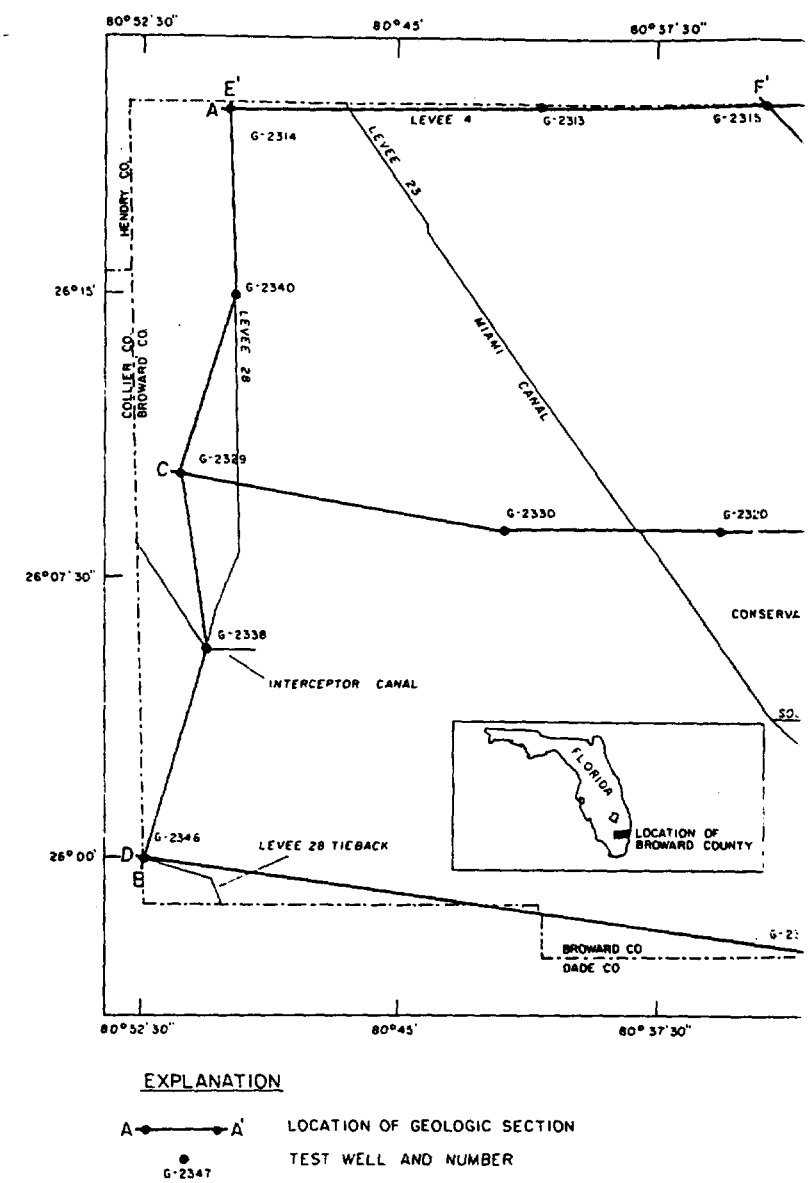
The lithologic logs were made from microscopic examination of the well cuttings and cores collected during the drilling phase. Other methods, such as stains, dilute hydrochloric acid tests, and petrographic thin sections, were used when additional aid in identifying and describing the sample was needed. Folk's 1962 classification of carbonate rocks was used in classifying rocks with a calcium carbonate content of 50 percent and greater (Folk, 1968). The standard Wentworth terrigenous grain-size classification (Pettijohn, 1957, p. 27) was used in classifying sediments and rocks consisting of less than 50 percent calcium carbonate. A modifying term was added to the description of the terrigenous samples if a foreign size content greater than 10 percent was present. A silty sand contains over 10 percent silt, a clayey silt contains over 10 percent clay, and a sandy clay contains over 10 percent sand. The same principle was utilized for carbonate rocks, so that a sandy limestone contains more than 10 percent sand. The percentage of a given constituent was determined by using the "Comparison Chart for Visual Percentage of Estimation" from Terry and Chilingar (*in* Scholle, 1978, p. x). The constituent rock fragments (RF) found in some samples are noted in the lithologic descriptions in the abbreviated form RF. The colors indicated by the chart numbers in parenthesis are based on the "Rock-Color Chart" by Goddard and others (1948) and were assigned while the samples were damp.

GEOLOGY

The surficial aquifer system in Broward County is composed of limestone, sandstone, sand, shell, limemud, silt, clay, and an admixture of these materials. These sediments were deposited during the Pliocene through Pleistocene Epochs (Parker and others, 1955, p. 160) and were assigned to the following general stratigraphic sequence from bottom to top, however, some units are equivalent: Tamiami Formation, Caloosahatchee Marl, Fort Thompson Formation, Key Largo Limestone, Anastasia Formation, Miami Oolite, and Pamlico Sand. The Caloosahatchee Marl occurs as erosional remnants in southeast Florida; in Broward County (Schroeder and others, 1958, p. 11), it has been reported only in the extreme northwestern part of the county. The Caloosahatchee Marl was not encountered in any well drilled during the present study.

The geologic sections A-A' to D-D' on sheets 1 and 2 show some of the variations in the wedge of sediments that make up the framework of the surficial aquifer system. The aquifer system is thickest along the coast where in some areas it may exceed 400 feet in thickness and gradually thins inland toward the west and southwest where it is about 160 feet thick. The aquifer system is comprised of distinct lithologic units that show numerous facies changes that were brought about primarily by changes in sea level. A distinct contrast exists in lithologies between western and eastern Broward County defined, respectively, as the area west of and under the water conservation areas and the area east of U.S. Highway 441 (fig. 1). In the western part of the county, the aquifer system is primarily composed of limestone, sand, limemud, and clay, but the eastern part is primarily composed of sandstone, sand, sandy limestone, and silt (see sheets 1 and 2, sections A-A' to D-D'). The transition between the predominantly carbonate and predominantly clastic areas lies between the water consetvation areas and U.S. Highway 441.

The uppermost lithologic unit of the aquifer system in western Broward County usually consists of pale-orange to yellowish-brown, mottled, well-cemented limestone that contains abundant specimens of the freshwater gastropod *Helisoma* sp. and has undergone diagnesis as a result of prolonged contact with slowly moving water. The limestone exhibits features of dissolution, replacement, and reprecipitation of calcite as cavity-filling cement. Iron oxide stains and calcrete crust indicate that the limestone has been subaerially exposed. This limestone unit ranges [illegible] from about [illegible] feet and is thickest along

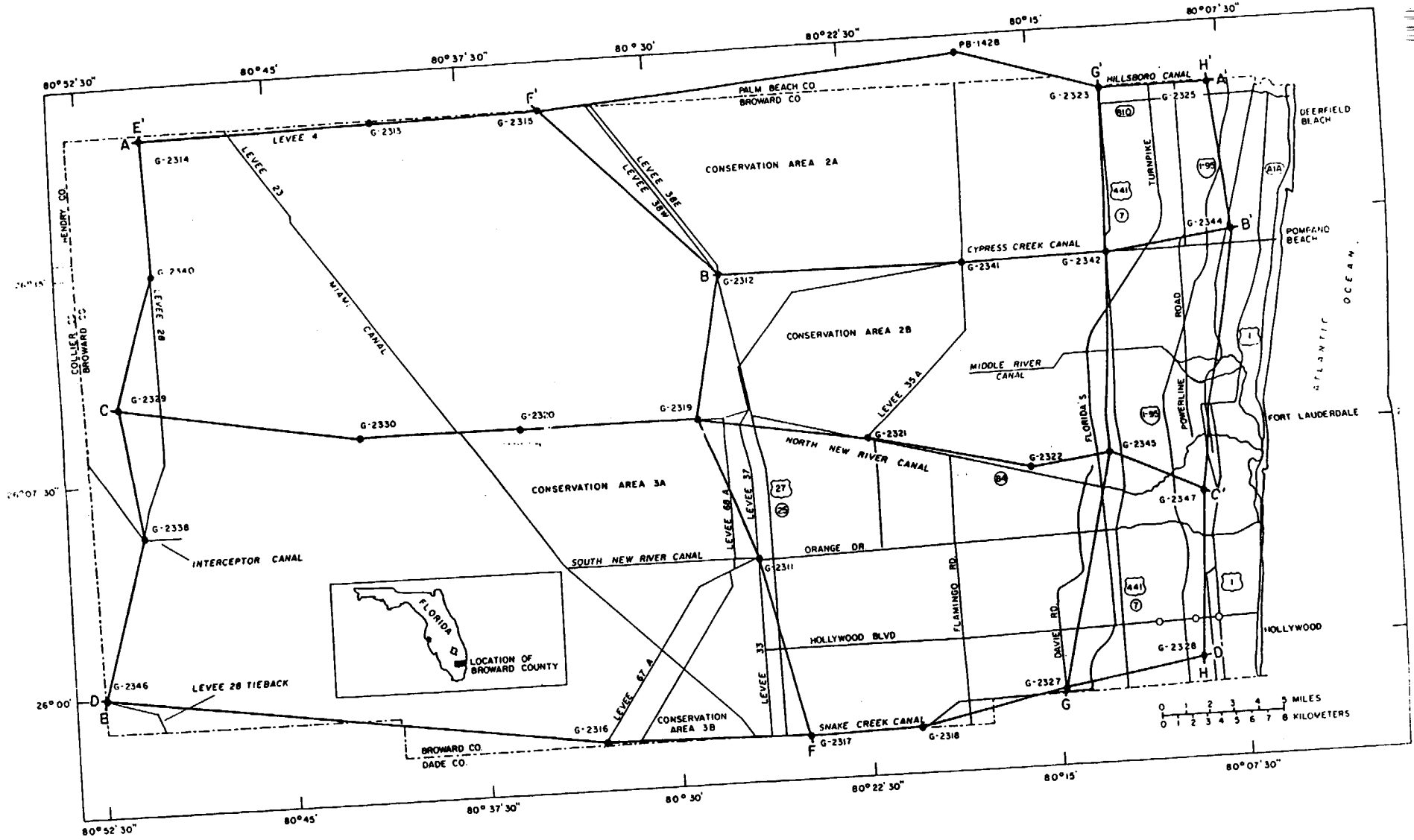


EXPLANATION

A—A' LOCATION OF GEOLOGIC SECTION

● G-2347 TEST WELL AND NUMBER

Figure 1.



EXPLANATION

A—A' LOCATION OF GEOLOGIC SECTION

G-2347 TEST WELL AND NUMBER

Figure 1.—Location of test wells and geologic sections in Broward County.

the shells are comparable in age to those in the Pamlico Sand and to those in the sand unit of the Tamiami Formation. With increasing depth, the silt and clay content of the fine-sand unit increases, and the unit grades into clay. Parker and Cooke (1944, p. 96–112) assigned this clay to the Hawthorn Formation. The clay is slightly calcareous and grades into clayey silt and silt toward the east where it was over 300 feet below land surface in test well G-2345 (sheet 1, section C-C'; sheet 2, section G-G'). In many of the wells drilled, it was difficult to differentiate between the Tamiami silt and the Hawthorn silt without a detailed foraminferal study. In these wells, the symbol "Tth" was used for Tamiami Formation and Hawthorn Formation undifferentiated. The silt and clay unit was not penetrated in test wells near the coast, two of which were drilled to a maximum depth of 476 feet below land surface (sheet 2, section H-H'). Apparently, the silt and clay unit grades laterally into impure Hawthorn limestone in this area.

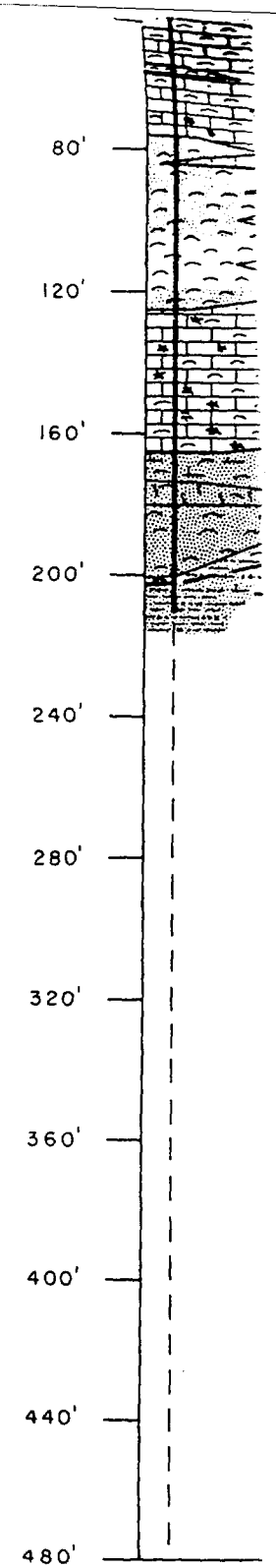
The part of the surficial aquifer system that extends from the coast to the eastern edge of the water conservation areas primarily consists of beach and inner shelf deposits such as sand, sandstone, and sandy shelly limestone. The uppermost part of the surficial aquifer system throughout that part of Broward County consists of a pale-orange to brown quartz sand that ranges from very coarse to very fine grained but is moderately to well sorted toward the medium sand-size fraction. This sand ranges in thickness from a minimum of 5 feet to a maximum of 52 feet in the vicinity of well G-2327 (sheet 2, sections D-D' and G-G'). This sand was called the Pamlico Sand by Parker and Cooke (1944, p. 75).

In test well G-2347 (sheet 1, section C-C'), a 13-foot thickness of the oolitic and bryozoan limestone facies of the Miami Oolite occurs at land surface. Well G-2347 was the only well drilled during this investigation that penetrated the Miami Oolite. Petrographic thin sections made from this limestone show that fine-grained angular quartz forms the nuclei of the ooids. A 20-foot layer of fine-grained quartz sand lies below the oolitic limestone. The sand grades into clay and limemud toward its base and contains approximately 3 to 10 percent ooids. This sand layer is considered in this report to be a part of the Miami Oolite.

The Key Largo limestone underlies this sand unit in well G-2347 and also was penetrated near the coast and southeast Broward County in wells G-2327, G-2328, and G-2344. The Key Largo is a highly crystalline, reefal limestone deposit that contains corals (including *Monastrea* sp.), Halimeda fragments, and mollusks.

Below the Pamlico Sand and interfingering with the Key Largo limestone and Miami Oolite in east Broward County are numerous layers and lenses of sand, shelly sand, shelly and nodular sandstone, and sandy limestone. These interbedded materials are part of the Anastasia Formation and are thickest in the northeastern part of the county where the Anastasia Formation is over 180 feet below land surface. The Anastasia Formation thins toward the central and southern parts of the county where it interfingers with the Fort Thompson Formation. Lying unconformably beneath these sediments are thin layers of limestone of the Tamiami Formation (similar to that found in west and central Broward County) interbedded with a sandstone and sand facies of the same formation. These materials are underlain by a relatively impermeable silt unit that is of Miocene age (F.W. Meyer, U.S. Geological Survey, oral commun., 1983) and whose top forms the base of the surficial aquifer system in east Broward County.

In the coastal areas (sheet 2, section H-H') instead of the silt unit, there occurs a loosely cemented, pale-green limestone which is probably of Hawthorn age; it was encountered at depths ranging from 300 to 480 feet below land surface. The limestone consists of fossiliferous micrites and intramicrites that are abundant in mollusks and planktonic foraminifers. This limestone unit is the base of the aquifer system in the coastal areas (J.E. Fish, U.S. Geological Survey, oral commun., 1983).



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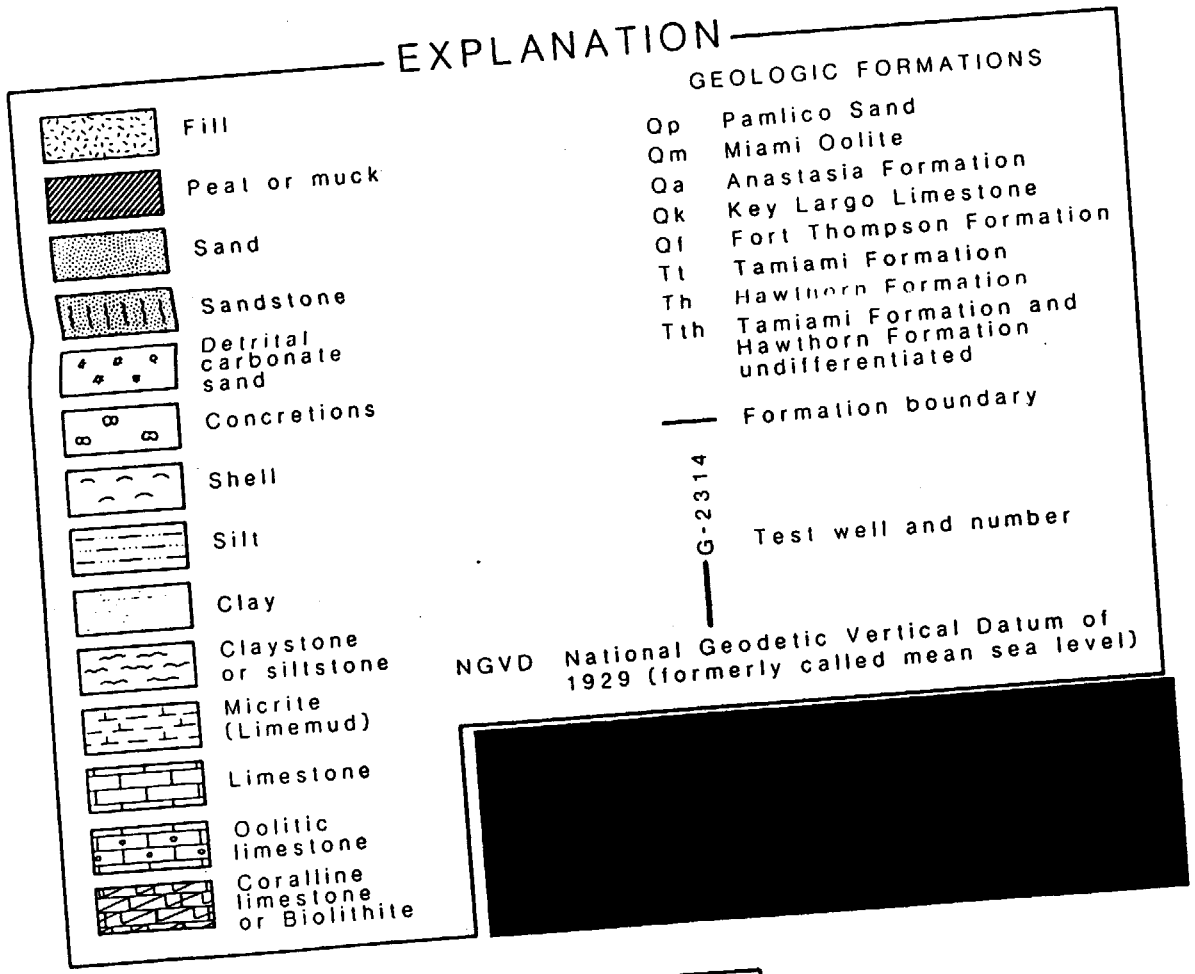
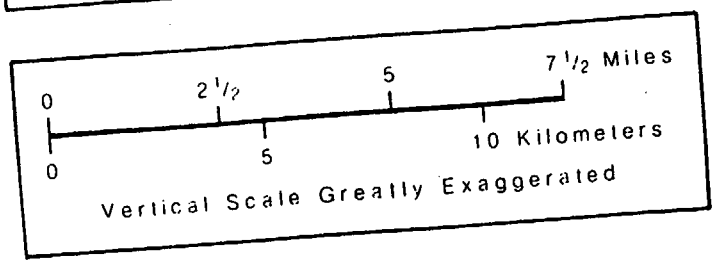
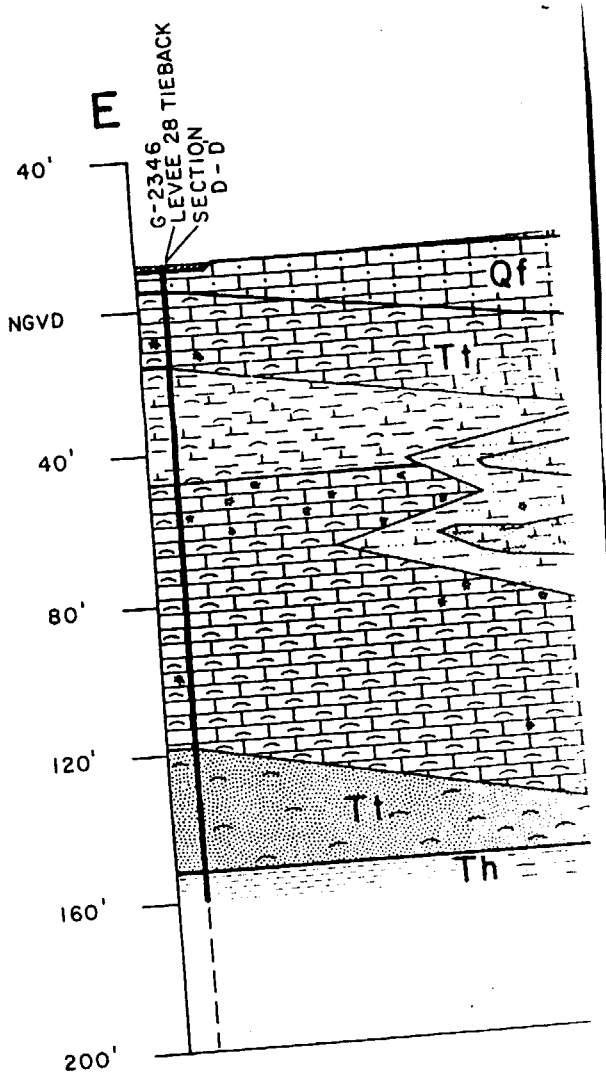
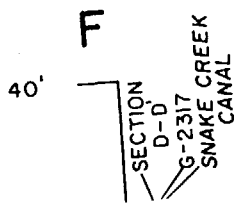
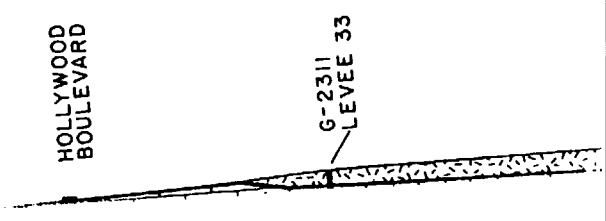
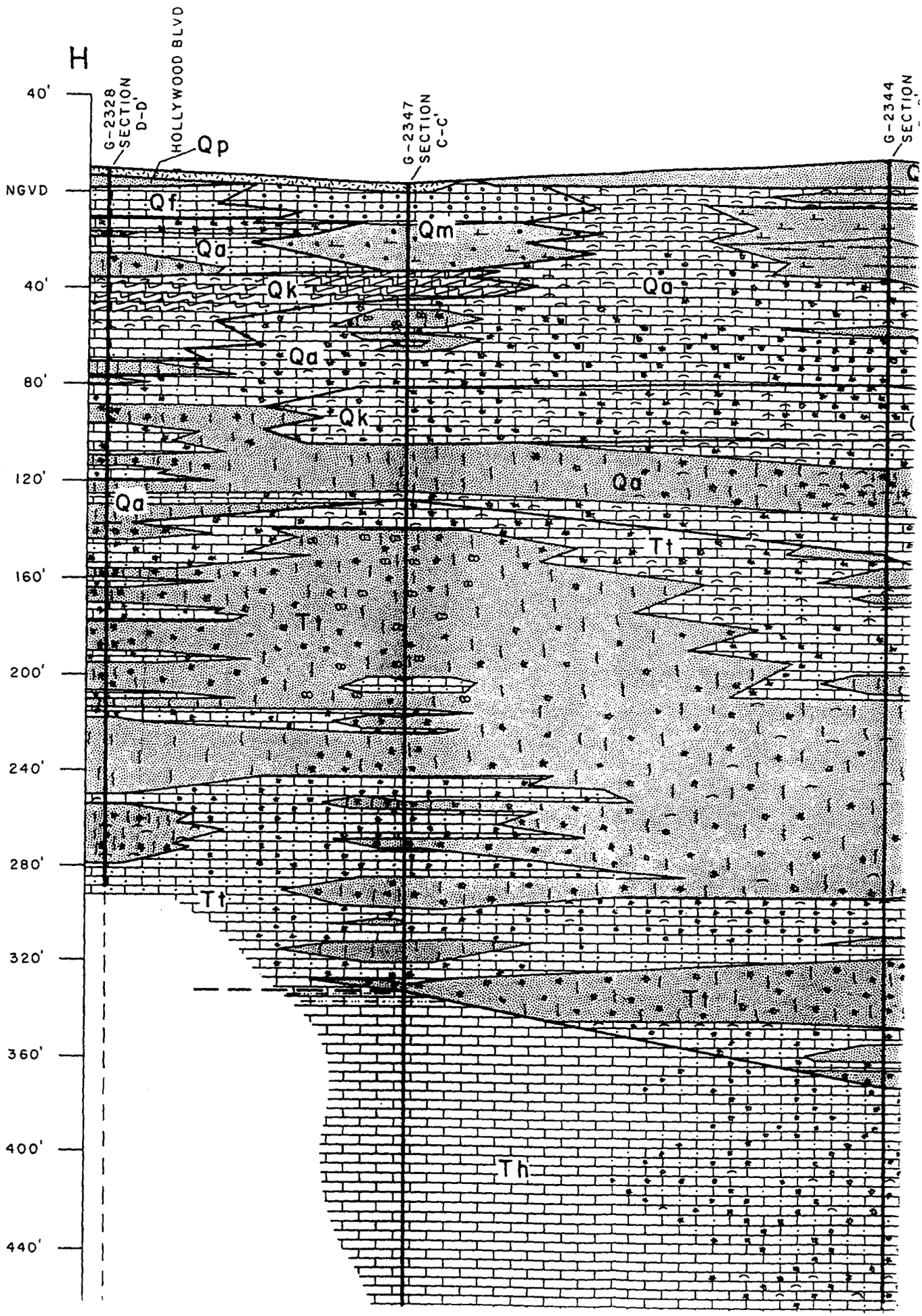

EXPLANATION
Fill
Peat or muck
Sand
Sandstone
Detrital carbonate sand
Concretions
Shell
Silt
Clay
Claystone or siltstone
Micrite (Limemud)
Limestone
Oolitic limestone
Coralline limestone or Biolithite
GEOLOGIC FORMATIONS
Op Pamlico Sand
Qm Miami Oolite
Qa Anastasia Formation
Qk Key Largo Limestone
Qf Fort Thompson Formation
Tt Tamiami Formation
Th Hawthorn Formation
Tth Tamiami Formation and Hawthorn Formation undifferentiated
Formation boundary
G-2314
Test well and number
NGVD National Geodetic Vertical Datum of 1929 (formerly called mean sea level)

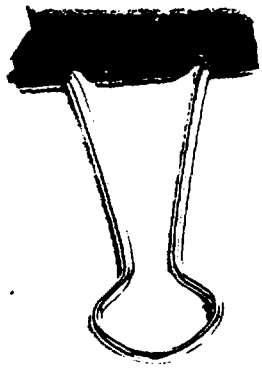

0
2 1/2
5
7 1/2 Miles
0
5
10 Kilometers
Vertical Scale Greatly Exaggerated


E
G-2346
LEVEE 28 TIEBACK
SECTION D-D
40'
NGVD
40'
80'
120'
160'
200'
Qf
Tt
Th


F
40'
SECTION D-D'
G-2317
SNAKE CREEK CANAL


HOLLYWOOD BOULEVARD
G-2311
LEVEE 33


H
40'
NGVD
40'
80'
120'
160'
200'
240'
280'
320'
360'
400'
440'
G-2328 SECTION D-D'
HOLLYWOOD BLVD
G-2347 SECTION C-C'
G-2344 SECTION
Qp
Qf
Qa
Qm
Qk
Qa
Qa
Qk
Qa
Qa
Tt
Tt
Tt
Tt
Th



Bureau
Technical Reports Section

GEOLOGY OF THE SURFICIAL AQUIFER SYSTEM

BROWARD COUNTY, FLORIDA

LITHOLOGIC LOGS

By Carmen R. Causarás

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS REPORT 84-4068

Lithologic Log of Well G-2347

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Fill.	4	0 - 4
Limemud, olive-gray (5 Y 4/1); sandy micrite; about 20 percent quartz, medium to fine grained, well sorted (fine), subrounded to rounded; interbedded with about 40 percent limestone mixture, yellowish-gray (5 Y 8/1); unsorted biosparite, mollusks and abundant bryozoans; neomorphic and cavity-filling calcite are present in matrix; well cemented; and sandy, fossiliferous oomicrite, mollusks; about 20 percent quartz, fine grained, subangular to subrounded; moderately cemented, friable.	3	4 - 7
Limestone, very pale orange (10 YR 8/2); sandy, sparse oomicrite, pelecypods; about 20 to 25 percent quartz, medium to fine grained, well sorted (fine), subrounded; moderately cemented, friable.	7	7 - 14
Limestone, very pale orange (10 YR 8/2); fossiliferous oomicrite grading into a sandy, fossiliferous oomicrite, pelecypods (smooth white tests); about 30 to 35 percent quartz as above; and an oosparite, cavity-filling calcite cement is present; moderately (friable) to well cemented.	3	14 - 17
Sand, very pale orange (10 YR 8/2) to pale-yellowish-brown (10 YR 6/2); quartzose, coarse to very fine grained, well sorted (fine), angular to subrounded; about 3 to 10 percent ooids, medium to fine grained, well sorted (medium), well rounded; about 3 to 10 percent clayey micrite, not cemented.	7	17 - 24
Sand as above, dark-yellowish-brown (10 YR 4/2); about 5 to 10 percent silty, calcareous clay; about 3 percent ooids.	3	24 - 27
Sand as above, dark-yellowish-brown (10 YR 4/2) to grayish-orange (10 YR 7/4) to very pale orange (10 YR 8/2); about 3 to 5 percent phosphorite and heavy minerals, fine grained, subangular to well rounded; about 3 to 5 percent silty, calcareous clay; about 1 to 5 percent silty clay.	10	27 - 37
Limestone, yellowish-gray (5 Y 8/1); biolithite, Monastrea sp.; neomorphic calcite present; about 5 to 10 percent quartz, fine grained, subangular to subrounded; grading into an intramicrite; about 5 percent clay; well cemented.	10	37 - 47
Limestone as above, grading into sandy intramicrite; about 25 to 30 percent quartz, medium to fine grained, moderately sorted (fine), subangular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, coarse to very fine grained, poorly sorted, subangular to well rounded.	3	47 - 50

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, yellowish-gray (5 Y 8/1); sandy intrasparite; about 15 to 20 percent quartz, coarse to fine grained, moderately sorted (fine), subangular to rounded; about 5 percent phosphorite, very coarse to very fine grained; well cemented; interbedded with about 30 percent sandstone; quartzose, fine to very fine grained, well sorted (fine), subangular to rounded; about 20 percent phosphorite and heavy minerals, very fine grained, subangular to rounded; about 40 to 45 percent micritic matrix; rod-shaped with center composed of a neomorphic calcite matrix; moderately to well cemented.	4	50 - 54
Sand, yellowish-gray (5 Y 8/1); quartzose, fine to very fine grained, well sorted (fine), angular to subrounded; about 20 percent phosphorite and heavy minerals, very fine grained, subangular to rounded; interbedded with about 30 to 40 percent sandstone as above, nodular.	6	54 - 60
Sand, yellowish-gray (5 Y 8/1); quartzose, coarse to fine grained, well sorted (fine), angular to rounded; about 20 percent phosphorite and heavy minerals, medium to very fine grained, moderately sorted (fine), subrounded to well rounded; interbedded with about 30 to 35 percent limestone mixture: sandy, intraclastic, sparse biomicrite, mollusks including gastropods and pelecypods; about 20 to 25 percent quartz, fine to very fine grained, well sorted (fine), angular to subrounded; about 15 percent phosphorite and heavy minerals, fine to very fine grained, subrounded to rounded; and a sandy intrasparite; calcite cavity-filling cement is present; about 25 to 30 percent quartz, medium to fine grained, moderately sorted (fine), angular to rounded; about 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted; fossiliferous micrite, very pale orange (10 YR 8/2); gastropods and pelecypods; about 5 percent quartz, very fine grained, angular to subangular; well cemented.	4	60 - 64
Limestone, yellowish-gray (5 Y 7/2); sandy, sparse intramicrite, gastropods and pelecypods; about 20 to 25 percent quartz, medium to very fine grained, well sorted (fine), subangular to rounded; is a contact with a sandy intramicrite; about 25 to 30 percent quartz, medium to fine grained, well sorted (fine), subrounded to rounded; about 3 to 5 percent phosphorite and green mineral, medium to very fine grained, moderately sorted (very fine), angular to well rounded; moderately to well cemented.	3	64 - 67
Limestone, yellowish-gray (5 Y 7/2); sandy, fossiliferous intramicrite; about 20 to 25 percent quartz, medium to fine grained, moderately sorted (fine), subangular to subrounded; about 5 to 10 percent phosphorite, very coarse to very fine grained, poorly sorted, subangular to well rounded; well cemented; interbedded with about 20 percent sand; quartzose, very angular to angular; about 15 to 20 percent phosphorite, fine to very fine grained, rounded to well rounded.	13	67 - 80

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, yellowish-gray (5 Y 7/2); sandy, intrasparite; about 20 percent quartz, medium to very fine grained, poorly sorted, angular to rounded; about 5 percent phosphorite, medium to very fine grained, poorly sorted, subangular to well rounded; is a contact with a micrite, weathered, pitted texture; cavity-filling calcite cement is present.	4	80 - 84
Limestone, yellowish-gray (5 Y 8/1) to very pale orange (10 YR 8/2); pelletiferous, sparse intramicrite, framework organism, gastropods, pelecypods, coral including Monastrea sp., burrows, and pellets; neomorphic calcite present at 87 to 90 feet; about 10 percent quartz, very fine grained, angular to subangular; about 5 to 10 percent phosphorite and heavy minerals, very fine grained, subangular to well rounded; moderately to well cemented.	10	84 - 94
Limestone, yellowish-gray (5 Y 8/1 and 5 Y 7/2); intraclastic, sparse pelmicrite, pelecypods, halimeda, and abundant coral; neomorphic and cavity-filling calcite are present in matrix; moderately to well cemented.	10	94 - 104
Limestone, yellowish-gray (5 Y 7/2 and 5 Y 8/1); fossiliferous pelintramicrite, echinoid spines and fragments, and mollusks including pelecypods and Pecten sp.; well cemented.	3	104 - 107
Limestone, yellowish-gray (5 Y 8/1); sandy intramicrite, grading into a sandy intrasparite in places; about 20 to 30 percent quartz, medium to very fine grained, moderately sorted (fine), subangular to rounded; about 5 to 10 percent phosphorite and heavy minerals, coarse to very fine grained, poorly sorted, subangular to well rounded; well cemented.	3	107 - 110
Limestone, yellowish-gray (5 Y 7/2); sandy intrasparite; about 30 to 35 percent quartz, fine to very fine grained well sorted (fine), subangular to subrounded; about 5 to 10 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (fine), subangular to well rounded; nodular; well cemented; interbedded with about 15 percent sand; quartzose, medium to very fine grained, well sorted (fine), subangular to rounded; about 10 percent detrital carbonate; about 5 to 10 percent phosphorite, medium to very fine grained, poorly sorted, subrounded to rounded.	4	110 - 114
Sandstone, yellowish-gray (5 Y 7/2); quartzose, medium to fine grained, well sorted (fine), subangular to subrounded; about 5 percent phosphorite, very coarse to very fine grained, poorly sorted, rounded to well rounded; about 25 percent detrital carbonate coarse to fine grained, moderately sorted (medium), angular to rounded; about 10 to 15 percent sparite matrix; grading into an intraclastic, unsorted biosparite; about 10 to 15 percent quartz and about 3 to 5 percent phosphorite as in sandstone; moderately to well cemented.	3	114 - 117

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Sandstone as above, grading into a limestone, yellowish-gray (5 Y 7/2); sandy intrasparite; about 30 percent quartz, medium to fine grained, well sorted (fine), subangular to subrounded; about 5 percent phosphorite, medium to very fine grained, moderately sorted, subrounded to well rounded; well cemented; interbedded with about 30 to 40 percent sand, quartzose, fine to very fine grained, well sorted (fine), very angular to subangular; about 10 percent phosphorite and heavy minerals, fine to very fine grained, subangular to well rounded.	5	117 - 122
Sandstone, yellowish-gray (5 Y 7/2); quartzose, medium to fine grained, moderately sorted (fine), subangular to rounded; about 20 to 25 percent detrital carbonate, coarse to fine grained, subangular to rounded; about 15 to 20 percent sparite matrix; grading into a sandy, fossiliferous intrasprite; moderately to well cemented.	2	122 - 124
Sandstone and limestone as above, grading into a shelly sandstone; about 20 to 25 percent shell fragments.	3	124 - 127
Limestone as above; grading into a sandstone; quartzose, fine to very fine grained, well sorted (fine), angular to subrounded; about 5 percent phosphorite and heavy minerals, very fine grained, angular to well rounded; well cemented.	3	127 - 130
Limestone, yellowish-gray (5 Y 8/1); intraclastic biomicrite, echinoid spines and mollusks; neomorphic calcite present; about 10 to 15 percent quartz, medium to very fine grained, moderately sorted (very fine), angular to subrounded; about 5 percent heavy minerals, very fine grained, subangular; well cemented; interbedded with about 20 percent sandstone; quartzose, fine to very fine grained, well sorted, angular to subangular; about 10 percent heavy minerals, as in limestone.	4	130 - 134
Limestone, yellowish-gray (5 Y 8/1); sandy, fossiliferous intrasparite; about 20 percent quartz, very fine grained, angular to subrounded; is in contact with a sandstone as above; cavity-filling calcite cement present; well cemented.	3	134 - 137
Limestone, yellowish-gray (5 Y 8/1); sandy, intraclastic, sparse biomicrite, mollusks including gastropods; about 10 percent quartz, medium to very fine grained, moderately sorted (fine), very angular to rounded; about 15 to 20 percent phosphorite and heavy minerals, medium to very fine grained, moderately sorted (very fine), angular to well rounded; interbedded with about 15 percent sandstone as above.	3	137 - 140

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, yellowish-gray (5 Y 8/1); sandy, intraclastic, sparse biomicrite grading into a sparse biomicrite, barnacles, mollusks including gastropods, and serpulids; neomorphic calcite is present; about 5 to 10 percent quartz, medium to very fine grained, moderately sorted (fine), angular to rounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subangular to well rounded; well cemented.	4	140 - 144
Limestone, yellowish-gray (5 Y 8/1); sandy, intraclastic, poorly washed biosparite, mollusks; about 20 percent quartz, medium to fine grained, moderately sorted (fine), subangular to rounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (fine), angular to well rounded; grading into a sandy, intraclastic sparite and sandstone, quartzose, medium to very fine grained, moderately sorted (fine), angular to rounded; about 20 percent phosphorite, coarse to fine grained, moderately sorted (fine), angular to well rounded; well cemented.	3	144 - 147
Sandstone, light-olive-gray (5 Y 5/2); quartzose, fine to very fine grained, well sorted (fine), angular to subrounded; about 20 to 30 percent detrital carbonate and shell fragments, medium to fine grained, well sorted (medium), angular to subrounded; about 5 to 10 percent phosphorite and heavy minerals, medium to very fine grained, moderately sorted (fine), angular to well rounded; about 5 percent shell fragments; about 10 to 20 percent sparite matrix; nodular; well cemented; interbedded with about 40 percent sand at 150 to 154 feet; quartzose, medium to very fine grained, moderately sorted (fine), very angular to subrounded; about 20 to 25 percent phosphorite and heavy minerals, coarse to very fine grained, moderately sorted (fine), rounded to well rounded; about 15 percent detrital carbonate and shell fragments.	7	147 - 154
Sand as above; about 10 to 15 percent detrital carbonate; interbedded with sandstone, medium to very fine grained moderately sorted (fine), angular to rounded; about 25 percent detrital carbonate, medium to fine grained, well sorted (medium), subrounded to rounded; about 20 to 25 percent phosphorite, very coarse to very fine grained, moderately sorted (fine), subangular to well rounded; moderately to well cemented.	6	154 - 160
Sand, medium-gray (N 5) to olive-gray (5 Y 4/1); quartzose, medium to fine grained, well sorted (fine), angular to rounded; about 20 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (fine), subangular to well rounded.	2	160 - 162

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Sandstone, medium-gray (N 5) to olive-gray (5 Y 4/1); quartzose, fine to very fine grained, well sorted (fine), angular to subangular; about 15 to 20 percent phosphorite and heavy minerals, very fine grained, subrounded to well rounded; about 5 to 15 percent sparite matrix; nodular and "rod-shaped"; well cemented; interbedded with about 20 percent sand as above.	28	162 - 190
Sand as in 160 to 162 feet; interbedded with about 30 to 40 percent sandstone, medium-gray (N 5) to olive-gray (5 Y 4/1); quartzose, medium to very fine grained, moderately sorted (fine), angular to rounded; about 20 percent phosphorite and heavy minerals, medium to very fine grained, moderately sorted (very fine), subangular to well rounded; about 30 percent shell fragments, mollusks including Pecten sp.	7	190 - 197
Sand as above; interbedded with sandstone at 197.5 to 198 feet, as in 162 to 190 feet.	1	197 - 198
Sandstone, medium-gray (N 5) to olive-gray (5 Y 4/1); medium to very fine grained, moderately sorted (fine), angular to rounded; about 25 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (very fine), subangular to well rounded; about 20 percent detrital carbonate, medium to fine grained, moderately sorted (medium), angular to rounded; well cemented.	1	198 - 199
Sandstone, light-olive-gray (5 Y 6/1); quartzose, medium to very fine grained, moderately sorted (fine), angular to subrounded; about 35 to 50 percent porosity, sparite matrix; about 10 to 15 percent sparite and heavy minerals, medium to very fine grained, moderately sorted (fine), subangular to well rounded; about 10 percent shell fragments; well cemented.	1	199 - 200
Sandstone and sand as in 190 to 197 feet.	6	200 - 206
Limestone, medium-light-gray (N 6); sandy intrasparite; about 35 percent quartz, medium to fine grained, moderately sorted (fine), subangular to rounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (fine), subangular to rounded; well cemented.	3	206 - 209
Sandstone, medium-light-gray (N 6); quartzose, medium to fine grained, moderately sorted (fine), subangular to rounded; about 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subangular to rounded; about 20 percent sparite matrix; about 5 to 10 percent detrital carbonate, medium to fine grained, well sorted (fine), subrounded to rounded; well cemented.	5	209 - 214

Lithologic Log of Well G-2547--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, medium-light-gray (N 6); sandy, fossiliferous intrasparite, benthic foraminifers; about 30 to 35 percent quartz, coarse to fine grained, moderately sorted (fine), subangular to rounded; about 10 to 15 percent phosphorite and heavy minerals, coarse to very fine grained, well sorted (fine), subangular to well rounded; grading into a sandstone as above; well cemented; interbedded with about 50 percent sand, quartzose, medium to very fine grained, well sorted (fine), angular to rounded; about 10 to 15 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (fine), subrounded to well rounded; about 5 to 10 percent detrital carbonate, coarse to very fine grained, well sorted (medium), subrounded to rounded.	2	214 - 216
Sand as above; abundant in benthic foraminifera; about 20 percent phosphorite and heavy minerals; interbedded with about 30 percent limestone, light-gray (N 7) and yellowish-gray (5 Y 7/2); sandy, intraclastic biosparite, benthic foraminifers, and large pelecypods and gastropods; neomorphic calcite present in test; about 30 to 35 percent quartz, medium to very fine grained, moderately sorted (fine), subrounded to rounded; about 10 to 20 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (fine), rounded to well rounded; well cemented.	4	216 - 220
Limestone, light-gray (N 7) to medium-gray (N 5); sandy intrasparite grading into a sandstone in places; about 20 to 40 percent quartz, medium to very fine grained, moderately to well sorted (fine), subrounded to rounded; about 5 to 15 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (fine), subangular to well rounded; well cemented; interbedded with about 30 to 40 percent sand as above.	13	220 - 233
Sandstone, light-gray (N 7) to medium-gray (N 5); quartzose, medium to very fine grained, well sorted (fine), subangular to rounded; about 20 percent detrital carbonate, medium to very fine grained, well sorted (fine), subangular to well rounded; about 20 percent sparite matrix; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (fine), subangular to well rounded; well cemented; interbedded with about 30 to 35 percent sand as above.	3	233 - 236
Sand, light-gray (N 7) to medium-gray (N 5); quartzose, fine to very fine grained, well sorted (fine), angular to subangular; about 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), angular to well rounded; about 5 to 10 percent detrital carbonate, medium to very fine grained, moderately sorted (fine), subangular to rounded; interbedded with sandstone as above at 238.5 to 239 feet.	3	236 - 239

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Sandstone, light-gray (N 7) to medium-light-gray (N 6); quartzose, fine to very fine grained, well sorted (fine), subangular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subangular to well rounded; about 20 to 30 percent detrital carbonate and shell fragments, medium to very fine grained, moderately sorted (fine), subangular to rounded; barnacles; moderately to well cemented.	7	239 - 246
Limestone, light-gray (N 7); sandy intrasparite; about 20 percent quartz, fine to very fine grained, well sorted (fine), angular to subrounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), rounded to well rounded; loosely to moderately cemented.	3	246 - 249
Limestone, yellowish-gray (5 Y 8/1) to light-gray (N 7); sandy, intraclastic, fossiliferous micrite; about 10 percent quartz, fine to very fine grained, well sorted (fine), subrounded to rounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), rounded to well rounded; loosely to moderately cemented.	4	249 - 253
Sandstone, medium-light-gray (N 6); quartzose, medium to very fine grained, well sorted (fine), angular to rounded; about 25 percent detrital carbonate, fine to very fine grained, well sorted (fine), subrounded to well rounded; about 20 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), rounded to well rounded; moderately to well cemented; interbedded with about 30 percent sand; quartzose, coarse to very fine grained, poorly sorted, angular to subrounded; about 15 to 20 percent phosphorite and heavy minerals, medium to very fine grained, moderately sorted (fine), subangular to well rounded; about 30 percent detrital carbonate and shell fragments, fine to very fine grained, well sorted (fine), subrounded to well rounded.	6	253 - 259
Limestone, light-gray (N 7) to medium-light-gray (N 6); sandy intrasparite; about 25 to 30 percent quartz, fine to very fine grained, well sorted (fine), angular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subrounded to well rounded; grading into an intraclastic dismicrite at 275 feet; moderately to well cemented; interbedded with about 20 percent silty clay, dark-yellowish-brown (10 YR 4/2) and about 30 to 50 percent sand as in 253 to 259 feet at 266 to 275 feet.	17	259 - 276
Sand as in 253 to 259 feet; interbedded with about 20 percent limestone as above.	3	276 - 279

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone as above grading into a sandy, fossiliferous intrasparite to a sandy intrasparite in places; about 20 to 30 percent quartz; loosely to well cemented.	14	279 - 293
Sand, light-olive-gray (5 Y 6/1); quartzose, medium to very fine grained, well sorted (fine), angular to subangular; about 15 to 20 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (fine), subrounded to well rounded; about 20 percent detrital carbonate and shell fragments, coarse to very fine grained, moderately sorted (medium), subangular to rounded; Pecten sp., echinoid spines, and abundant in benthic foraminifers; interbedded with about 30 to 35 percent sandstone as in 253 to 259 feet.	3	293 - 296
Sandstone, light-olive-gray (5 Y 6/1); quartzose, fine to very fine grained, well sorted (fine), subangular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subrounded to well rounded; about 25 to 30 percent detrital carbonate, medium to very fine grained, well sorted (fine), subrounded to rounded; about 10 percent shell fragments at 299 to 303 feet; moderately to well cemented.	7	296 - 303
Limestone, medium-light-gray (N 6) to medium-gray (N 5); sandy, fossiliferous intrasparite grading into a sandy intrasparite in places; about 20 percent quartz, fine to very fine grained, well sorted (fine), subangular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subrounded to well rounded; moderately to well cemented; interbedded with sand as in 293 to 296 feet; about 60 percent at 306 to 309 feet and about 30 percent at 309 to 313 feet.	10	303 - 313
Sand, light-gray (N 7); quartzose, fine to very fine grained, well sorted (fine), angular to subangular; about 15 to 20 percent phosphorite and heavy minerals, very fine grained, subrounded to well rounded; about 15 to 20 percent detrital carbonate and shell fragments, medium to very fine grained, well sorted (fine), subrounded to rounded; pink barnacles and benthic foraminifers.	5	313 - 318
Sandstone, light-olive-gray (5 Y 6/1); quartzose, medium to very fine grained, well sorted (fine), subangular to subrounded; about 20 percent phosphorite and heavy minerals, very fine grained, subrounded to well rounded; about 10 to 15 percent detrital carbonate; medium to very fine grained, well sorted (fine), subrounded to rounded; about 5 percent shell fragments; moderately to well cemented.	7	318 - 325

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, light-olive-gray (5 Y 6/1); sandy, fossiliferous intramicrite, benthic foraminifers and mollusks; about 20 percent quartz, fine to very fine grained, well sorted (fine), subangular to subrounded; about 10 to 15 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), subrounded to well rounded; loosely to well cemented.	2.5	325 - 327.5
Limestone, light-olive-gray (5 Y 5/2); sandy intramicrite; about 20 to 25 percent quartz, medium to very fine grained, moderately sorted (fine), subrounded; about 20 percent phosphorite and and heavy minerals, medium to very fine grained, well sorted (very fine), rounded to well rounded; well cemented.	1.5	327.5 - 329
Limestone, light-olive-gray (5 Y 6/1); sandy intrasparite; about 15 to 20 percent phosphorite and heavy minerals, very fine grained, rounded to well rounded; about 10 to 15 percent quartz, fine to very fine grained, well sorted (fine), angular to subangular; well cemented; interbedded with about 30 percent sandy, intraclastic, fossiliferous micrite; about 25 to 30 percent quartz, medium to very fine grained, moderately sorted (fine), subrounded; about 10 percent phosphorite and heavy minerals, medium to very fine grained, well sorted (very fine), rounded to well rounded; moderately to well cemented.	4	329 - 333
Sand, medium-gray (N 5); quartzose, fine to very fine grained, well sorted (fine), angular to subangular; about 15 to 20 percent phosphorite and heavy minerals, very fine grained, rounded to well rounded; about 25 to 30 percent detrital carbonate and shell fragments, fine grained, subangular to rounded; about 15 percent micrite, not cemented; interbedded with about 15 percent sandy, fossiliferous intramicrite as above.	3	333 - 336
Limestone, pale-olive (10 YR 6/2); sandy, silty micrite; about 30 percent silt; about 10 percent phosphorite, very fine grained, rounded to well rounded; loosely cemented.	7	336 - 343
Limestone, pale-olive (10 YR 6/2); silty, fossiliferous micrite; about 30 percent silt; about 5 percent phosphorite, very fine grained, rounded to well rounded; loosely cemented.	3	343 - 346

Lithologic Log of Well G-2347--Continued

Lat 26°05'07", long 80°08'56"
Sec. 22, T. 50 S., R. 42 E.

Description	Thickness (feet)	Depth, feet below land surface
Limestone, pale-olive (10 YR 6/2); sandy, fossiliferous micrite; about 20 to 30 percent quartz, very fine grained, angular; about 5 to 10 percent phosphorite and heavy minerals, very fine grained, rounded to well rounded; loosely cemented.	10	346 - 356
Limestone, pale-olive (10 YR 6/2); sandy, intraclastic, fossiliferous micrite, mollusks; about 25 percent quartz, medium to very fine grained, moderately to well sorted (fine), angular to subangular; about 10 to 15 percent phosphorite and heavy minerals, very fine grained, rounded to well rounded; loosely to well cemented.	10	356 - 366
Limestone, pale-olive (10 YR 6/2) to pale-greenish-yellow (10 YR 8/2); sandy, fossiliferous intracmicrite, mollusks; about 20 to 25 percent quartz, fine to very fine grained, well sorted (very fine), angular to subangular; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (fine to very fine at 369 to 373 feet), subangular to well rounded; loosely to well cemented.	27	366 - 393
Limestone, pale-olive (10 YR 6/2); sandy, intraclastic, fossiliferous micrite; about 20 percent quartz, medium to very fine grained, moderately sorted (very fine), subrounded to rounded; about 5 to 10 percent phosphorite, fine to very fine grained, well sorted (fine), rounded to well rounded; loosely to moderately cemented.	3	393 - 396
Limestone, pale-olive (10 YR 6/2); sandy, fossiliferous intramicrite grading into a sandy intramicrite, abundant in planktonic foraminifers at 429 to 433 feet, mollusks, and claws at 449 to 453 feet; about 5 to 25 percent quartz, medium to very fine grained, well sorted (very fine), angular to rounded; about 5 to 10 percent phosphorite and heavy minerals, fine to very fine grained, well sorted (very fine), rounded to well rounded; loosely to moderately cemented.	79	396 - 475

Reference 18

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STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
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DIVISION OF RESOURCE MANAGEMENT
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BULLETIN NO. 59

THE LITHOSTRATIGRAPHY OF THE HAWTHORN GROUP (MIOCENE) OF FLORIDA

By
Thomas M. Scott

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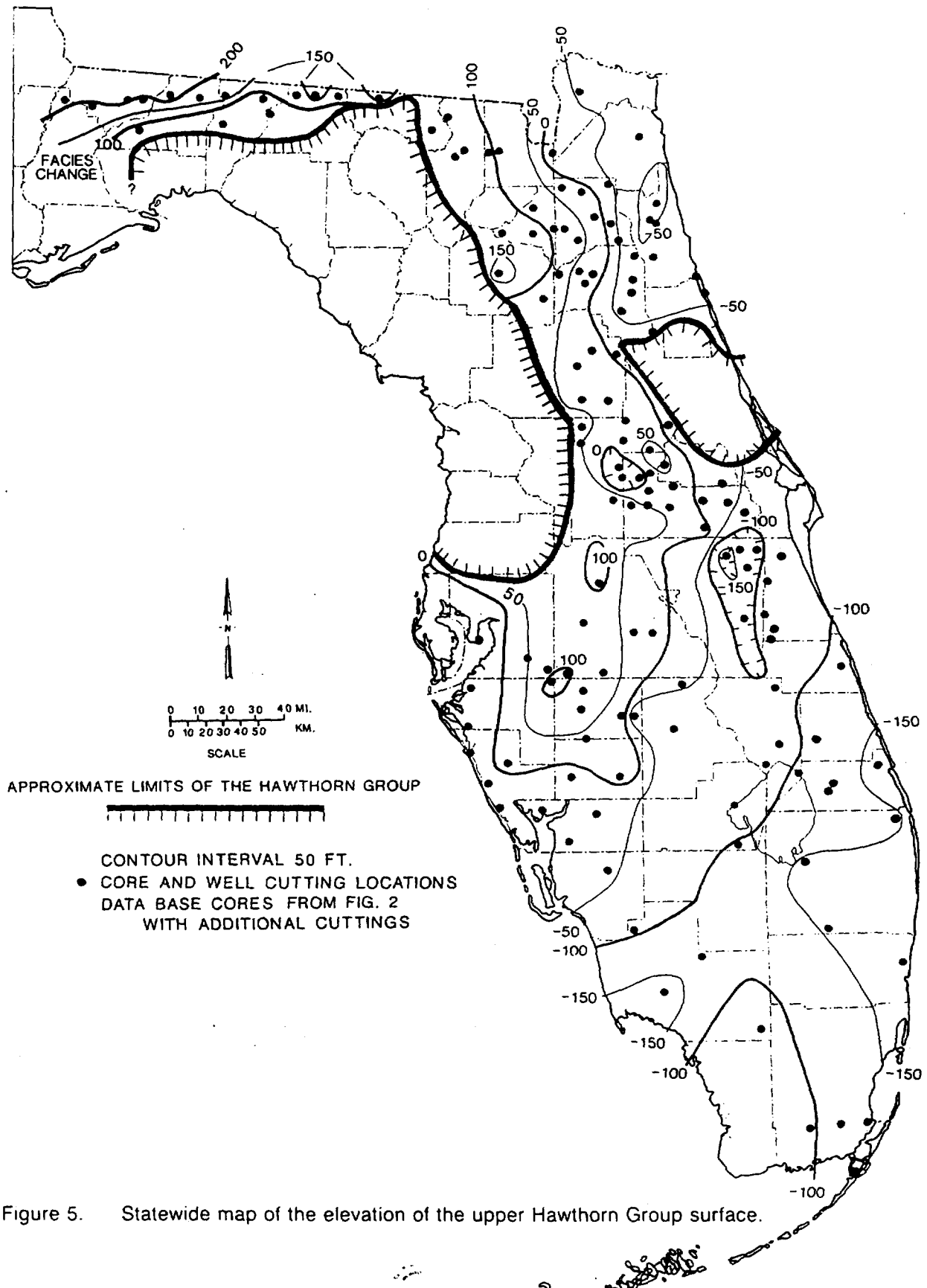

Figure 5. Statewide map of the elevation of the upper Hawthorn Group surface.

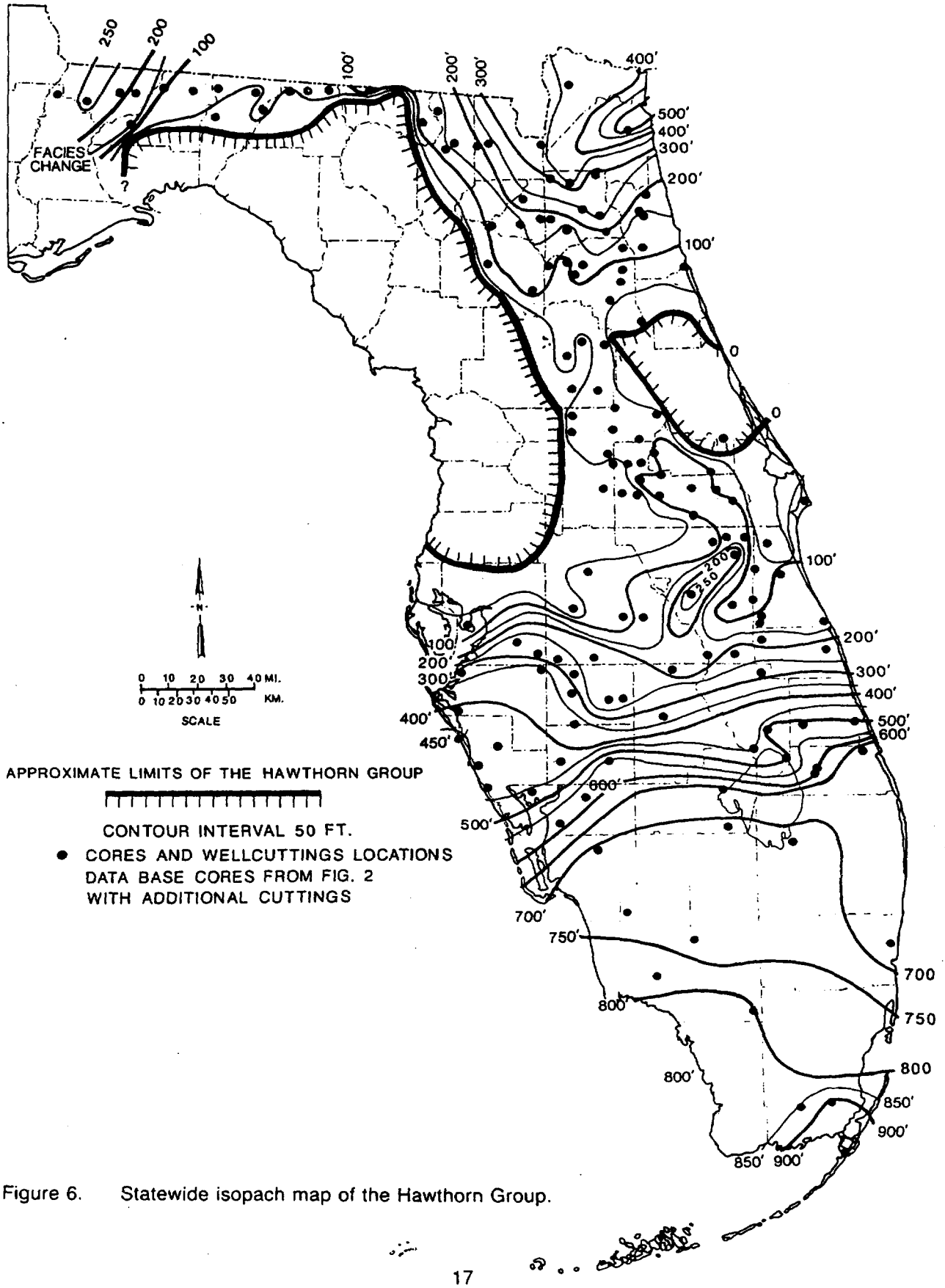

Figure 6. Statewide isopach map of the Hawthorn Group.

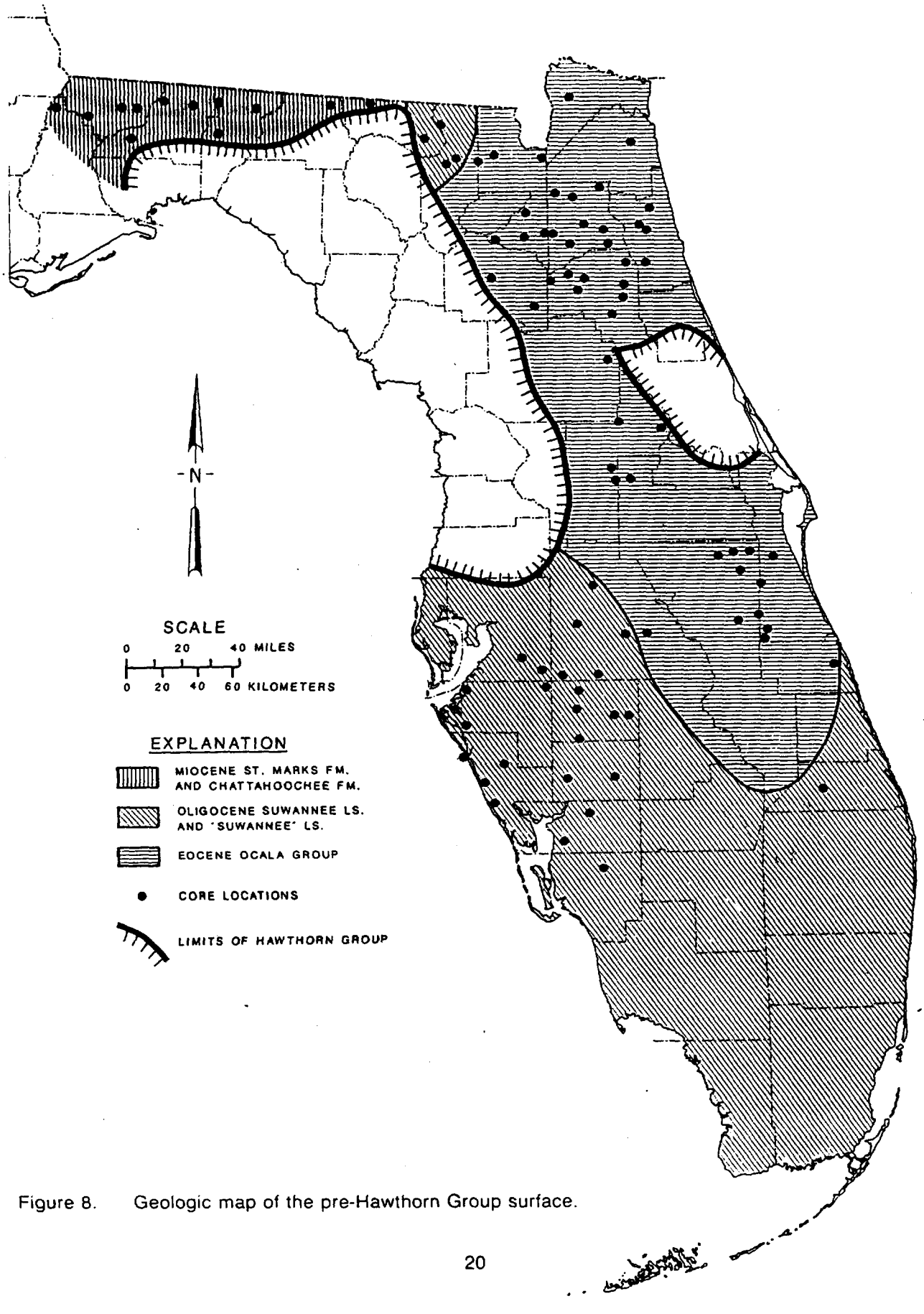

Figure 8. Geologic map of the pre-Hawthorn Group surface.

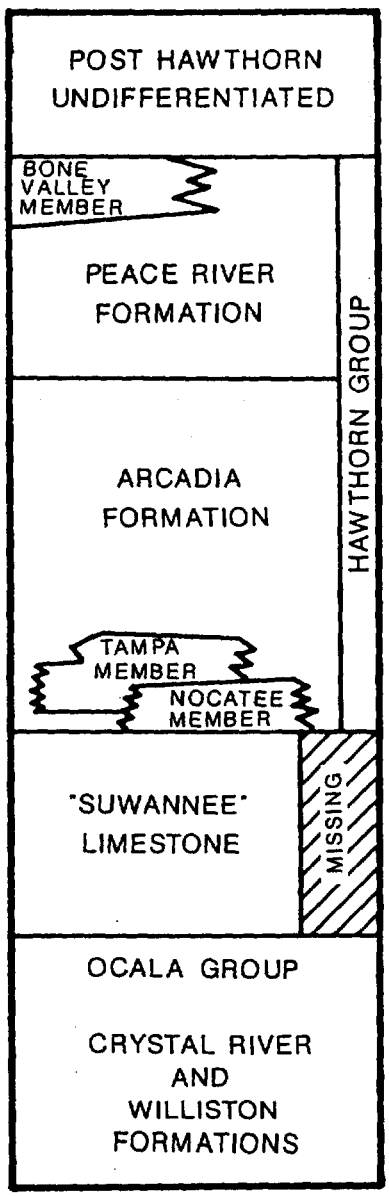

Figure 33. Lithostratigraphic units of the Hawthorn Group in southern Florida.

SOUTH FLORIDA

Although the Hawthorn Group in south Florida consists of the same general sediment types (carbonate, quartz sand, clay and phosphate), the variability and complexity of the section is different from the strata in northern Florida. In the south Florida area (Figure 1), particularly the western half of the area, the Hawthorn Group consists of a lower, predominantly carbonate unit and an upper, predominantly siliciclastic unit. Eastward the section becomes more complex due to a greater percentage of siliciclastic beds present in the lower portion of the Hawthorn Group.

The differences that exist between the northern and southern sections of the Hawthorn Group require separate formational nomenclature. In southern Florida, the Hawthorn Group consists of in ascending order, the Arcadia Formation (new name) with the Tampa and Nocatee (new name) Members and the Peace River Formation (new name) with the Bone Valley Member (Figure 33). The new nomenclature helps alleviate many of the previously existing problems associated with the relationship of the Bone Valley, Tamiami, Hawthorn, and Tampa units in the south Florida region.

ARCADIA FORMATION

Definition and Type Section

The Arcadia Formation is a new formational name proposed here for the lower Hawthorn carbonate section in south Florida. This unit includes sediments formerly assigned to the Tampa Formation or Limestone (King and Wright, 1979) and the "Tampa sand and clay" unit of Wilson (1977).

Dall and Harris (1892) used the term "Arcadia marl" to describe beds along the Peace River. This term was never widely used and did not appear in the literature again except in reference to Dall and Harris. It appears that their use of the "Arcadia marl" described a carbonate bed now belonging in the Peace River Formation of the upper Hawthorn Group. Riggs (1967) used the term "Arcadia formation" for the carbonate beds often exposed at the bottom of the phosphate pits in the Central Florida Phosphate District. Riggs' use of this name was never formalized. The "Lexicon of Geologic Names" (U.S.G.S., 1966) listed the name Arcadia as being used as a member of the Cambrian Trempealeau Formation in Wisconsin and Minnesota, thereby precluding its use elsewhere. Investigations into the current status of this name indicated that the Arcadia member has not been used in some 25 years and does not fit the current Cambrian stratigraphic framework. The Lexicon also indicates Arcadia clays as an Eocene (Claibornian) unit in Louisiana. This name also has been dropped from the stratigraphic nomenclature of Louisiana (Louisiana Geological Survey, 1984, personal communication). Since these former usages of this name are no longer viable, the term can be used for the lower Hawthorn Group sediments in southern Florida in accordance with Article 20 of the North American Code of Stratigraphic Nomenclature (NACSN, 1983).

The Arcadia Formation is named after the town of Arcadia in DeSoto County, Florida. The type section is located in core W-12050, Hogan #1, DeSoto County (SE¼, NW¼, Section 16, Township 38S, Range 26E, surface elevation 62 feet (19 meters)) drilled in 1973 by the Florida Geological Survey. The type Arcadia Formation occurs between -97 feet MSL (-30 meters MSL) to -520 feet MSL (-159 meters) (Figure 34).

Two members can be recognized within the Arcadia Formation in portions of south Florida. These are the Tampa Member and the Nocatee Member (Figure 33). The members are not recognized throughout the entire area. When the Tampa and Nocatee are not recognized, the section is simply referred to as the Arcadia Formation.

Lithology

The Arcadia Formation, with the exception of the Nocatee Member, consists predominantly of limestone and dolostone containing varying amounts of quartz sand, clay and phosphate grains. Thin beds of quartz sand and clay often are present scattered throughout the section. These thin sands and clays are generally very calcareous or dolomitic and phosphatic. Figure 34 graphically illustrates the lithologies of the Arcadia Formation including the Tampa and Nocatee Members. The lithologies of the

Tampa and Nocatee Members will be discussed separately from the undifferentiated Arcadia Formation.

Dolomite is generally the most abundant carbonate component of the Arcadia Formation except in the Tampa Member. Limestone is common and occasionally is the dominant carbonate type. The dolostones are quartz sandy, phosphatic, often slightly clayey to clayey, soft to hard, moderately to highly altered, slightly porous to very porous (moldic porosity) and micro- to fine crystalline. The dolostones range in color from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). The phosphate grain content is highly variable ranging up to 25 percent but is more commonly in the 10 percent range. The limestones of the Arcadia are typically quartz sandy, phosphatic, slightly clayey to clayey, soft to hard, low to highly recrystallized, variably porous and very fine to fine grained. The limestones are typically a wackestone to mudstone with few beds of packstone. They range in color from white (N 9) to yellowish gray (5 Y 8/1). The phosphate grain content is similar to that described for the dolostones. Fossils are generally present only as molds in the carbonate rocks.

Clay beds occur sporadically throughout the Arcadia Formation. They are thin, generally less than 5 feet thick, and of limited areal extent. The clays are quartz sandy, silty, phosphatic, dolomitic and poorly to moderately indurated. Color of the clay ranges from yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1). Lithoclasts of clay are often found in other lithologies. Smectite, illite, palygorskite, and sepiolite comprise the clay mineral suite (Reynolds, 1962).

Quartz sand beds also occur sporadically and are generally less than 5 feet thick. They are very fine to medium grained (characteristically fine grained), poorly to moderately indurated, clayey, dolomitic and phosphatic. The sands are usually yellowish gray (5 Y 8/1) in color.

Chert is also sporadically presently in the Arcadia Formation in the updip areas (portions of Polk, Hillsborough, Manatee and Hardee Counties). In many instances the chert appears to be silicified clays and dolosilts.

Subjacent and Suprajacent Units

The Arcadia Formation overlies either the Ocala Group or the "Suwannee" Limestone in the south Florida region (Figure 8). The contact between the basal Arcadia and the Ocala Group is an easily recognized unconformity. In the north central and northeastern portions of southern Florida, where the Hawthorn Group overlies the Ocala Group (Figures 8 and 41), the Arcadia is characteristically a gray, hard, quartz sandy, phosphatic dolostone with a few siliciclastic interbeds. This is in contrast to the Ocala Group, which is a cream to white, fossiliferous, soft to hard limestone (packstone to wackestone).

Throughout most of south Florida, the Hawthorn Group overlies limestones most often referred to as the "Suwannee" Limestone (Figure 33). In much of this area the contact is recognizably unconformable. The contrast between the sandy, phosphatic, fine-grained to finely crystalline carbonates of the Arcadia and the coarser grained nonphosphatic, non-quartz-sandy limestones of the "Suwannee" Limestone allow the contact to be easily placed. However, in the downdip areas (e.g., Lee and Charlotte Counties and further south) the contact becomes more obscure. In this area the contact is placed at the base of the last occurrence of a sandy, variably phosphatic carbonate.

The limestones underlying the Arcadia are referred to as "Suwannee" limestone due to the uncertainty of the formational assignment. These sediments have characteristically been called "Suwannee" by previous workers despite the fact that they have never been accurately correlated with the typical Suwannee Limestone in northern Florida. Hunter (personal communication, 1984) believes that these carbonates are not Suwannee or the equivalent but are an unnamed limestone of Chickasawhayan Age (Late Oligocene).

Unconformably overlying the Arcadia Formation is the Peace River Formation (Figure 33). The Peace River Formation is predominantly a siliciclastic unit with varying amounts of carbonate beds. The percentage of carbonate beds is higher near the base of the Peace River, resulting in a transitional or gradational contact with the Arcadia. In some areas the contact is often marked by a phosphatic rubble zone and/or a phosphatized dolostone hardground. In the more gradational sequence the contact is placed where the carbonate beds become significantly more abundant than the siliciclastic beds.

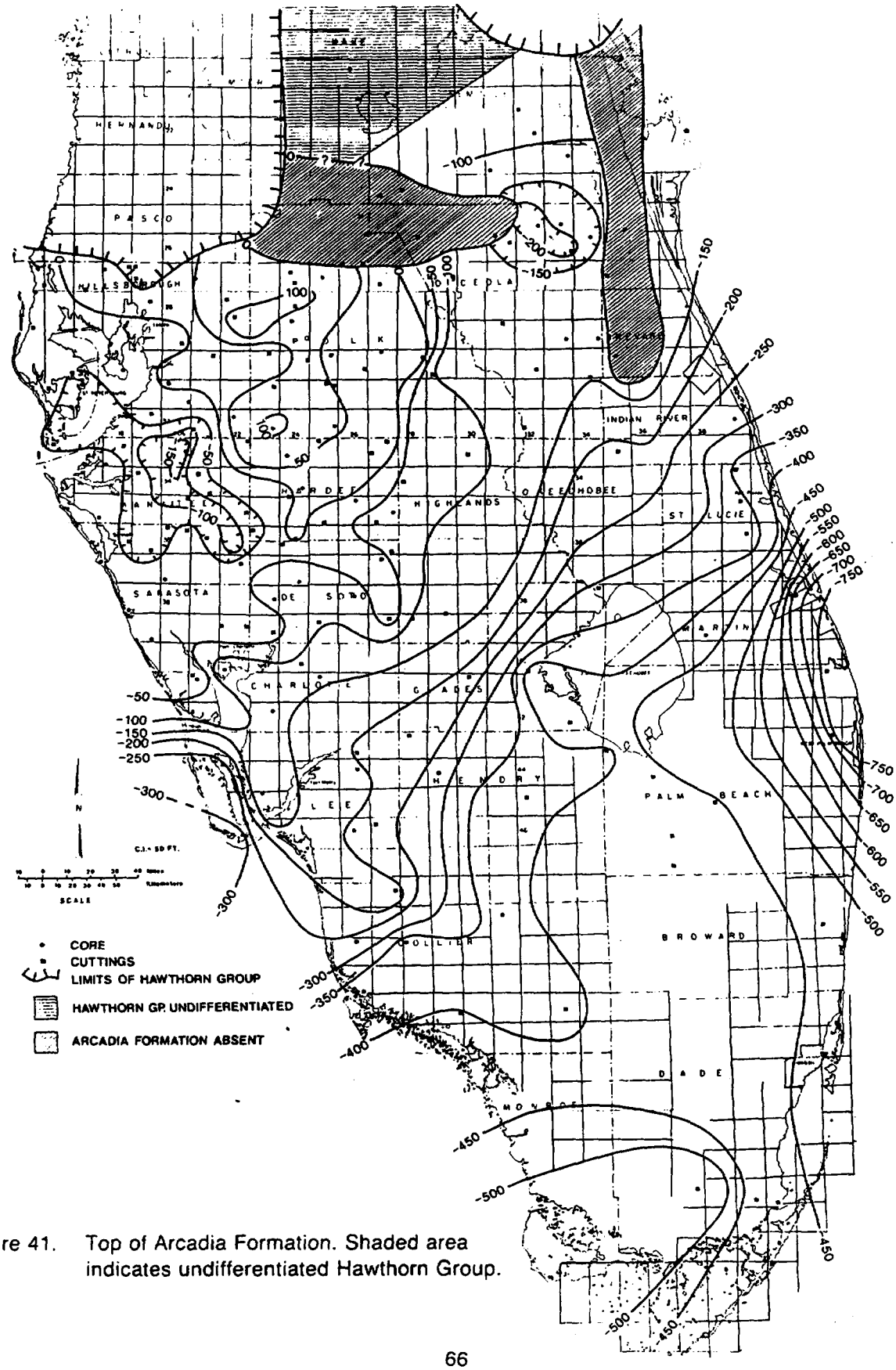

Figure 41. Top of Arcadia Formation. Shaded area indicates undifferentiated Hawthorn Group.

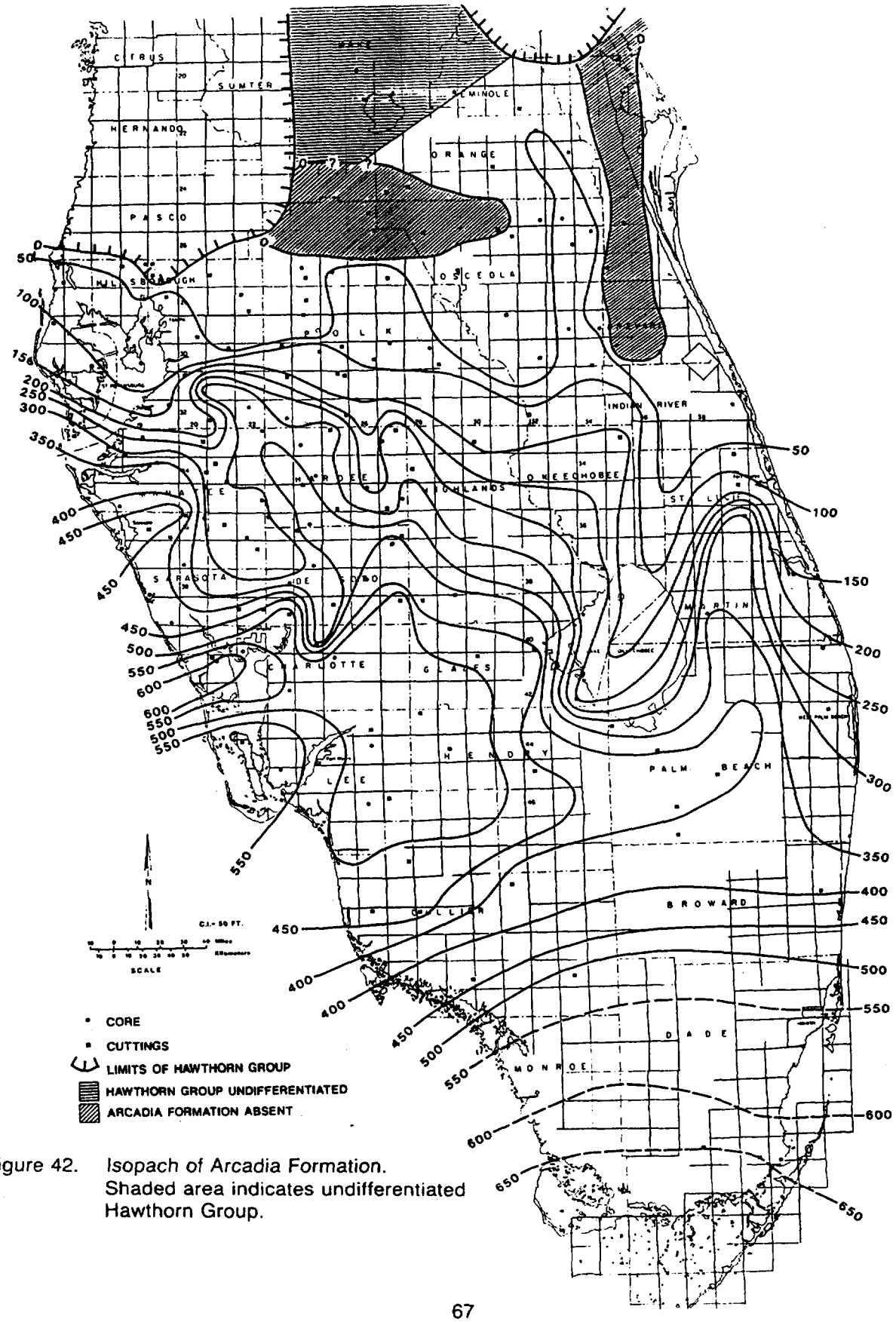

Figure 42. *Isopach of Arcadia Formation.* Shaded area indicates undifferentiated Hawthorn Group.

Discussion

The sediments of the Nocatee Member have been recognized for some time. The name "Tampa sand and clay unit" represents the first published name applied to these sediments (Wilson, 1977). Although these sediments are of limited areal extent, their distinctive lithology suggests the formal recognition of these sediments as a member of the Arcadia Formation. Outside the recognized area of occurrence equivalent carbonate sediments of the Arcadia Formation are often very sandy and may contain thin clay beds. The equivalence of the two units is recognized by the stratigraphic position.

PEACE RIVER FORMATION

Definition and Type Section

The Peace River Formation is a new formational rank name proposed for the combined upper Hawthorn siliciclastic strata and the Bone Valley Formation. The upper Hawthorn siliciclastic strata include siliciclastic beds previously placed in the Tamiami Formation (Parker, 1951) and the Murdock Station and Bayshore Clay members of the Tamiami Formation (Hunter, 1968). The formation is named for the Peace River which occurs in the vicinity of the type section in core W-12050.

The type section for the Peace River Formation is designated as core W-12050, Hogan #1, located in east central DeSoto County, Florida (SE ¼, NW ¼ Section 16, Township 38S, Range 26E) with a surface elevation of 62 feet (19 meters). The type Peace River Formation occurs between +41 feet (+12.5 meters) MSL and -97 feet (-29.5 meters) MSL (Figure 51).

W-15303, R.O.M.P. #17, is suggested as a reference section (Figure 48). R.O.M.P. #17 is located west of W-12050 in the west central part of DeSoto County (NE ¼, NE ¼ Section 14, Township 38S, Range 23E, surface elevation 22 feet (6.5 meters)). The Peace River Formation occurs between -3 feet (-1 meter) MSL and -77 feet (-23.5 meters) MSL in W-15303.

Lithology

The Peace River Formation consists of interbedded quartz sands, clays and carbonates. The siliciclastic component predominates and is the distinguishing lithologic feature of the unit. Typically the siliciclastics comprise two-thirds or more of the formation.

The quartz sands are characteristically clayey, calcareous to dolomitic, phosphatic, very fine to medium grained, and poorly consolidated. Their color ranges from light gray (N 7) and yellowish gray (5 Y 8/1) to olive gray (5 Y 4/1). The phosphate content of the sands is highly variable. In the type section (W-12050), the phosphate content is lowest in the upper part of the section and greatest near the base. The same is true for the reference section in W-15303. The phosphate occurs both as sand- and gravel-sized particles. The gravels are most abundant in the Bone Valley Member, although they may occur elsewhere in the unit.

Clay beds are quite common in the Peace River Formation. The clays are quartz sandy, silty, calcareous to dolomitic, phosphatic, and poorly to moderately indurated. Color ranges from yellowish gray (5 Y 8/1) to olive gray (5 Y 4/1). Reynolds (1962) characterized the clay minerals as consisting of smectite (montmorillonite), palygorskite (attapulgite) and sepiolite. Strom (personal communication, 1984) and Barwood (personal communication, 1984) agree that smectite and palygorskite are the dominant clay minerals in the formation.

Carbonates occur throughout the Peace River Formation. Characteristically they comprise less than 33 percent of the Peace River section. The carbonates may be either limestone or dolostone. Updip (northward), dolostone occurs more frequently. The limestones are characteristically variably sandy, clayey and phosphatic, poorly to well indurated, mudstones to wackestones. They vary in color from yellowish gray (5 Y 8/1) to white (N 9). Dolostones are micro- to very finely crystalline, variably sandy, clayey and phosphatic, and poorly to well indurated. Colors range from light gray (N 7) to yellowish gray

(5 Y 8/1). Mollusk molds are common throughout the carbonates. Occasionally dolomite occurs as a dolosilt (composed of unconsolidated, silt-sized dolomite rhombs). The dolosilts contain variable amounts of clay, are generally only slightly sandy and phosphatic, and do not contain fossil molds or fragments.

Chert occurs sporadically in the Peace River Formation. Characteristically it appears to be a replacement of the carbonates although silicified clays do occur. The cherts are opaline and are suggestive of localized "alkaline lake" deposition, as described by Upchurch, Strom and Nuckels (1982) and Strom and Upchurch (1983).

Subjacent and Suprajacent Units

The Peace River Formation disconformably overlies the Arcadia Formation throughout its extent. The contact often appears unconformable updip and conformable (gradational) downdip (Figure 35 through 40). The gradational appearance is due to the repetition of similar lithologies in both formations. When the boundary appears gradational the base of the Peace River Formation is placed where the carbonates become dominant over the siliciclastic beds (Figures 48 and 51). As was previously mentioned in the discussion of the Arcadia Formation, the contact may also be marked by a rubble zone.

The sediments overlying the Peace River Formation are assigned to several formations. In the south Florida area and the southern part of east central Florida, the limestone and sand facies of the Tamiami Formation unconformably overlie the Peace River. Sediments disconformably suprajacent to the Peace River Formation in the west central Florida area (Polk, Hillsborough, Manatee, Sarasota, and Charlotte Counties) and parts of east central Florida are generally unnamed, nonphosphatic sands (often surficial) and unnamed fossiliferous sands and shell beds. The contact with the surficial sands is often obscure due to leaching of the phosphate and clays in the upper portion of the Peace River Formation. In the central and south central section, unfossiliferous non-phosphatic to very slightly phosphatic sands overlie the Peace River. These sands have been called "Citronelle" Formation (Cooke and Mossom, 1929; Cooke, 1945) and "Fort Preston" Formation (Puri and Vernon, 1964). In Georgia, these sands are currently assigned to the Cypresshead Formation by Huddlestun (personal communication, 1984). These sediments are assigned here, for convenience, to the post-Hawthorn sediments.

Problems in identifying the upper limits of the Peace River arise in areas of extensive reworking of the sediments. In such a case the sediment may be completely reworked and the resultant lithology only slightly different than the unreworked sediments. When this occurs minor changes in lithology such as an increase in shell material, change in clay mineralogy, or change in sorting provide the necessary lithologic criteria for separating the units.

Thickness and Areal Extent

Sediments assigned to the Peace River Formation occur over much of the southern half of the Florida peninsula. The top of the unit ranges from a maximum known elevation of +175 feet (+53 meters) MSL in Polk County to greater than -150 feet (-46 meters) MSL in part of Collier, Dade, Broward, and Palm Beach Counties (Figure 52). The thickness of this unit varies to more than 650 feet (198 meters) in parts of Martin and Palm Beach Counties (Figure 53). This thickness, which is taken from several sets of cuttings in the area, seems anomalously thick. Thicknesses of 400 feet (122 meters) or greater occur in eastern Glades County along the western edge of Lake Okeechobee (Figure 53).

Although the Peace River Formation occurs over most of the southern portion of the state, it is absent from the Ocala Platform and the Sanford High (Figures 4, 52 and 53). It is also absent, possibly due to erosion, from portions of Hillsborough, Pinellas, Manatee and Sarasota Counties (Figures 52 and 53). It dips east, south and west off the southern nose of the Ocala Platform (an area referred to as the Central Florida Platform by Hall [1983]). South of this area, the dip is primarily south and southeast at approximately 8 feet per mile (1.3 meters per kilometer) (Figure 52). Local variations of dip direction and degree are common.

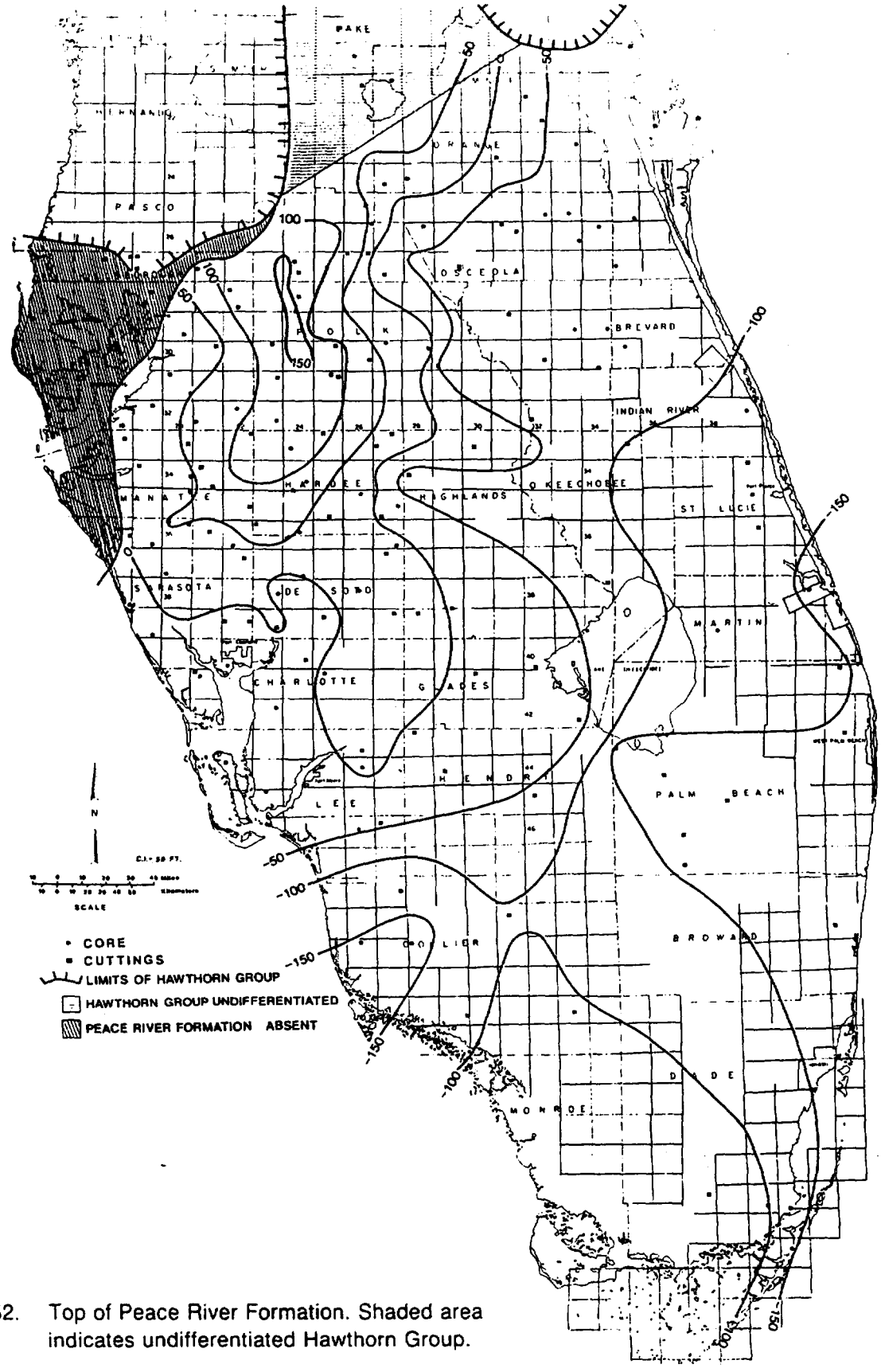

Figure 52. Top of Peace River Formation. Shaded area indicates undifferentiated Hawthorn Group.

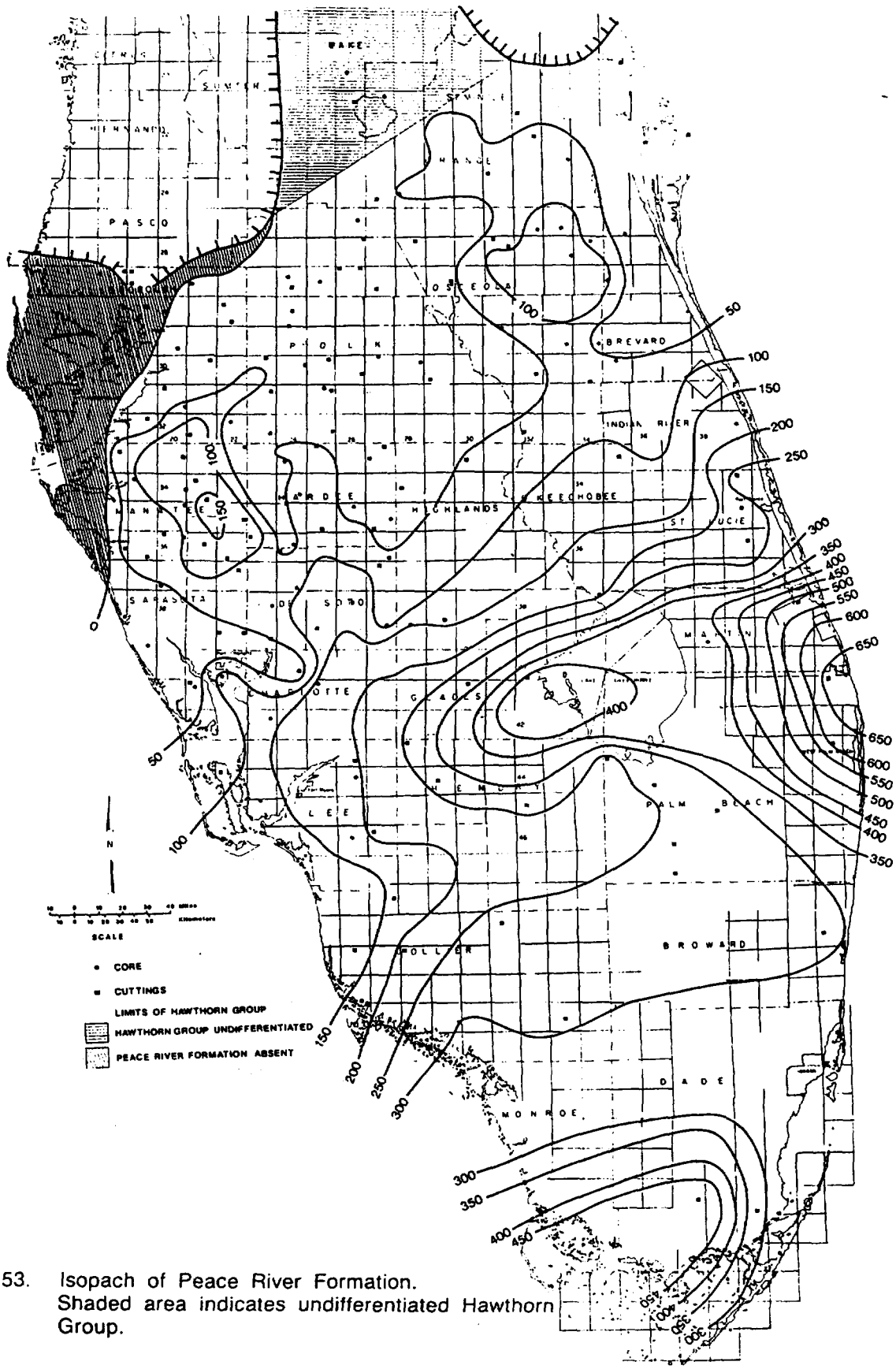

Figure 53. Isopach of Peace River Formation. Shaded area indicates undifferentiated Hawthorn Group.

Reference 19

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FLORIDA'S GROUND WATER QUALITY MONITORING PROGRAM

HYDROGEOLOGICAL FRAMEWORK

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the peninsula except in the northwestern-most peninsular area where the Oldsmar Formation forms the base (Miller, 1986). The upper, porous dolostone comprises the lowest beds of the Floridan aquifer system. The lower Cedar Keys Formation is significantly less porous, contains evaporites and forms the sub-Floridan confining unit.

Eocene Series

The sediments of the Eocene Series that form portions of the Floridan aquifer system are carbonates. During the Early Eocene, deposition followed a distribution pattern similar to the Paleocene carbonate sediments. However, through the Eocene, carbonate-forming environments slowly encroached further north and west over what had been siliciclastic depositional environments during the Paleocene. The Eocene carbonate sediments are placed in the Oldsmar Formation, Avon Park Formation and the Ocala Group. The Eocene carbonate sediments comprise a large part of the Floridan aquifer system.

Claiborne Group

The Lower to Middle Eocene Claiborne Group unconformably (?) overlies the undifferentiated Lower Eocene and Paleocene sediments. The Claiborne Group consists of the Tallahatta and Lisbon Formations which are lithologically nearly identical and are not separated. The group is composed of glauconitic, often clayey sand grading into fine-grained limestone to the south (Allen, 1987). The Claiborne Group ranges from 250 to 400 feet below NGVD and is up to 350 feet thick (Allen, 1987). It is unconformably overlain by the Ocala Limestone.

Oldsmar Formation

The Oldsmar Formation consists predominantly of limestone interbedded with vuggy dolostone. Dolomitization is usually more extensive in the lower portion of the section. Pore-filling gypsum and thin beds of anhydrite occur in some places, often forming the base of the Floridan aquifer system (Miller, 1986).

The Oldsmar Formation is recognized throughout the Florida peninsula. It grades laterally in the eastern panhandle into Undifferentiated Lower to Middle Eocene sediments equivalent to the Claiborne Group. The undifferentiated sediments are marine shales, siltstones, fine sandstones and impure limestones (Miller, 1986).

Avon Park Formation

The Middle Eocene sediments of peninsular Florida as originally described by Applin and Applin (1944) were subdivided, in ascending order, into the Lake City Limestone and the Avon Park Limestone. Miller (1986) recommended the inclusion of the Lake City in the Avon Park based on the very similar nature of the sediments. Miller also changed the term limestone to formation due to the presence of significant quantities of dolostone within the expanded Avon Park Formation.

The Avon Park Formation is primarily composed of fossiliferous limestone interbedded with vuggy dolostone. In a few, limited areas of west-central Florida, evaporites are present as vug fillings in dolostone.

The Avon Park Formation occurs throughout the Florida peninsula and the eastern panhandle in a pattern very similar to the underlying Oldsmar Formation. The oldest rocks cropping out in Florida belong to the Avon Park Formation. These sediments are locally exposed on the crest of the Ocala Platform in west-central peninsular Florida.

The carbonate sediments of the Avon Park Formation form part of the Floridan aquifer system and serve to subdivide it into an upper and lower Floridan in many areas. Miller (1986) recognized that portions of the Avon Park Formation are fine-grained and have low permeability, often acting as a confining bed in the middle of the Floridan aquifer system. In Brevard County, for example, these low permeability beds are relied upon to keep less desirable water injected into the lower Floridan from migrating into the potable water of the upper Floridan.

Ocala Limestone

Dall and Harris (1892) referred to the limestones exposed in central peninsular Florida near the city of Ocala in Marion County as the Ocala Limestone. Puri (1957) raised the Ocala to group and recognized formations based on the incorporated foraminiferal faunas. As a result of the biostratigraphic nature of these subdivisions, formational recognition is often difficult. In keeping with the intent of the Code of Stratigraphic Nomenclature, in this text, the Florida Geological Survey is returning to the use of the Ocala Limestone terminology.

The lower and upper subdivisions of the Ocala Limestone are based on distinct lithologic differences. The lower subdivision consists of a more granular limestone (grainstone to packstone). The lower facies is not present everywhere and may be partially to completely dolomitized in some regions (Miller, 1986). The upper unit is composed of variably muddy (carbonate), granular limestone (packstone to wackestone with very limited grainstone). Often this unit is very soft and friable with numerous large foraminifera. In southern Florida, virtually the entire Ocala Limestone consists of a muddy (carbonate) to finely pelletal limestone (Miller,1986). Chert is a common component of the upper portion of the Ocala Limestone. The Bumpnose "Formation", a very early Oligocene fossiliferous limestone, is lithologically very similar to the Ocala Limestone. It is included in the Ocala Limestone in this report.

The sediments of the Ocala Limestone form one of the most permeable zones within the Floridan aquifer system. The Ocala Limestone comprises much of the Floridan aquifer system in the central and western panhandle. The extensive development of secondary porosity by dissolution has greatly enhanced the permeability, especially in those areas where the confining beds are breached or absent. The Ocala Limestone forms the lower portion of the Floridan in the western panhandle (Wagner, 1982). In much of the peninsular area, it comprises all or part of the upper Floridan.

By Late Eocene, carbonate sediments were deposited significantly further to the north and west than had previously occurred during the Cenozoic. The Ocala Limestone is present throughout much of the State except where the unit has been erosionally removed. This occurs in outcrop on the crest of the Ocala Platform and in the subsurface on the Sanford High, a limited area in central Florida and a relatively large area in southernmost Florida (Miller, 1986). Chen (1965) suggests that the Ocala Limestone is also absent in a portion of Palm Beach County in eastern southern Florida. The surface and thickness of the Ocala Limestone are highly irregular due to dissolution of the limestones as karst topography developed.

Oligocene Series

The carbonate sediments of the Oligocene Series form much of the upper portion of the Floridan aquifer system in Florida. The depositional pattern of the Oligocene sediments shows that carbonate sediments were deposited well updip to the north of the Florida Platform (Miller, 1986). In the central panhandle and to the west, siliciclastic sediments began to be mixed with the carbonates.

The Oligocene sediments in peninsular Florida and part of the panhandle are characteristically assigned to the Suwannee Limestone. The Oligocene sediments in the central and western panhandle are placed in the Marianna, Bucatunna and Chickasawhay Formations (Miller, 1986). In the westernmost panhandle, the lower carbonates of the Suwannee Limestone grade into the siliciclastic Byram Formation (Braunstein et al., 1988).

Suwannee Limestone

The Suwannee Limestone consists primarily of variably vuggy and muddy (carbonate) limestone (grainstone to packstone). The occurrence of a vuggy, porous dolostone is recognized in the type area, the eastern to central panhandle and in southwest Florida. The dolostone often occurs interbedded between limestone beds.

The Suwannee Limestone is absent throughout a large area of the northern and central peninsula probably due to erosion. Scattered outliers of Suwannee Limestone are present within this area. Where it is present, the Suwannee Limestone forms much of the upper portion of the Floridan aquifer system. The reader is referred to Miller (1986) for a map of the occurrence of the Suwannee Limestone in the peninsula.

Marianna Limestone

The Marianna Limestone is a fossiliferous, variably argillaceous limestone (packstone to wackestone) that occurs in the central panhandle. It is laterally equivalent to the lower portion of the Suwannee Limestone. The Marianna Limestone forms a portion of the uppermost Floridan aquifer system in the central panhandle region.

Bucatunna Clay Member of the Byram Formation

The Bucatunna Clay Member is silty to finely sandy clay. Fossils are generally scarce in the Bucatunna (Marsh, 1966). The sand content of the Bucatunna ranges from very minor percentages to as much as 40 percent (Marsh, 1966).

The Bucatunna Clay Member has a limited distribution in the western panhandle. It occurs from the western end of the state eastward to approximately the Okaloosa-Walton County line where it pinches out (Marsh, 1966). The Bucatunna Clay Member provides an effective intra-aquifer confining unit in the middle of the Floridan aquifer system in the western panhandle.

Chickasawhay Formation

Marsh (1966) describes the Chickasawhay Formation as being composed of highly porous limestone and dolomitic limestone. This is often interbedded with porous to compact dolomitic limestone to dolostone. The Chickasawhay Formation grades into the upper Suwannee Limestone eastward. Due to difficulty in separating the Chickasawhay from the Lower Miocene limestones in the western panhandle, both Marsh (1966) and Miller (1986) included thin beds of possible Lower Miocene carbonate in the upper portion of the Chickasawhay Formation. The permeable sediments of the Chickasawhay Formation form part of the upper Floridan in the western panhandle (Wagner, 1982).

Miocene Series

The Miocene Epoch was a time of significant change in the depositional sequence on the Florida Platform and the adjacent Gulf and Atlantic Coastal Plains. During the early part of the Miocene, carbonate sediments continued to be deposited over most of the State. Intermixed with the carbonates were increasing percentages of siliciclastic sediments. By the end of the Early Miocene, the deposition of carbonate sediments was occurring only in southern peninsular Florida. Siliciclastic deposition dominated the Middle Miocene statewide with this trend continuing into the Late Miocene.

The basal Miocene carbonate sediments often form the uppermost portion of the Floridan aquifer system. The remainder of the Miocene sediments form much of the intermediate aquifer system and intermediate confining system. In some instances, these sediments may also be included in the surficial aquifer system.

Unusual depositional conditions existed during the Miocene as is evident from the occurrence of abundant phosphate, palygorskite, opaline cherts and other uncommon minerals plus an abundance of dolomite within the Hawthorn Group (Scott, 1988a). The presence of these minerals may influence ground-water quality in areas where the Miocene sediments are being weathered. Ground-water quality may also be affected where these sediments form the upper portion of the Floridan aquifer system or portions of the intermediate aquifer system.

Current geologic thought holds that in the peninsula the Miocene section is composed of the Hawthorn Group. The Tampa Formation is included as a member in the basal Hawthorn Group. In the panhandle, the Lower Miocene remains the Chattahoochee and St. Marks Formations, the Middle Miocene Alum Bluff Group and the Upper Miocene Choctawhatchee Formation and equivalents. Formations previously mentioned in the literature as being Miocene in age include the Tamiami, which is Pliocene in age, and the Miccosukee Formation which is now recognized as being Late Pliocene to possibly early Pleistocene in age.

The Miocene sediments are absent from the Ocala Platform and the Sanford High (Scott, 1988a). These sediments are as much as 800 feet thick in southwest Florida (Miller, 1986; Scott, 1988a), 500 feet thick in the northeastern peninsula (Scott, 1988a) and 900 to 1000 feet thick in the westernmost panhandle (Miller, 1986).

Chattahoochee Formation

The Chattahoochee Formation is predominantly a fine-grained, often fossiliferous, silty to sandy dolostone which is variable to a limestone (Huddlestun, 1988). Fine-grained sand and silt may also form beds with various admixtures of dolomite and clay minerals. Clay beds may also be common in some areas (Puri and Vernon, 1964).

The Chattahoochee Formation occurs in a limited area of the central panhandle from the axis of the Gulf Trough westward. It appears that the Chattahoochee grades to the west into a carbonate unit alternately referred to as Tampa Limestone (Marsh, 1966; Miller, 1986) or St. Marks (Puri and Vernon, 1964; NWFWMD Staff, 1975). Northward into Georgia, this unit grades into the basal Hawthorn Group (Huddlestun, 1988). To the east of the axis of the Gulf Trough, the Chattahoochee Formation grades into the St. Marks Formation (Puri and Vernon, 1964; Scott, 1986). The gradational change between the Chattahoochee and St. Marks Formations occurs over a broad area of Leon and Gadsden Counties (Scott, 1986). The sediments of the Chattahoochee Formation comprise the upper zone of the Floridan aquifer system in the central panhandle.

St. Marks Formation

The St. Marks Formation is a fossiliferous limestone (packstone to wackestone). Sand grains occur scattered in an often very moldic limestone. The lithology of the St. Marks and the associated units in the Apalachicola Embayment and to the west are often difficult to separate (Schmidt, 1984). The St. Marks Formation lithology can be traced in cores grading into the Chattahoochee Formation (Scott, 1986). This formation forms the upper part of the Floridan aquifer system in portions of the eastern and central panhandle.

Hawthorn Group

The Hawthorn Group is a complex series of the phosphate-bearing Miocene sediments in peninsular and eastern panhandle Florida. The carbonate sediments of the Hawthorn Group are primarily fine-grained and contain varying admixtures of clay, silt, sand and phosphate. Dolostone is the dominant carbonate sediment type in the northern two-thirds of the peninsula while limestone predominates in the southern peninsula and in the eastern panhandle area.

The siliciclastic sediment component consists of fine- to coarse-grained quartz sand, quartz silt and clay minerals in widely varying proportions. The clay minerals present include palygorskite, smectite and illite with kaolinite occurring in the weathered sediments.

The top of the Hawthorn Group is a highly irregular erosional and karstic surface. This unconformable surface can exhibit dramatic local relief especially in outcrop along the flanks of the Ocala Platform. Figures 12 through 19 show the top and thickness of the Hawthorn Group sediments which comprise the intermediate aquifer system/confining unit.

In the peninsula, the Hawthorn Group can be broken into a northern section and a southern section. The northern section consists of interbedded phosphatic carbonates and siliciclastics with a trend of increasing siliciclastics in the younger sediments. In ascending order, the formations in northern Florida are the Penney Farms, Marks Head and Coosawhatchee and its lateral equivalent Statenville (Scott, 1988a). The sediments comprising these formations characteristically have low permeabilities and form an effective aquiclude, the intermediate confining unit. In a few areas, permeabilities within the Hawthorn sediments are locally high enough to allow the limited development of an intermediate aquifer system.

The southern section consists of a lower dominantly phosphatic carbonate section and an upper phosphatic siliciclastic section. In the southern area, in addition to increasing siliciclastics upsection, there is also a trend of increasing siliciclastics from west to east in the lower carbonate section. The Hawthorn Group in southern Florida has been subdivided into, in

ascending order, the Arcadia Formation with the former Tampa Formation as a basal member, and the Peace River Formation (Scott, 1988a). Throughout much of south Florida, these sediments have limited or low permeabilities and form an effective intermediate confining unit. However, where the Tampa Member is present and permeable enough, it may form the upper portion of the Floridan aquifer system. In portions of southwestern Florida, the Hawthorn sediments are permeable enough to form several important producing zones in the intermediate aquifer system (Knapp et al., 1986; Smith and Adams, 1988).

The Hawthorn Group, Torreya Formation sediments in the eastern panhandle are predominantly siliciclastics with limited amounts of carbonates (Scott, 1988a). In this area, carbonates become increasingly important in the Gulf Trough where the basal Hawthorn sediments are fine-grained carbonates. The siliciclastic sediments are very clayey and form an effective intermediate confining unit. The carbonate sediments may locally be permeable enough to form the upper portion of the Floridan aquifer system.

Bruce Creek Limestone

Huddlestun (1976) applied the name Bruce Creek Limestone to late Middle Miocene limestones occurring in the Apalachicola Embayment and coastal areas of the central and western panhandle. The Bruce Creek Limestone is a fossiliferous, variably sandy limestone (Schmidt, 1984). This lithology becomes indistinguishable, to the east, from lithologies found in the St. Marks Formation (Schmidt, 1984). The Bruce Creek Limestone is laterally equivalent to and grades into the lower portion of the Alum Bluff Group (Schmidt, 1984). The Bruce Creek Limestone forms part of the upper Floridan aquifer system in the central and western panhandle.

Alum Bluff Group

West of the Apalachicola River in the Florida panhandle, the Hawthorn Group is replaced by the Alum Bluff Group. The Alum Bluff Group includes the Chipola Formation, Oak Grove Sand, Shoal River Formation and the Choctawhatchee Formation (Braunstein et al., 1988). The formations included in this group are generally defined on the basis of their molluskan faunas and are of variable areal extents. These sediments can be distinguished as a lithologic entity at the group level and will be referred to as such in this text.

The Alum Bluff Group consists of clays, sands and shell beds which may vary from a fossiliferous, sandy clay to a pure sand or clay and occasional carbonate beds or lenses. The Jackson Bluff Formation is currently thought to be Late Pliocene in age; and, even though Huddlestun (1976) included it in the Alum Bluff Group, it was not included in the Alum Bluff Group on the latest correlation charts (Braunstein et al., 1988). Sediments comprising the Jackson Bluff Formation are very similar to those making up the Alum Bluff Group.

The sediments comprising the Alum Bluff Group are generally impermeable due to the abundance of clay-sized particles. These sediments form an important part of the intermediate confining unit in the central panhandle.

Pensacola Clay

The Pensacola Clay consists of three members: lower and upper clay members and a middle sand member, the Escambia Sand (Marsh, 1966). Lithologically, the clay members consist of silty, sandy clays with carbonized plant remains (Marsh, 1966). The sand member is fine to coarse, quartz sand. Marine fossils are rarely present in the Pensacola Clay with the exception of a fossiliferous layer near the base (Clark and Schmidt, 1982). The Pensacola Clay grades laterally into the lower portion of the "Miocene Coarse Clastics" to the north and the Alum Bluff Group and the lower Intracoastal Formation to the east (Clark and Schmidt, 1982).

The Pensacola Clay forms the intermediate confining unit for the Floridan in the western panhandle. It lies immediately supradjacent to the limestones of the upper Floridan aquifer system.

Intracoastal Formation

Schmidt (1984) describes the Intracoastal Formation as a "very sandy, highly microfossiliferous, poorly consolidated, argillaceous, calcarenitic limestone." Phosphate is generally present in amounts greater than one percent. This unit is laterally gradational with the Pensacola Clay and Mio-Pliocene "Coarse Clastics" (Schmidt, 1984). The lower Intracoastal Formation is Middle Miocene while the upper portion is Late Pliocene. Wagner (1982) indicates that the Intracoastal Formation forms part of the intermediate confining unit in the central to western panhandle.

Pliocene-Pleistocene Series

The sediments of the Pliocene-Pleistocene Series occur over most of the State. These sediments range from nonfossiliferous, clean sands to very fossiliferous, sandy clays and carbonates. Lithologic units comprising this series include the "Coarse Clastics", Tamiami Formation, Citronelle Formation, Miccosukee Formation, Cypresshead Formation, Nashua Formation, Caloosahatchee Formation, Fort Thompson Formation, Key Largo Limestone, Miami Limestone, Anastasia Formation and Undifferentiated Pleistocene-Holocene sediments. The upper portion of the Intracoastal Formation is Pliocene and is discussed with the lower Intracoastal Formation under the Miocene Series.

"Coarse Clastics"

The name "Coarse Clastics" has been applied to sequences of quartz sands and gravels in a number of areas around Florida. These sediments are often referred to in the literature as "Miocene Coarse Clastics" (for example, Puri and Vernon, 1964).

In northern Florida, these sediments are referred to as the Cypresshead Formation of Late Pliocene to Early Pleistocene age (Scott, 1988b). In southern Florida, Knapp et al. (1986) referred to these sediments as the "Miocene Coarse Clastics" and placed them in the Hawthorn Group. In the panhandle, Marsh (1966) mentions the "Miocene Coarse Clastics" as sands and gravel with some clay which underlie the Citronelle Formation.

In the panhandle, the "Coarse Clastics" are variably clayey sands with gravel and some shell material (Clark and Schmidt, 1982). These siliciclastics occur in Escambia, Santa Rosa and western Okaloosa Counties in the western panhandle. They equate in part to the upper part of the Pensacola Clay, part of the Intracoastal Formation and part of the Alum Bluff Group.

In southern peninsular Florida, the coarse siliciclastics are fine to very coarse quartz sands with quartz gravel and variable amounts of clay, carbonate and phosphate. These sediments may equate with the Cypresshead Formation sediments in central and northern Florida.

These siliciclastic sediments form important aquifer systems in portions of southern and panhandle Florida. In the western panhandle, the "Coarse Clastics" form a portion of the Sand-and-Gravel aquifer, part of the surficial aquifer system. These sediments also comprise a portion of the surficial aquifer system in the peninsular area, especially in southern Florida.

Tamiami Formation

The Tamiami Formation consists of the Pinecrest Sand Member, the Ochopee Limestone Member, and the Buckingham Limestone Member (Hunter, 1968). The various facies of the Tamiami occur over a wide area of southern Florida. The relationships of the facies are not well known due to: 1- the complex set of depositional environments that were involved in the formation of the sediments and 2- the Tamiami Formation most often occurs as a shallow subsurface unit throughout much of its extent. Many of the facies are important from a hydrogeologic perspective in an area of ground-water problems.

The limestone in the Tamiami Formation occurs as two types: 1- a moderately to well-indurated, slightly phosphatic, variably sandy, fossiliferous limestone (Ochopee) and 2- a poorly indurated to unindurated, slightly phosphatic, variably sandy, fossiliferous limestone (Buckingham). The sand facies is often composed of a variably phosphatic and sandy, fossiliferous, calcareous, quartz sand often containing abundant, well-preserved mollusk shells (Pinecrest). The sand varies from a well-sorted, clean sand with abundant well-preserved shells and traces of silt-sized phosphate in the type Pinecrest Sand Member (Hunter, 1968) to a clayey sand with sand-sized phosphate, clay-sized carbonate in the matrix and abundant, well preserved mollusk shells. Siliciclastic sediments (undifferentiated) of this age appear to occur along the eastern side of the peninsula but have not been assigned to the Tamiami Formation.

Sediments of the Tamiami Formation exhibit

variable permeabilities and form the lower Tamiami aquifer and Tamiami confining beds of the surficial aquifer system (Knapp et al., 1986). Smith and Adams (1988) indicate that the upper Tamiami sediments form the basal portion of the "water table aquifer" overlying the Tamiami confining beds

Citronelle Formation

The Citronelle Formation is composed of fine to very coarse siliciclastics. The name was extended to include the siliciclastics comprising the central ridge system in the Florida peninsula by Cooke (1945). As it is currently recognized, the Citronelle Formation occurs only in the panhandle. The unit is recognized from central Gadsden County on the east to the western boundary of the State. The Citronelle Formation is composed of very fine to very coarse, poorly sorted, angular to subangular quartz sand. The unit contains significant amounts of clay, silt and gravel which may occur as beds, lenses or stringers and may vary rapidly over short distances. Limonite nodules and limonitic cemented zones are common.

The Citronelle Formation extends over much of the central and western panhandle. Previous investigators encountered problems in the separation of the Citronelle and the overlying terrace deposits and generally considered the thickness of the Citronelle including these younger sediments (Marsh, 1966; Coe, 1979). The Citronelle Formation grades laterally into the Miccosukee Formation through a broad transition zone in Gadsden County. The Citronelle Formation forms an important part of the Sand-and-Gravel aquifer in the western panhandle and produces up to 2,000 gallons of water per minute (Wagner, 1982).

Miccosukee Formation

Hendry and Yon (1967) describe the Miccosukee Formation as consisting of interbedded and cross-bedded clay, silt, sand and gravel of varying coarseness and admixtures. Limonite pebbles are common in the unit. The Miccosukee Formation occurs in the eastern panhandle from central Gadsden County on the west to eastern Madison County on the east. Due to its clayey nature, the Miccosukee Formation does not produce significant amounts of water. It is generally considered to be part of the surficial aquifer system (Southeastern Geological Society, 1986).

Cypresshead Formation

The name Cypresshead Formation was first used by Huddlestun (1988). It was extended into Florida by Scott (1988b). The Cypresshead Formation is composed entirely of siliciclastics; predominantly quartz and clay minerals. The unit is characteristically a mottled, fine- to coarse-grained, often gravelly, variably clayey quartz sand. As a result of weathering, the clay component of these sediments has characteristically been altered to kaolinite. Clay serves as a binding matrix for the sands and gravels. Clay content may vary from absent to more than fifty percent in sandy clay lithologies although the average clay content is 10 to 20 percent. These sediments are often thinly bedded with zones of cross bedding. The Cypresshead Formation appears to occur in the Central Highlands of the peninsula south to northern Highlands County, although the extent of the Cypresshead Formation has not been accurately mapped in this area. This unit may locally comprise the surficial aquifer system where clay content is low.

Nashua Formation

The Nashua is a fossiliferous, variably calcareous, sometimes clayey, quartz sand. The fossil content is variable from a shelly sand to a shell hash. The dominant fossils are mollusks.

The extent of the Nashua in northern Florida is not currently known. It extends some distance into Georgia and appears to grade laterally into the Cypresshead Formation (Huddlestun, 1988). The Nashua Formation may produce limited amounts of water in localized areas where it forms part of the surficial aquifer system.

Caloosahatchee Formation

The Caloosahatchee Formation consists of fossiliferous quartz sand with variable amounts of carbonate matrix interbedded with variably sandy, shelly limestones. The sediments vary from non-indurated to well indurated. The fauna associated with these sediments are varied and often well preserved. Fresh water limestones are commonly present within this unit.

Sediments identified as part of the Caloosahatchee Formation by various investigators occur from north of Tampa on the west coast south to Lee County, eastward to the East Coast then northward into northern Florida (DuBar, 1974). The Caloosahatchee Formation as used here includes those sediments informally referred to as the Bermont formation (DuBar, 1974).

In most hydrogeologic investigations of southern Florida, the Caloosahatchee Formation is not differentiated from the Fort Thompson Formation and other faunal units. The undifferentiated sediments form much of the surficial aquifer system.

Fort Thompson Formation

The Fort Thompson Formation consists of interbedded shell beds and limestones. The shell beds are characteristically variably sandy and slightly indurated to unindurated. The sandy limestones present in the Fort Thompson Formation were deposited under both freshwater and marine conditions. The sand present in these sediments is fine- to medium-grained. The sediments of Fort Thompson age in central Florida along the east coast, consist of fine to medium quartz sand with abundant mollusk shells and a minor but variable clay content.

The Fort Thompson Formation, as the Caloosahatchee Formation, is part of the undifferentiated sediments in southern Florida. It forms a portion of the surficial aquifer system.

Key Largo Limestone

The Key Largo Limestone is a coralline limestone composed of coral heads encased in a matrix of calcarenite (Stanley, 1966). Hoffmeister and Multer (1968) indicate that the Key Largo Limestone occurs in the subsurface from as far north as Miami Beach to as far south as the Lower Keys. The fossil reef tract represented by the Key Largo sediments may be as much as 8 miles wide (DuBar, 1974). Near the northern and southern limits of the Key Largo Limestone, it is overlain conformably by the Miami Limestone with which the Key Largo is, in part, laterally equivalent.

The Key Largo Limestone forms a part of the Biscayne aquifer of the surficial aquifer system. The Biscayne aquifer provides water for areas of Dade, Broward and Monroe Counties.

Miami Limestone

The Miami Limestone includes an oolitic facies and a bryozoan facies. The bryozoan facies underlies and extends west of the western boundary of the oolitic facies. The bryozoan facies consists of calcareous bryozoan colonies imbedded in a matrix of ooids, pellets and skeletal sand. It generally occurs as a variably sandy, recrystallized, fossiliferous limestone (Hoffmeister et al., 1967). The oolitic facies consists of variably sandy limestone composed primarily of oolites with scattered concentrations of fossils.

Hoffmeister et al. (1967) indicate that the Miami Limestone covers Dade County, much of Monroe County and the southern part of Broward County. It grades laterally to the south into the Key Largo Limestone and to the north into the Anastasia Formation. The oolitic facies underlies the Atlantic Coastal Ridge southward from southern Palm Beach County to southern Dade County.

The Miami Limestone forms a portion of the Biscayne aquifer of the surficial aquifer system. It is very porous and permeable due to the dissolution of carbonate by ground water as it recharges the aquifer system.

Anastasia Formation

The Anastasia Formation consists of interbedded quartz sands and coquinoid limestones. The sand beds consist of fine to medium-grained, variably fossiliferous, calcareous, quartz sand. The contained fossils are primarily broken and abraided mollusk shells. The limestone beds, commonly called coquina, are composed of shell fragments, scattered whole shells and quartz sand enclosed in a calcareous matrix, usually sparry calcite cement.

The Anastasia Formation forms the Atlantic Coastal Ridge through most of its length (White, 1970). Natural exposures of this unit occur scattered along the east coast from St. Augustine south to southern Palm Beach County near Boca Raton. South of this area the Anastasia Formation

grades into the Miami Limestone. Cooke (1945) felt that the Anastasia Formation extended no more than three miles inland from the intracoastal Waterway. Field work by this author (Scott) suggests that the Anastasia may extend as much as 10 miles inland; although, Schroeder (1954) suggests that this unit may occur more than 20 miles inland.

The Anastasia Formation forms a portion of the surficial aquifer system along the eastern coast of the state. Ground water is withdrawn from the Anastasia Formation in many areas along the Atlantic Coastal Ridge where, locally, it may be the major source of ground water. Near the southern extent of the Anastasia Formation, it forms a portion of the Biscayne aquifer (Hoffmeister, 1974).

Undifferentiated Pleistocene-Holocene Sediments

The sediments referred to as the "undifferentiated Pleistocene-Holocene sediments" cover much of Florida effectively hiding most older sediments. Included in this category are marine "terrace" sediments, eolian sand dunes, fluvial deposits, fresh water carbonates, peats and a wide variety of sediment mixtures. These sediments often occur as thin layers overlying older formations and are not definable as formations. As such, these sediments have been referred to by many different names including Pliocene to Recent sands, Pleistocene sands, Pleistocene Terrace Deposits.

The sediments incorporated in this category are most often quartz sands. The sands range from fine- to coarse-grained, nonindurated to poorly indurated and nonclayey to slightly clayey. Gravel may be present in these sediments in the panhandle area. Other sediments included in this group include peat deposits, some clay beds, and freshwater carbonates. The freshwater carbonates occur in many freshwater springs and in large areas of the Everglades.

Locally, these sediments may form a portion of the surficial aquifer system. The greatest thicknesses of these sediments occurs infilling paleokarst features where more than 300 feet of undifferentiated Pleistocene-Holocene sediments have been recorded (Florida Geological Survey, unpublished well data).

HYDROSTRATIGRAPHY

The hydrostratigraphy of the Florida Platform has been the focus of numerous investigations by the various water management districts, the USGS and the FGS. The hydrostratigraphic framework recognized in Florida consists of a thick sequence of Cenozoic sediments which comprise the Floridan aquifer system, the intermediate aquifer system/confining unit and the surficial aquifer system (Figure 4) (Southeastern Geological Society Ad Hoc Committee, 1986). The Floridan aquifer system underlies much of the State, providing abundant potable water for a rapidly expanding population (Figure 20). In limited areas throughout the State, the intermediate aquifer system is utilized. Water is also withdrawn from the surficial aquifer system in many areas particularly in the western panhandle and southern Florida. As an example, Figure 21 illustrates the extent and occurrence of ground-water systems in the NWFWMD area of the panhandle.

The hydrologic parameters of each aquifer system vary widely from one area of the state to another as do the lithologies of the sediments. Hydrologic subdivisions do not have to conform to the lithostratigraphic framework.

Each water management district has identified surface-water basins and ground-water areas. The surface-water basins (Figures 22 through 26) delineate the areas influenced by the tributaries of the major drainage features. The ground-water areas (Figures 27 through 31) were delineated as convenient study areas. Maps representing the potentiometric surface of the Floridan aquifer system were constructed for each district (Figures 32 through 36).

Surficial aquifer system

The surficial aquifer system is defined by the Southeastern Geological Society (SEGS) Ad Hoc Committee on Florida Hydro-stratigraphic Unit Definition (1986) as "the permeable hydrologic unit contiguous with the land surface that is comprised principally of unconsolidated to poorly indurated, siliciclastic deposits. It also includes well-indurated carbonate rocks, other than those of the Floridan aquifer system where the Floridan is at or near land surface. Rocks making up the surficial aquifer system belong to all or part of the Upper Miocene to Holocene Series. It contains the water table, and the water within it is under mainly unconfined conditions; but beds of low permeability may cause semi-confined or locally confined conditions to prevail in its deeper parts. The lower limit of the surficial aquifer system coincides with the top of the laterally extensive and vertically persistent beds of much lower permeability".

Some areas of the state rely heavily upon the surficial aquifer system for potable water in areas where the water quality of the Floridan aquifer system is poor. The two main aquifers of the surficial aquifer system to which names have been applied are the Sand and Gravel Aquifer of northwestern panhandle Florida and the Biscayne Aquifer in southeastern Florida. The distribution of these aquifers is limited (Figure 20). Maps delineating the thickness of the surficial aquifer system were provided by the Northwest Florida Water Management District (NWFWMD) (Figure 37) and Southwest Florida Water Management District (SWFWMD) (Figure 38). The South Florida Water Management District provided a map of the base of the surficial aquifer system (Figure 39). Figure 40 depicts those areas of the SJRWMD where the surficial aquifer system is a primary groundwater supplier.

The surficial aquifer system is composed of Pliocene to Holocene quartz sands, shell beds and carbonates (Figure 4). In the Florida panhandle, these units include the Citronelle and Miccosukee Formations and undifferentiated sediments. In the northern portion of the peninsula, sediments belonging to the Anastasia Formation, Cypresshead Formation and Undifferentiated Sediments, which include shell beds and limestones that are lime equivalent to the Caloosahatchee and Fort Thompson Formations, comprise the surficial aquifer system. In southern Florida, the surficial aquifer system consists of the Tamiami, Caloosahatchee, Fort Thompson, and Anastasia Formations, the Key Largo and Miami Limestones and the undifferentiated sediments. Following the definition of the Tamiami as proposed by Hunter and Wise (1980), the portion of the Tamiami previously considered to be the lower Tamiami confining unit now forms the upper part of the Hawthorn Group of the intermediate confining unit. Where a clay bed separates the upper and lower limestones of the Tamiami, as in Hendry County (Smith and Adams, 1988), the clay bed is recognized as a thin confining unit within the surficial aquifer system.

Intermediate aquifer system/confining unit

The SEGS (1986) defines the intermediate aquifer system/ confining unit as "all rocks that lie between and collectively retard the exchange of water between the overlying surficial aquifer system and the underlying Floridan aquifer system. These rocks in general consist of fine-grained siliciclastic deposits interlayered with carbonate strata belonging to all or parts of the Miocene and younger series. In places, poorly-yielding to non-water-yielding strata mainly occur and there the term "intermediate confining unit" applies. In other places, one or more low- to moderate-yielding aquifers may be interlayered with relatively impermeable confining beds; there the term "intermediate aquifer system" applies. The aquifers within this system contain water under confined conditions.

The top of the intermediate aquifer system/confining unit "coincides with the base of the surficial aquifer system. The base of the intermediate aquifer [or confining unit] is at the top of the vertically persistent, permeable, carbonate section that comprises the Floridan aquifer system, or, in other words, that place in the section where siliciclastic layers of significant thickness are absent and permeable carbonate rocks are dominant. Where the upper layers of the persistent carbonate section are of low permeability, they are part of either the intermediate aquifer system or intermediate confining unit, as applicable to the area."

The sediments comprising the intermediate aquifer system/confining unit exhibit wide variability over the state. In the central and western panhandle, this section acts principally as an intermediate confining unit for the Floridan aquifer system. The formations belonging to the intermediate confining unit include the Alum Bluff Group, Pensacola Clay, Intracoastal Formation, and the Chipola Formation (SEGS, 1986). In the eastern panhandle, the confining unit includes primarily the

Hawthorn Group sediments. Figures 41 and 42 show the top and thickness of the intermediate confining unit in the NWFWMD area while Figures 12 and 13 show the top and thickness of the Hawthorn Group sediments in the eastern part of the District. In the northern peninsula, the Hawthorn Group sediments form the intermediate confining unit with minor occurrences of aquifer zones (Figures 14 through 17). In the southern peninsula, the Hawthorn Group sediments form both an intermediate confining unit and an intermediate aquifer system. The top and thickness of the intermediate aquifer system/confining unit in the SWFWMD area is shown in Figures 43 and 44. The top and isopach of the Hawthorn Group sediments in southern Florida (SWFWMD and SFWMD) are shown on Figures 18 and 19. In many areas of the state, impermeable carbonates of Eocene and Oligocene age may form the base of the intermediate confining unit. Conversely, permeable carbonates occurring at the base of the Hawthorn Group may be hydraulically connected to the Floridan aquifer system and locally form the top of the Floridan.

The intermediate aquifer system plays a very important role in the ground-water resources of southwestern peninsular Florida. In the Lee County and surrounding areas, the intermediate aquifer system provides relatively large quantities of potable water. The Hawthorn Group may contain two producing zones (Wedderburn et al., 1982) referred to as the mid-Hawthorn aquifer and the sandstone aquifer. Figure 45 illustrates the top of the mid-Hawthorn confining zone in Lee County. Figure 46 delineates the base of the sandstone aquifer while Figure 47 shows the top of the mid-Hawthorn aquifer.

The intermediate confining unit occurs widespread in the state providing an effective aquiclude for the Floridan aquifer system. On the crests of the Ocala Platform, Sanford High, St. Johns Platform, Brevard Platform and the Chattahoochee Anticline (Figure 4) these beds are absent due to erosion. In these areas, surface water has a direct avenue to recharge the Floridan aquifer system. Immediately surrounding these areas, the intermediate confining unit is present but is breached by karst features which also allow surface water and water from the surficial and intermediate aquifer systems direct access to the Floridan. In the west-central portion of the peninsula and along the west coast from Hillsborough County into the eastern panhandle, the intermediate confining unit is generally absent and the Floridan aquifer system occurs unconfined. In the east-central peninsula, the intermediate confining unit is thin and provides only limited confinement for the underlying Floridan aquifer system. Miller (1986) mapped a maximum thickness of the intermediate confining unit as being greater than 1000 feet thick in the western-most panhandle and in southwestern Florida.

Floridan aquifer system

The Floridan aquifer system is one of the world's most productive aquifers. The sediments that comprise the aquifer system underlie the entire state although potable water is not present everywhere (Figure 20).

The Floridan aquifer system may occur as a continuous series of vertically connected carbonate sediments or may be separated by sub-regional to regional confining beds (Miller, 1986). Often the confining beds consist of low permeability carbonates. In the western panhandle, the intra-aquifer confining unit is the Bucatunna Clay. Elsewhere, the confining beds are carbonate sediments belonging to the Ocala Limestone, Avon Park Formation or the Oldsmar Formation. When intra-aquifer confining beds are present, the Floridan aquifer system can be subdivided into an upper and lower Floridan. Figures 48 through 51 indicate the configuration of the top and the thickness of the upper and lower limestones of the Floridan aquifer system. Figures 52 and 53 reveal the top and thickness of the Bucatunna Clay, the intra-aquifer confining unit in the western panhandle. Figure 54 shows the top of the lower Floridan aquifer system in the SJRWMD area.

The Floridan aquifer system in peninsular Florida and the eastern panhandle is composed of all or parts of the Cedar Keys Formation, Oldsmar Formation, Avon Park Formation, Ocala Limestone, Suwannee Limestone, St. Marks Formation and, possibly, the basal carbonates of the Hawthorn Group in limited areas of the state (Figure 4). The Floridan aquifer system encompasses the Ocala Limestone, Marianna Limestone, Suwannee Limestone, Chickasawhay Limestone, Chattahoochee Formation, St. Marks Formation and Bruce Creek Limestone (Figure 4) in the central and western panhandle.

The elevation of the upper surface of the Floridan aquifer system is directly related to the positioning on the major structural features (Figure 5). The top of the Floridan aquifer system ranges in elevation from greater than +100 feet NGVD on the Ocala Platform and Chattahoochee Arch to more than -1400 feet NGVD in the western-most panhandle and more than -1100 feet NGVD in the Okeechobee Basin of southern Florida (Figures 55 through 59). The thickness of the Floridan aquifer system (including those areas where water from the Floridan aquifer system may not be potable) varies from less than 100 feet along the state line in north-central panhandle to more than 3000 feet in the Apalachicola Embayment and 3400 feet in southern peninsular Florida (Figures 60 through 64). The base of the Floridan aquifer system in the NWFWMD area is shown in Figure 65.

The degree of confinement of the Floridan aquifer system also varies in relation to the position of the major structural features. The Floridan may be unconfined or semiconfined on the major features including the Ocala Platform and the Chattahoochee Anticline (Figures 66 through 68). In the negative areas such as the Jacksonville Basin, Okeechobee Basin and the Gulf Coast Basin, the Floridan aquifer system is well confined. Many areas of central peninsular Florida and in the eastern panhandle exhibit the development of karst features that breach the confining unit allowing localized recharge to occur. Figure 69 illustrates the NWFWMD area karst development. Throughout most of southern Florida, particularly the SFWMD area, the Floridan aquifer system occurs under confined conditions. The thickness of the beds confining the Floridan aquifer system in the SWFWMD area is shown in Figure 70.

Recharge to the Floridan aquifer system is directly related to the confinement of the system. The highest recharge rates occur where the Floridan is unconfined or poorly confined as in those areas where the Floridan aquifer system is at or near land surface (Figure 71). Recharge may also be high in areas where the confining layers are breached by karst features as shown for the NWFWMD area (Figure 69). Figures 72 through 76 indicate the relative recharge rates around the state.

The potentiometric surface of the Floridan aquifer system varies widely throughout the state. In localized areas, the potentiometric surface may be affected by intensive pumpage of ground water. Figures 32 through 36 indicate the elevation of this surface relative to NGVD. In those areas where the potentiometric surface is higher than the ground elevation, artesian conditions occur. Figures 77 through 82 delineate the areas where artesian flow is expected based on current data.

The intrusion of saline waters into fresh water producing zones is a major concern for Florida's coastal, and some inland, communities. Excessive pumpage of fresh water may draw the saline waters laterally or may cause an upconing of underlying nonpotable water. The salt water that can affect the potable water supply may be connate water trapped during the deposition of the sediments forming the aquifer system. It may represent saline waters that entered the aquifer system during previous high sea level stands which have not been flushed from the aquifer. The limits of salt water intrusion are shown on Figures 83 through 86.

The Claiborne aquifer occurs in a limited area of the central-northern panhandle. It is a permeable portion of the sub-Floridan Confining Unit in that area. It is poorly defined and rarely used at this time (Allen, 1987).

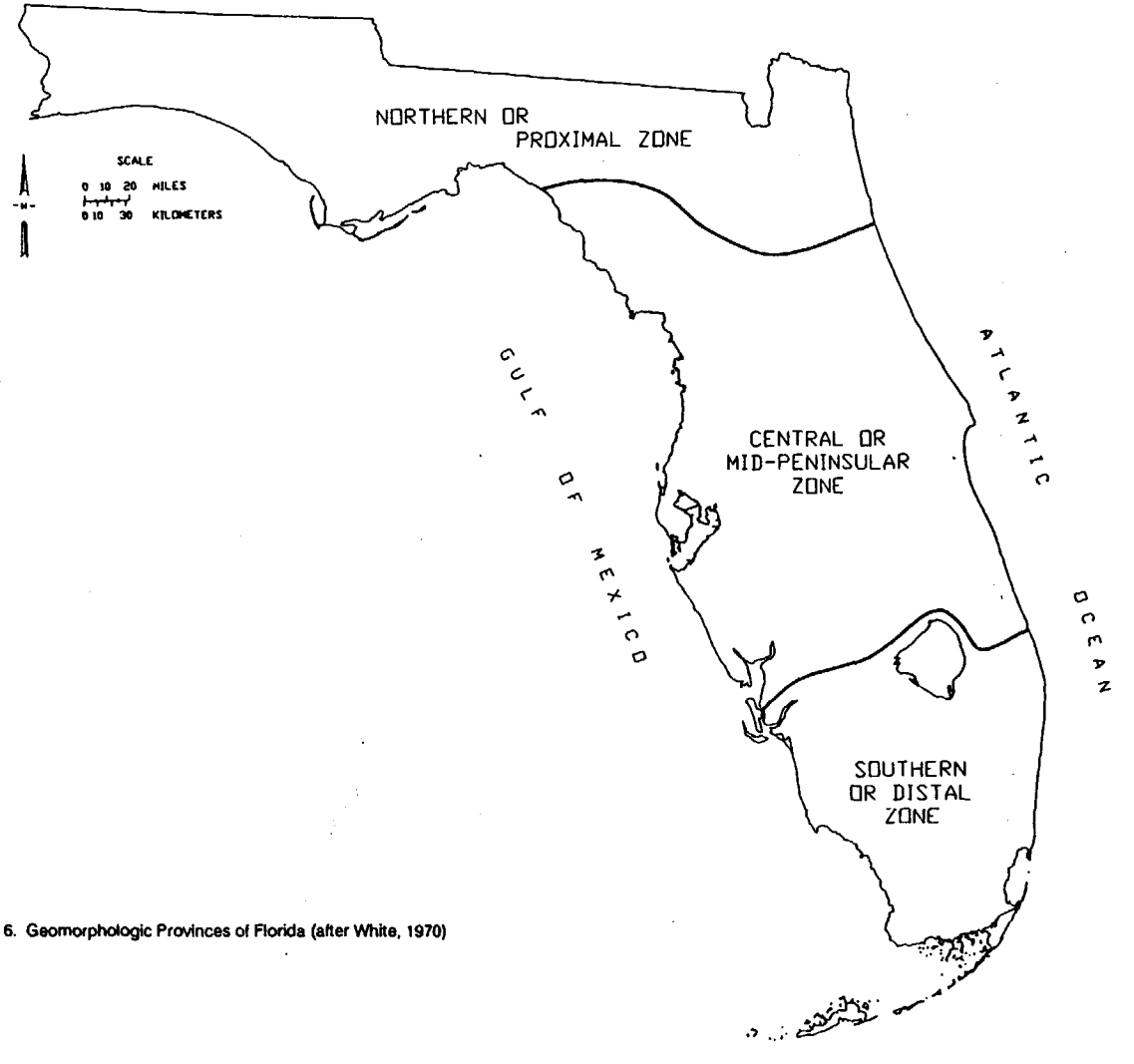


Figure 6. Geomorphologic Provinces of Florida (after White, 1970)

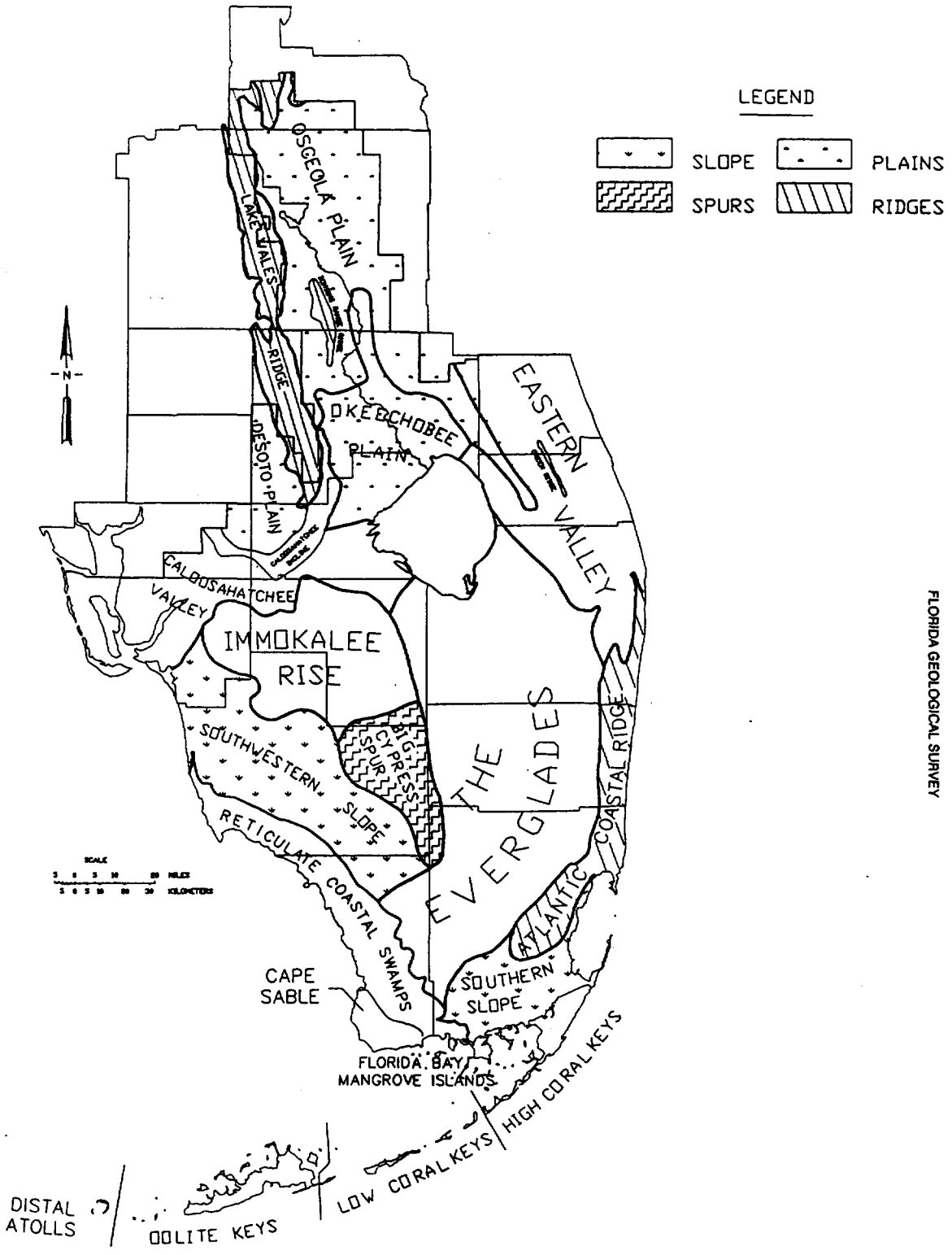


Figure 11. Geomorphologic Features of South Florida Water Management District (SFWMD) (after White, 1970)

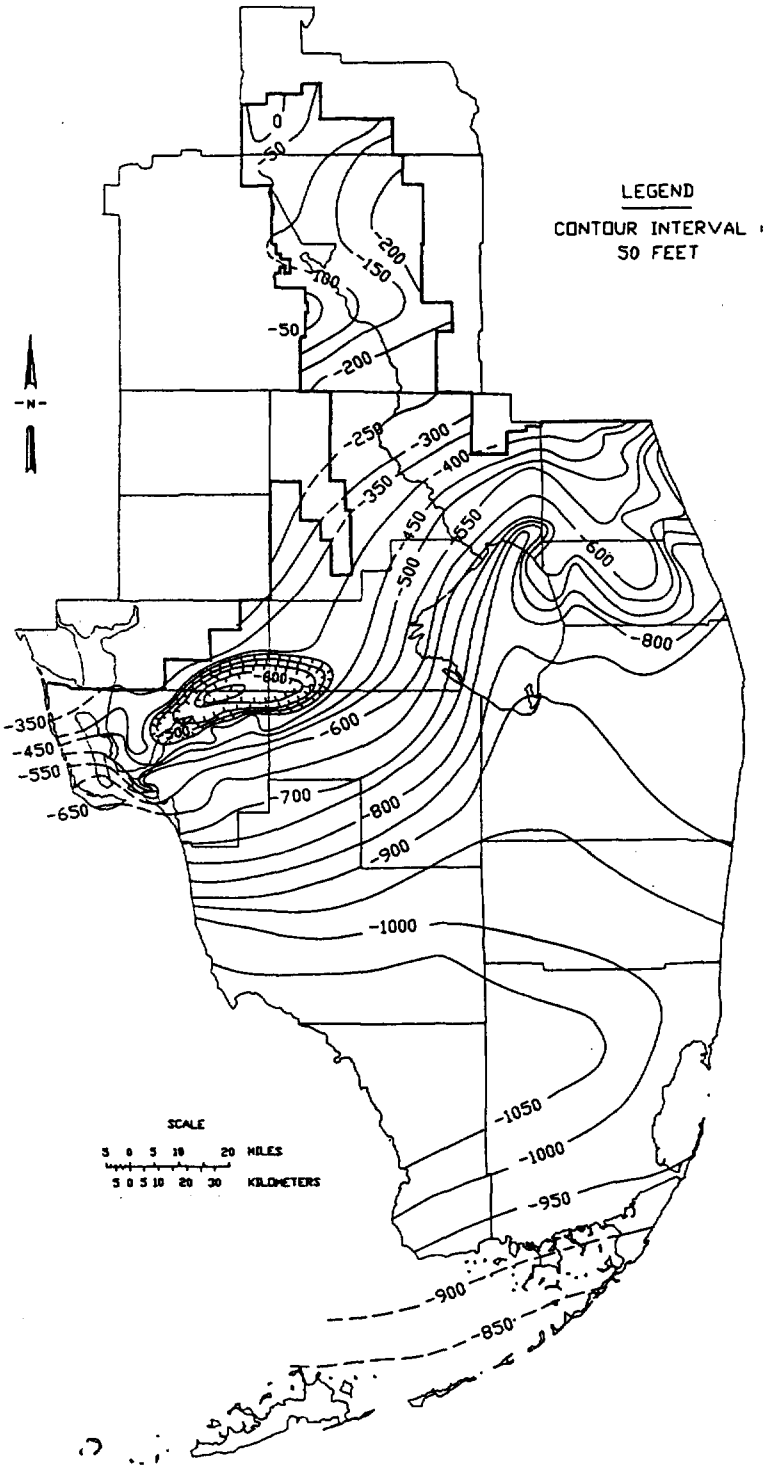


Figure 59. Top of the Floridan aquifer system, SFWMD

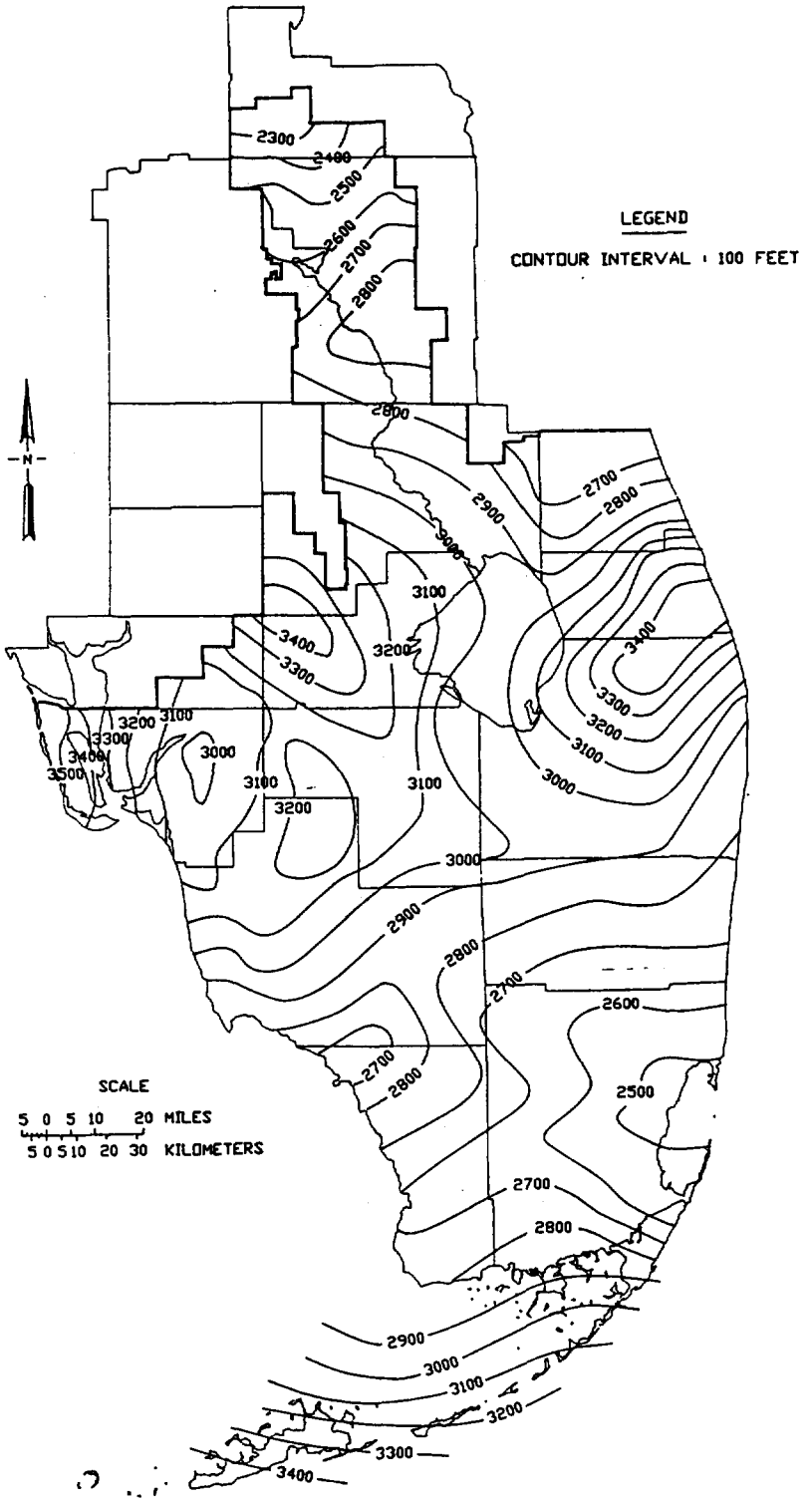


Figure 64. Thickness of the Floridan aquifer system, SFWMD (after Miller, 1986)

Reference 20

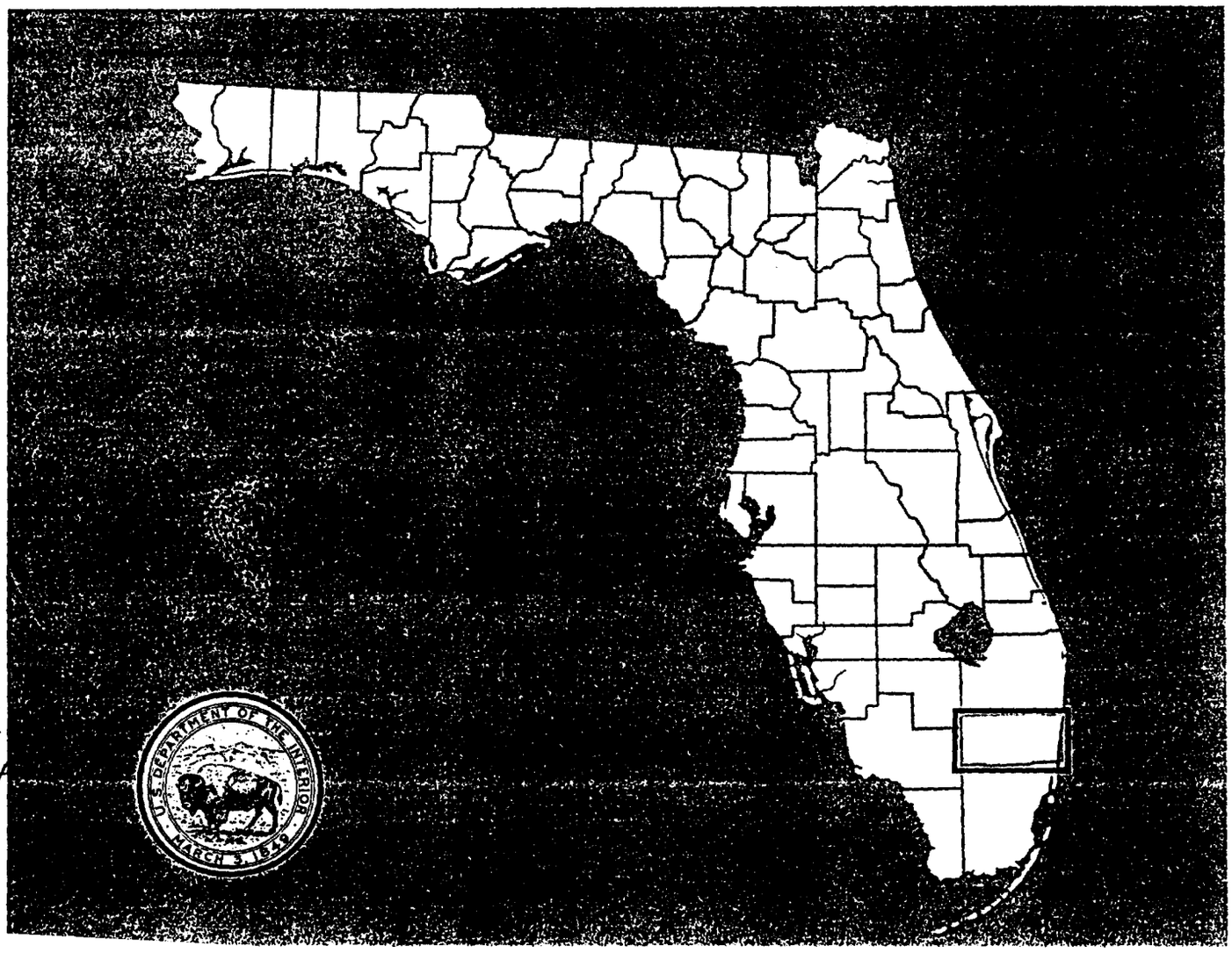
HYDROGEOLOGY, AQUIFER CHARACTERISTICS, AND GROUND-WATER FLOW OF THE SURFICIAL AQUIFER SYSTEM, BROWARD COUNTY, FLORIDA

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS REPORT 87-4034

Prepared in cooperation with the

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



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HYDROGEOLOGY, AQUIFER CHARACTERISTICS, AND GROUND-WATER FLOW OF THE SURFICIAL AQUIFER SYSTEM, BROWARD COUNTY, FLORIDA

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Tallahassee, Florida

1988

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HYDROGEOLOGY, AQUIFER CHARACTERISTICS, AND GROUND-WATER FLOW OF THE SURFICIAL AQUIFER SYSTEM, BROWARD COUNTY, FLORIDA

By Johnnie E. Fish

ABSTRACT

An investigation of the surficial aquifer system in Broward County, begun in 1981, is part of a regional study of the aquifer system in southeast Florida. Test drilling for lithologic samples, flow measurements taken during drilling, aquifer testing, and analyses of previously available data permitted delineation of the permeability framework (on geologic sections), the aquifers in the system and the generalized transmissivity distribution, and interpretation of the ground-water flow system.

The surficial aquifer system, in which an unconfined ground-water flow system exists, comprises the sediments from land surface to the top of a regionally persistent zone of low permeability called the intermediate confining unit. The aquifer system materials vary from clays to cavernous limestone in composition. These sediments are grouped as the Biscayne aquifer at the top; an intervening semiconfining unit primarily of clayey sand; a gray limestone aquifer in the Tamiami Formation (west Broward County); and sand or clayey sand near the base of the surficial aquifer system. The depth of the base of the aquifer system ranges from about 160 feet below land surface in westernmost Broward County to more than 350 feet near the coast. Test drilling and aquifer-test data indicate a complex permeability framework. Hydraulic conductivities of the very highly permeable zone of the Biscayne aquifer exceed 10,000 feet per day in places; in the gray limestone aquifer, they range from 590 to 930 feet per day, except in a less-permeable upper zone of the aquifer that occurs primarily in northwesternmost Broward County.

Transmissivities of the surficial aquifer system vary locally but have a definite areal trend. Estimated values are generally about 300,000 square feet per day or more in the southeast, south-central, and part of coastal northeast Broward County. Transmissivity is lower to the north and west, decreasing to less than 75,000 square feet per day over a large area in northwest and north-central Broward County. High transmissivity generally is associated with the Biscayne aquifer. The gray limestone aquifer has transmissivities that range from about 20,000 to 88,000 square feet per day in west Broward County. The transition from high transmissivity to relatively low transmissivity is often only a few miles wide and coincides with the decrease of cavernous porosity and associated permeability in the Fort Thompson Formation or the Anastasia Formation.

Ground-water circulation in Broward County must be considered in either predevelopment or development conditions because of changes in hydrologic factors that control flow. Effective canal drainage and large-scale pumping from municipal well fields have greatly altered the predevelopment flow system in east Broward County by: (1) eliminating a coastal ground-water ridge; (2) reducing deep circulation and reducing or eliminating seasonal westward

aquifer system, the source of freshwater supplies for Broward County and for most of southeast Florida and the subject of this report.

Surficial Aquifer System

The surficial aquifer system comprises all materials from the water table to the top of the intermediate confining unit. These materials are primarily cavity-riddled limestone and sandstone, sand, shell, and clayey sand with minor clay or silt and range in age from Pliocene to Holocene (see Causarás, 1985). Practically speaking, the top of the system may be considered to be the land surface because virtually all of Broward County formerly was seasonally or perennially flooded, although drainage by canals in recent years has reduced the occurrence of flooding in east and south-central Broward County. The base of the system is defined hydraulically by a significant contrast in average permeability. It is the surface, mappable over a multicounty area, that separates the thick section of generally permeable sediments (surficial aquifer system) from a thick section of sediments having generally low permeability (intermediate confining unit). The upper part of the intermediate confining unit is usually green clay or silt, locally sandy, except near the coast where it is composed of green, fine-grained calcarenite.

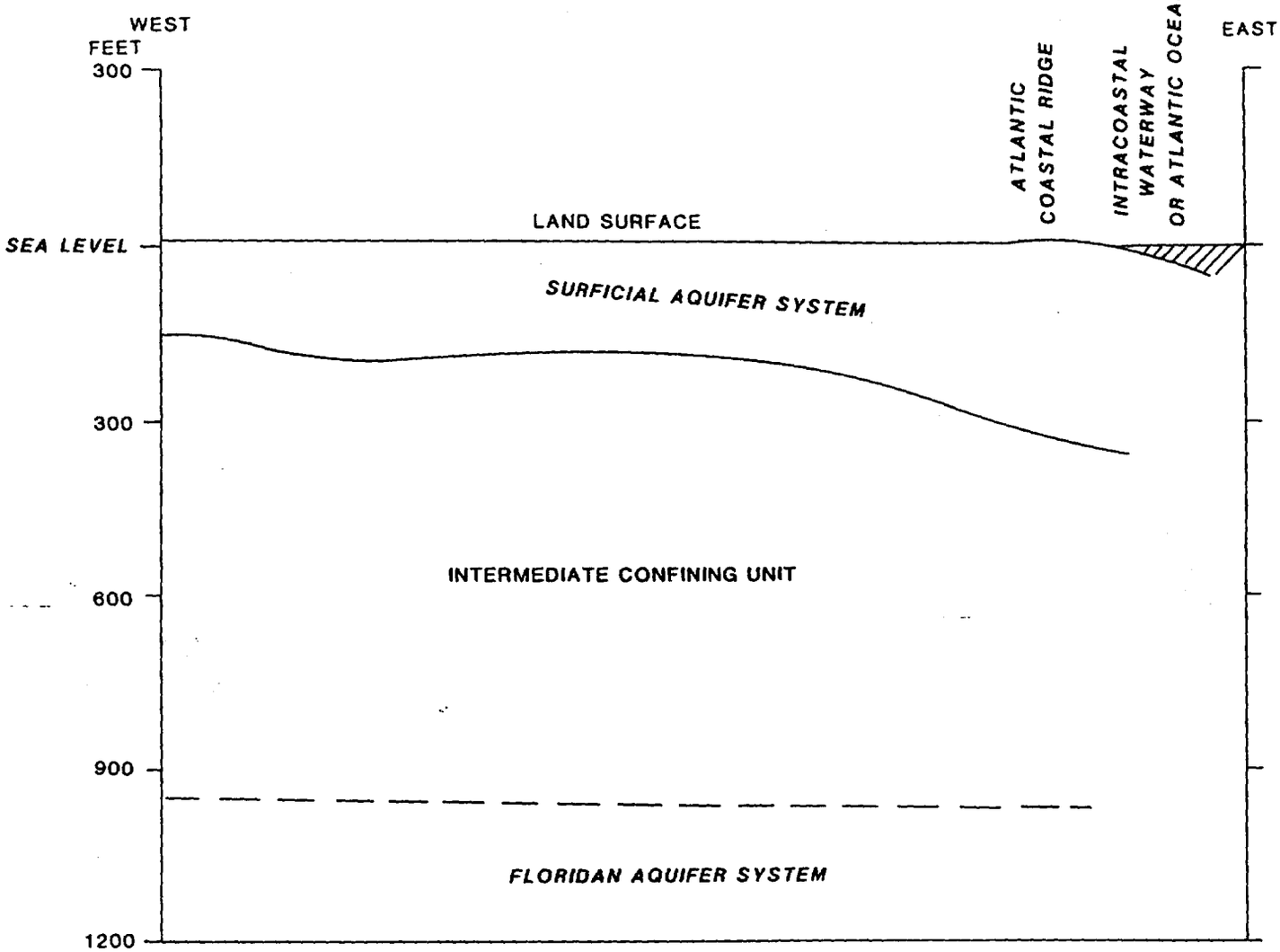
Sediments of the surficial aquifer system have a wide range of permeability, and locally may be divided into one or more aquifers separated by less-permeable or semiconfining units. A hydrogeologic section that illustrates the generalized framework of the system in Broward County from west to east is shown in figure 7b. The Biscayne aquifer is the best known and contains the most permeable materials of the surficial aquifer system (fig. 8). Another permeable unit, informally termed the gray limestone aquifer in this report, was not previously known in Broward County. Separating or underlying these aquifers are less-permeable sand, limestone, silt, and clay, which generally act as leaky units.

Due to large permeability contrasts with adjacent materials, permeable units (aquifers or smaller sections within aquifers) may exhibit semiconfined characteristics when stressed. However, the head distribution throughout the surficial aquifer system is closely related to the water table, generally less than 10 feet above sea level, which contrasts sharply with the head in the confined Florida aquifer system.

Biscayne Aquifer

The Biscayne aquifer is the only formally named aquifer in the surficial aquifer system in Broward County. Because it is the principal aquifer in Broward County (it has been declared a sole-source aquifer; Federal Register Notice, 1979) and because some refinement of the definition of the aquifer will be given herein, a brief summary of previous definitions, maps delineating the aquifer, and some problems are included below.

The Biscayne aquifer was named and defined by Parker (1951, p. 820) as follows:



0 10 20 MILES

0 10 20 KILOMETERS

SCALE APPROXIMATE
VERTICAL SCALE GREATLY EXAGGERATED

Figure 7a.--Generalized hydrogeologic framework of Broward County.

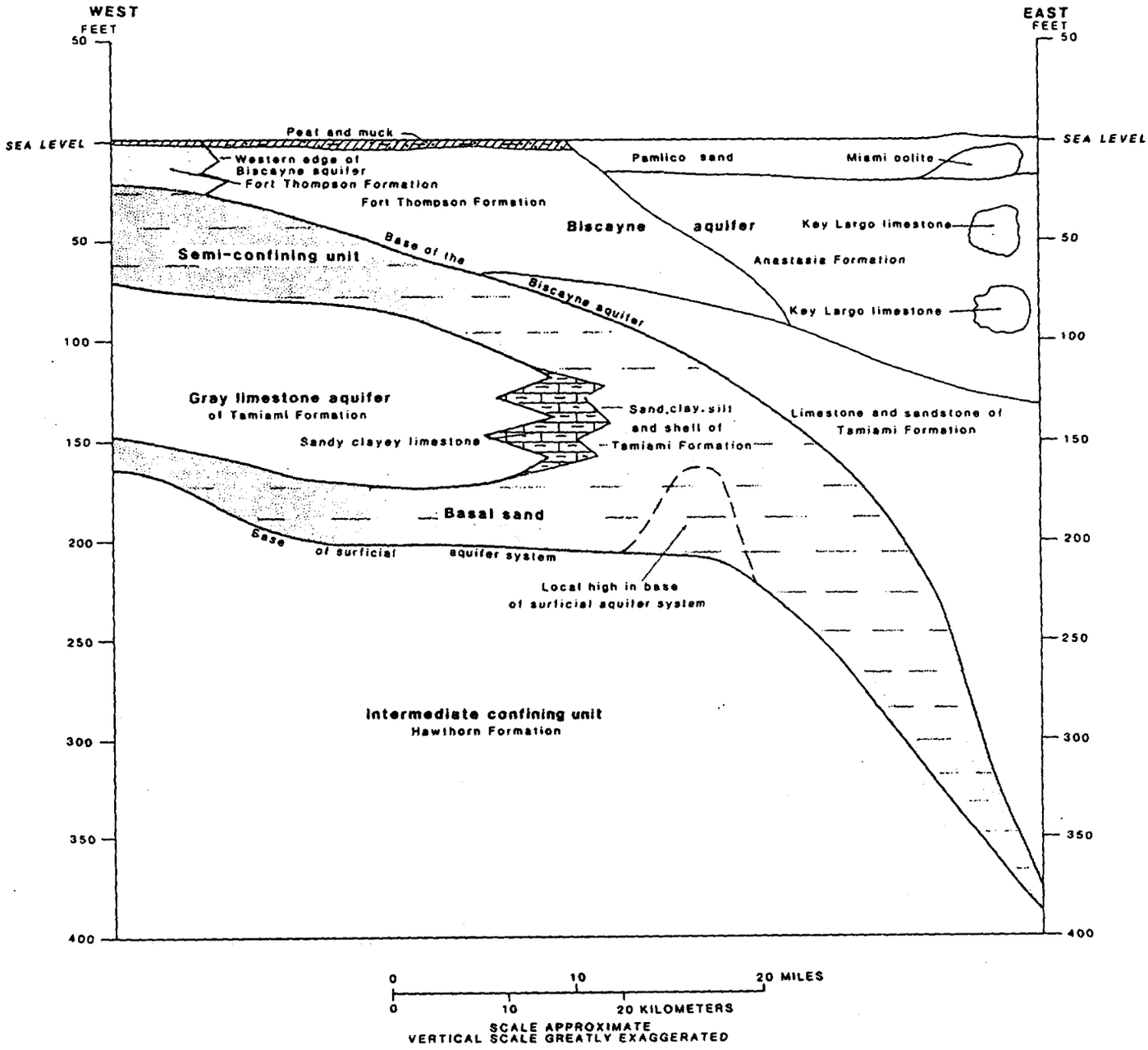
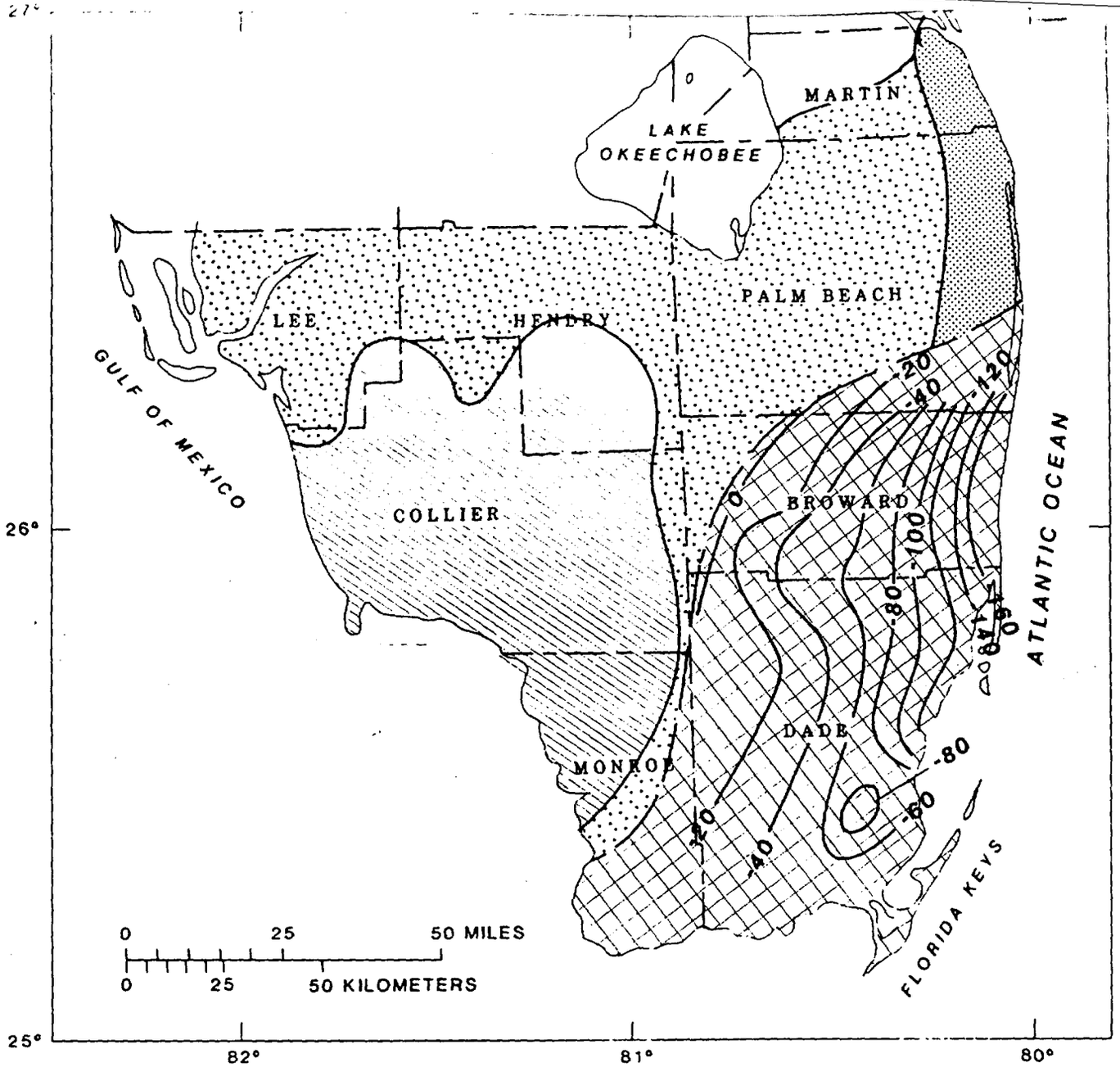


Figure 7b.--Schematic relations of geologic formations, aquifers, and confining unit of the surficial aquifer system across Broward County.



EXPLANATION

BISCAYNE AQUIFER,MAXIMUM YIELD 7000 GALLONS PER MINUTE.

SHALLOW AQUIFER SOUTHWEST FLORIDA,MAXIMUM YIELD 2500 GALLONS PER MINUTE.

COASTAL AQUIFER PALM BEACH AND MARTIN COUNTIES, MAXIMUM YIELD 1000 GALLONS PER MINUTE.

LOCAL,DISCONTINUOUS,WATERBEARING MATERIAL, YIELD LESS THAN 500 GALLONS PER MINUTE.

-60 STRUCTURE CONTOUR--Shows altitude of base of Biscayne aquifer below sea level. Contour interval 20 feet.

APPROXIMATE WESTERN EDGE OF BISCAYNE AQUIFER.

Figure 8.--Areal extent and yield to wells of Biscayne aquifer and other aquifers of the surficial aquifer system in south Florida (from Klein and others, 1975. p. 31).

"The name Biscayne aquifer is proposed for the hydrologic unit of water-bearing rocks that carries unconfined ground water in southeastern Florida."

In a later comprehensive treatment of water resources in southeast Florida, Parker and others (1955, p. 160, 162) give the following information:

"The Biscayne aquifer, named after Biscayne Bay, is the source of the most important water supplies developed in southeastern Florida. It is the most productive of the shallow nonartesian aquifers in the area and is one of the most permeable in the world. The aquifer extends along the eastern coast from southern Dade County into coastal Palm Beach County as a wedge-shaped underground reservoir having the thin edge to the west. It underlies The Everglades as far as northern Broward County, though in that area it is comparatively thin, and the permeability is not as high as it is farther east and south."

"The Biscayne aquifer is a hydrologic unit of water-bearing rocks ranging in age from upper Miocene through Pleistocene. The aquifer is comprised, from bottom to top, of parts or all of the following formations: (1) Tamiami Formation (including only the uppermost part of the formation--a thin layer of highly permeable Tamiami Limestone of Mansfield); (2) Caloosahatchee Marl (relatively insignificant erosion remnants and isolated reefs); (3) Fort Thompson Formation (the southern part); (4) Anastasia Formation; (5) Key Largo Limestone; and (6) Pamlico Sand."

Shallow core borings by the U.S. Army Corps of Engineers in west Dade and Broward Counties, in conjunction with other well data, provided a basis for an additional description of the Biscayne aquifer and a contour map of the base over most of Dade and south Broward Counties (Schroeder and others, 1958). The contour map was later modified by Klein and others (1975, p. 31) and is shown in figure 8. A more recent summary description of the Biscayne aquifer is given by Klein and Hull (1978).

Despite the definitions and accumulated knowledge about the Biscayne aquifer, some ambiguities and practical problems remain. Schroeder and others (1958, p. 5) indicate that although the base of the Biscayne aquifer is readily determined as the top of low permeability sand or "marl" of the Tamiami Formation in the Miami area, it is more difficult to define the lateral and basal limits of the Biscayne aquifer in Broward and Palm Beach Counties where clastic materials predominate and interfingering or gradations of sands and calcareous materials are common. Also, some geologic formations that make up the Biscayne aquifer extend beyond the area generally ascribed to the aquifer. Thus, to delineate the boundaries, changes of hydraulic properties within the geologic formations must be determined. The key criterion for defining the Biscayne aquifer apparently is the presence of highly permeable limestone or calcareous sandstone in the Fort Thompson Formation, Anastasia Formation, or Key Largo Limestone.

The hydraulic behavior of the Biscayne aquifer may also cause confusion. In his 1951 definition, Parker stated that the Biscayne aquifer carries unconfined ground water. Throughout the area (except near well fields or margins of water-conservation areas), water levels at depth are almost identical to the local water table. Water in the Biscayne aquifer is unconfined in that the potential distribution (as indicated by water levels in tightly cased wells) is closely related to the water table or to surface-water bodies. Because of considerable stratification and local permeability variations of the aquifer, aquifer tests of highly permeable zones overlain by much less permeable sand or muddy sand may exhibit semiconfined behavior, particularly during early stages of pumping.

The Biscayne aquifer is redefined herein as that part of the surficial aquifer system in southeast Florida comprised (from land surface downward) of the Pamlico Sand, Miami Oolite, Anastasia Formation, Key Largo Limestone, and Fort Thompson Formation all of Pleistocene age, and contiguous highly permeable beds of the Tamiami Formation of Pliocene age where at least 10 feet of the section is very highly permeable (a horizontal hydraulic conductivity of about 1,000 ft/d or more). Solution-riddled limestone or sandstone of Broward and Dade Counties has hydraulic conductivities often exceeding 10,000 ft/d. The permeability requirement of this definition provides a means of estimating the aquifer boundary where the Fort Thompson Formation, Anastasia Formation, or Key Largo Limestone grade laterally into less-permeable facies. If there are contiguous highly permeable (having hydraulic conductivities of about 100 ft/d or more) limestone or calcareous sandstone beds of the Tamiami Formation, the lower boundary is the transition from these beds to subjacent sands or clayey sands. Where the contiguous beds of the Tamiami Formation do not have sufficiently high permeability, the base of highly permeable limestone or sandstone in the Fort Thompson Formation, Anastasia Formation, or Key Largo Limestone is the base of the Biscayne aquifer.

Gray Limestone Aquifer

In addition to the Biscayne aquifer, a previously undefined aquifer, composed of gray (in places, greenish-gray or tan) limestone of the lower part and locally the middle part of the Tamiami Formation, was found at depth in west Broward County (fig. 7b). The gray limestone usually is shelly with abundant shell fragments or carbonate sand and minor quartz sand, and it is lightly to moderately cemented. Laterally, the gray limestone grades eastward to less-permeable, sandy, clayey limestone and eventually sand and sandstone, except at one locality where coarse shell sand and quartz occur. Although it is less permeable than the Biscayne aquifer, the gray limestone is nevertheless a significant aquifer and a potential source of water. The aquifer is informally and locally named here as the gray limestone aquifer. It is defined as that part of the limestone beds (usually gray) and contiguous coarse clastic beds of the lower to middle part of the Tamiami Formation that are highly permeable (having a hydraulic conductivity of about 100 ft/d or more) and at least 10 feet thick. Above and below the gray limestone aquifer in west Broward County and separating it from the Biscayne aquifer and the base of the surficial aquifer system are sediments having relatively low permeability, such as mixtures of sand, clay, silt, shell, and lime mud, and some sediments of moderate to low permeability, such as limestone, sandstone, and claystone (fig. 7b).

Reference 21

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SITE SCREENING SUPERFUND SUBSECTION
CONVERSATION RECORD

Date: 7/24/92

File Name: Gate City

Time: 11:00 A.M.

Contact Person: Glory
City of Ft. Lauderdale

From: Jim McCarthy, P.G. JM
Environ. Specialist III

Title: Utilities Secretary for Mike Bailey

To: Eric S. Nuzie
Environ. Manager

Phone No.: (305) 771-0880

Subject: Stormwater runoff from Gate City/Sun Bank site area.

Glory, Mike Bailey's secretary, has reviewed the storm water drainage map of the S.W. 4th Ave and W. Broward Blvd. area and has informed me that storm drains exist on both S.W 4th Ave. and W. Broward Blvd. This system directs stormwater runoff to the New River, located south of the site area.

United States Environmental Protection Agency

Reference 22

EPA

FACT SHEET: NATIONAL PRIMARY DRINKING WATER STANDARDS

Contaminants	Health Effects	MCL*	Sources
Microbiological			
Total Coliforms (Coliform bacteria, fecal coliform, streptococcal, and other bacteria)	Not necessarily disease producing themselves, but coliforms can be indicators of organisms that cause assorted gastroenteric infections, dysentery, hepatitis, typhoid fever, cholera, and others; also interfere with disinfection process.	1 per 100 milliliters	human and animal fecal matter
Turbidity	Interferes with disinfection	1-5tu	erosion, runoff, discharges
Inorganic Chemicals			
Arsenic	Dermal and nervous system toxicity effects	.05	geological, pesticide residues, industrial waste and smelter operations
Barium	Circulatory system effects	1	
Cadmium	Kidney effects	.01	geological, mining and smelting
Chromium	Liver/kidney effects	.05	
Lead	Central and peripheral nervous system damage; kidney effects; highly toxic to infants and pregnant women	.05 **	leaches from lead pipes and lead-based solder pipe joints
Mercury	Central nervous system disorders; kidney effects	.002	used in manufacture of paint, paper, vinyl chloride, used in fungicides, geological
Nitrate	Methemoglobinemia ("blue-baby syndrome")	10	fertilizer, sewage, feedlots, geological
Selenium	Gastrointestinal effects	.01	geological, mining
Silver	Skin discoloration (Argyria)	.05	geological, mining
Fluoride	Skeletal damage	4	geological, additive to drinking water, toothpaste, foods processed with fluorinated water

* In milligrams per liter, unless otherwise noted.
** Agency considering substantially lower number.

FACT SHEET:
NATIONAL PRIMARY
DRINKING WATER STANDARDS (Page 2)

Contaminants	Health Effects	MCL*	Sources
Organic Chemicals			
Endrin	Nervous system/ kidney effects	.0002	Insecticide used on cotton, small grains, orchards (cancelled)
Lindane	Nervous system/ liver effects	.004	Insecticide used on seed and soil treatments, foliage application, wood protection
Methoxychlor	Nervous system/ kidney effects	.10	Insecticide used on fruit trees, vegetables
2,4-D	Liver/kidney effects	.1	herbicide used to control broad-leaf weeds in agriculture, used on forests, range, pastures, and aquatic environments
2,4,5-TP Silvex	Liver/kidney effects	.01	herbicide, cancelled in 1984
Toxaphene	Cancer risk	.005	Insecticide used on cotton, corn, grain
Benzene	Cancer	.005	fuel (leaking tanks), solvent commonly used in manufacture of industrial chemicals, pharmaceuticals, pesticides, paints and plastics
Carbon tetrachloride	Possible cancer	.005	common in cleaning agents, industrial wastes from manufacture of coolants
p-Dichlorobenzene	Possible cancer	.075	used in insecticides, moth balls, air deodorizers
1,2-Dichloroethane	Possible cancer	.005	used in manufacture of insecticides, gasoline
1,1-Dichloroethylene	Liver/kidney effects	.007	used in manufacture of plastics, dyes, perfumes, paints, SOCs
1,1,1-Trichloroethane	Nervous system problems	.2	used in manufacture of food wrappings, synthetic fibers

* In milligrams per liter, unless otherwise noted.

FACT SHEET:
NATIONAL PRIMARY DRINKING WATER STANDARDS (Page 3)

Contaminants	Health Effects	MCL*	Sources
Trichloroethylene (TCE)	Possible cancer	.005	waste from disposal of dry cleaning materials and manufacture of pesticides, paints, waxes and varnishes, paint stripper, metal degreaser
Vinyl chloride	Cancer risk	.002	polyvinylchloride pipes (PVC) and solvents used to join them, industrial waste from manufacture of plastics and synthetic rubber
Total trihalomethanes (TTHM) (chloroform, bromoform, bromodichloromethane, dibromochloromethane)	Cancer risk	.1	primary formed when surface water containing organic matter is treated with chlorine
Radionuclides			
Gross alpha particle activity	Cancer	15 pCi/L	radioactive waste, uranium deposits
Gross beta particle activity	Cancer	4 mrem/yr	radioactive waste, uranium deposits
Radium 226 & 228 (total)	Bone cancer	5 pCi/L	radioactive waste, geological

* In milligrams per liter, unless otherwise noted.

U.S. Environmental Protection Agency
Office of Water
Washington DC 20460

EPA

FACT SHEET: NATIONAL SECONDARY DRINKING WATER STANDARDS*

Contaminants	Suggested Levels	Contaminant Effects
pH	6.5 - 8.5	Water is too corrosive
Chloride	250 mg/l	Taste and corrosion of pipes
Copper	1 mg/l	Taste and staining of porcelain
Foaming agents	0.5 mg/l	Aesthetic
Sulfate	250 mg/l	Taste and laxative effects.
Total dissolved solids (hardness)	500 mg/l	Taste and possible relation between low hardness and cardiovascular disease; also an indicator of corrosivity (related to lead levels in water); can damage plumbing and limit effectiveness of soaps and detergents
Zinc	5 mg/l	Taste
Fluoride	2.0 mg/l	Dental fluorosis (a brownish discoloration of the teeth)
Color	15 color units	Aesthetic
Corrosivity	non-corrosive	Aesthetic and health related (Corrosive water can leach pipe materials, such as lead, into drinking water.)
Iron	0.3 mg/l	Taste and staining of laundry
Manganese	0.05 mg/l	Taste and staining of laundry
Odor	3 threshold odor number	Aesthetic

*Secondary Drinking Water Standards are unenforceable federal guidelines regarding the taste, odor, color – and certain other non-aesthetic effects – of drinking water. EPA recommends them to the states as reasonable goals, but federal law does not require water systems to comply with them. States may, however, adopt their own enforceable regulations governing these concerns. To be safe, check your state's drinking water rules.

[43]

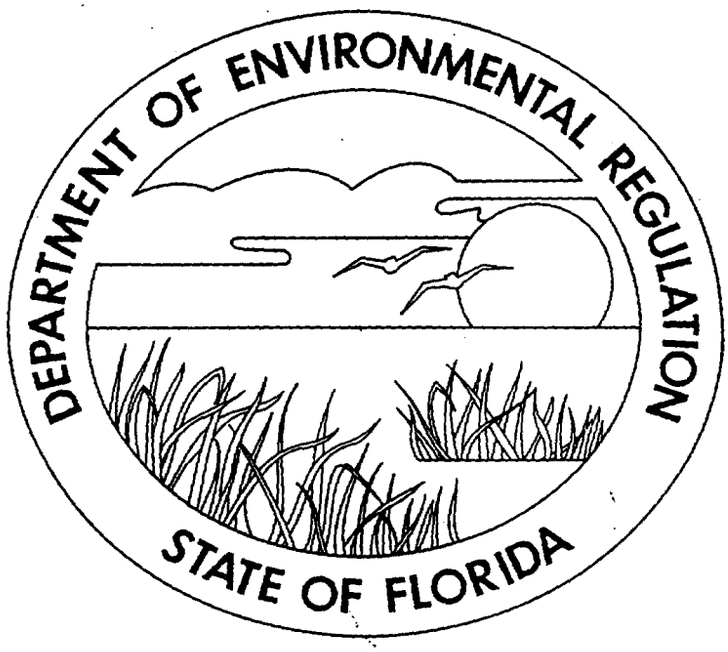
Existing Florida Primary Drinking Water Maximum Contaminant Levels (MCLs) vs. New EPA Primary Drinking Water Maximum Contaminant Levels (MCLs) (Published 1/30/91)

Contaminant	Current FL MCL (ug/L)	New EPA MCL (ug/L)
Cadmium	10	5
Chromium	50	100
Mercury	2	2
Nitrate (as N)	10,000	10,000
Nitrite (as N)	---	1,000
Total Nitrate and Nitrite (as N)	---	10,000
Selinum	10	50
o-Dichlorobenzene	---	600
cis-1,2-Dichloethylene	---	70
trans-1,2-Dichloroethylene	---	100
1,2-Dichloropropane	---	5
Ethylbenzene	---	700
Monochlorobenzene	---	100
Styrene	---	100
Tetrachloroethylene (PCE)	3	5
Toluene	---	1,000
Xylenes (total)	---	10,000
Alachlor	---	2
Atrazine	---	3
Carbofuran	---	40
Chlordane	---	2
Dibromochloropropane (DBCP)	---	0.2
2,4-D	100	70
Ethylene dibromide (EDB)	0.02	0.05
Heptachlor	---	0.4
Heptachlor epoxide	---	0.2
Lindane	4	0.2
Methoxychlor	---	40
Polychlorinated biphenyls	---	0.5
Toxaphene	5	3
2,4,5-TP (Silvex)	10	50
Silver	50	Secondary MCL=100
Aluminum	---	Secondary MCL= 50 to 200

--- = No Standard

Reference 23

FLORIDA GROUND WATER GUIDANCE CONCENTRATIONS



Florida
Department of Environmental Regulation
February 1989

GROUND WATER GUIDANCE CONCENTRATIONS

FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
Division of Water Facilities

Bureau of Ground Water Protection
Compiled by: Randy Merchant
February 1989

Reference 24

MORE DATA ON FILE? NO SCREEN ACTION _

PWS014 260717 800747 04 _

PWS014 260717 800747 04 _ DRINKING WATER PROGRAM 07/31/92

LATITUDE/LONGITUDE RANGE LOOK UP 13:37:43

TYPE DISPLAYED: PLANT, SOURCE AND WELL

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26:07:00	80:08:00	4500351	02	001	0001	DELRAY BEACH WATER DEPARTMENT	A C I
26:07:00	80:08:00	4500351	01	001	0001	DELRAY BEACH WATER DEPARTMENT	A C I
26:10:00	80:10:00	4060168	01	001	0001	BCOES 1B	A C I
26:10:00	80:10:00	4060168	01	001		BCOES 1B	A C I
26:10:35	80:09:36	4061593	01			TAMARAC (EAST), CITY OF	A C I
26:10:35	80:09:36	4061925	01			DAVIE (HACIENDA VILLAGE)	A C I
26:10:35	80:09:36	4060486	02	001		FORT LAUDERDALE, CITY OF	A C I
26:10:35	80:09:36	4060486	02			FORT LAUDERDALE, CITY OF	A C I
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26:10:35	80:09:36	4061574	01	001		FORT LAUDERDALE, CITY OF	A C I
26:10:35	80:09:36	4060486	01	001		FORT LAUDERDALE, CITY OF	A C I

MORE DATA ON FILE? YES SCREEN ACTION _

PWS014 260717 800747 04 _ DRINKING WATER PROGRAM 07/31/92

LATITUDE/LONGITUDE RANGE LOOK UP 13:38:23

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LATITUDE	LONGITUDE	PWS-ID	PLT	SRC	WELL	MAILING NAME	ST/TP/RE
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26:10:35	80:09:36	4061574	01	001		WILTON MANORS, CITY OF	A C I
26:10:35	80:09:36	4061934	01			BROWARD CHRISTIAN SCHOOL	A P I
26:10:35	80:09:36	4061934	01	001		BROWARD CHRISTIAN SCHOOL	A P I
26:10:35	80:09:36	4061593	01	001		TAMARAC (EAST), CITY OF	A C I

MORE DATA ON FILE? NO SCREEN ACTION _

PWS014 260717 800747 01 _ DRINKING WATER PROGRAM 07/31/9
LATITUDE/LONGITUDE RANGE LOOK UP 13:35:5

TYPE DISPLAYED: PLANT, SOURCE AND WELL

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26:07:00	80:08:00	4500351	01	001	0001	DELRAY BEACH WATER DEPARTMENT	A	C	I

MORE DATA ON FILE? NO SCREEN ACTION _
PWS014 260717 800747 02 _ DRINKING WATER PROGRAM 07/31/9
LATITUDE/LONGITUDE RANGE LOOK UP 13:36:3

TYPE DISPLAYED: PLANT, SOURCE AND WELL

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26:07:00	80:08:00	4500351	02	001	0001	DELRAY BEACH WATER DEPARTMENT	A	C	I
26:07:00	80:08:00	4500351	01	001	0001	DELRAY BEACH WATER DEPARTMENT	A	C	I

MORE DATA ON FILE? NO SCREEN ACTION _
PWS014 260717 800747 03 _ DRINKING WATER PROGRAM 07/31/9
LATITUDE/LONGITUDE RANGE LOOK UP 13:36:5

TYPE DISPLAYED: PLANT, SOURCE AND WELL

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26:07:00	80:08:00	4500351	01	001	0001	DELRAY BEACH WATER DEPARTMENT	A	C	I

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PWS002 4061603                DRINKING WATER PROGRAM                          07/31/92
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                                                                  LAST UPDATED: 06/19/92
MAILING NAME: PORT EVERGLADES AUTHORITY                ACTIVE      COMMUNITY
                                                BACT NON  COMPLIER: _
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     DESIGN CAP: ____6,444,000 (GPD)            RADS SAMPLES REQ'D: ___
    MAXIMUM DAY: ____1,369,000 (GPD)            RADS SAMPLES FREQY: ____  (MONTHS)
   % DESIGN CAP:  21.2                          TTHM SAMPLES REQ'D: ___
 AVG PRODUCTION:        916,000 (GPD)           TTHM SAMPLES FREQY: _____ (MONTHS)
   MAXIMUM/HOUR: _____________ (G)            SERVICE CONNECTIONS: ______125
TOT STORAGE CAP: _____________ (G)                NUMBER METERED: ______125
      METER CAP: ____________________              TYPE OF METER: ____________________
                                                CONSEC INDIC: 3 = BACTERIA MONITORING

SERVICE AREA CHARACTERISTICS:
  PRIMARY: RO = RETAIL/GENERAL MERCH                TOTAL # OF PLANTS:      1
SECONDARY: MA = MARINA                              TOTAL # OF SOURCES:      1

    PRIMARY PLANT:    1  LATITUDE: 26:06:00   LONGITUDE: 80:07:10
   PRIMARY SOURCE:    1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36

                                  SCREEN ACTION _
PWS001 4061603                DRINKING WATER PROGRAM                          07/31/92
                         SYSTEM INVENTORY INFORMATION PART 1                  13:40:24
                                                                  LAST UPDATED: 06/19/92

  STATUS: A = ACTIVE                  RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __ INACT REASON: _ = ........................
PWS TYPE: C = COMMUNITY      CATG./CLASS: 5D REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: 01/ 01 END: 12/ 31     NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

 SYSTEM NAME: PORT_EVERGLADES_AUTHORITY_____    GENERAL MAIL: Y (Y OR N)
     ADDRESS: 1850_ELLER_DR_________________    PHONE: ( 305 ) 523 - 3404
        CITY: FORT_LAUDERDALE_____ STATE: FL    ZIP CODE: 33316 - ____

  OWNER NAME: PORT_EVERGLADES_AUTHORITY_____    GENERAL MAIL: Y (Y OR N)
     ADDRESS: 1850_ELLER_DR_________________    PHONE: ( 305 ) 523 - 3404
        CITY: FORT_LAUDERDALE_____ STATE: FL    ZIP CODE: 33316 - ____
  OWNER TYPE: A = AUTHORITY/COMMISION/
                                                  INSPECTOR'S INITIALS: DO_
DATE OF VISIT: 01/ 16/ 92 CLASS: 01 PRIOR VISIT: 05/ 16/ 91 PRIOR CLASS: 01
PERSON CONTACTED: JAMES_J_O'BRIEN_______________   TITLE: PORT_DIRECTOR_______
CONTACT PHONE: ( 305 ) 523 - 3404        SANITARY SURVEY: __/ __/ __
CREATE HISTORY OF MAILING/OWNER ? _
                                  SCREEN ACTION _
PWS004 4061603 01 001         DRINKING WATER PROGRAM                          07/31/92
                                SOURCE INFORMATION                            13:40:42
                                                                  LAST UPDATED: 06/27/84

MAILING NAME: PORT EVERGLADES AUTHORITY          ACTIVE      COMMUNITY
  PLANT NAME: PORT EVERGLADES AUTHORITY          ACTIVE      PLANT NUMBER:  1
          SOURCE NAME: FT._LAUDERDALE_FIVEASH_PLANT__
        SOURCE NUMBER: 001              SOURCE STATUS: A = ACTIVE
            LATITUDE: 26 : 10 : 35       LONGITUDE: 80 : 09 : 36

   SOURCE AVAILABILITY: P = PERMANENT
 SOURCE AVG PRODUCTION: ______916,000 (GPD)          % OF SYSTEM PRODUCTION: 100

ANN %                 SOURCE TYPE: P = PURCHASED
     GROUND,     NUMBER OF WELLS: ___
```

100 PURCHASED GROUND, PWS ID: 4060486 _ NAME: FORT LAUDERDALE, CITY OF

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION: _

PWS002 4061593 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 2 13:41:31
LAST UPDATED: 06/19/92

MAILING NAME: TAMARAC (EAST), CITY OF ACTIVE COMMUNITY

BACT NON COMPLIER: _
RET POP SERVED: ____5,750 BACT SAMPLES REQ'D: __6 RULE MIN: 6
DESIGN CAP: ____2,592,000 (GPD) RADS SAMPLES REQ'D: ___
MAXIMUM DAY: _____268,000 (GPD) RADS SAMPLES FREQY: __48 (MONTHS)
% DESIGN CAP: 10.3 TTHM SAMPLES REQ'D: ___
AVG PRODUCTION: 179,000 (GPD) TTHM SAMPLES FREQY: _____ (MONTHS)
MAXIMUM/HOUR: _____ (G) SERVICE CONNECTIONS: ____1,003
TOT STORAGE CAP: _____ (G) NUMBER METERED: ____1,003
METER CAP: _____ TYPE OF METER: _____
CONSEC INDIC: 3 = BACTERIA MONITORING

SERVICE AREA CHARACTERISTICS:
PRIMARY: MC = MUNICIPAL/CITY TOTAL # OF PLANTS: 1
SECONDARY: __ = ... TOTAL # OF SOURCES: 1

PRIMARY PLANT: 1 LATITUDE: 26:10:35 LONGITUDE: 80:09:36
PRIMARY SOURCE: 1 LATITUDE: 26:10:35 LONGITUDE: 80:09:36

SCREEN ACTION _

PWS001 4061593 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 1 13:41:47
LAST UPDATED: 06/19/92

STATUS: A = ACTIVE RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __ INACT REASON: _ = ...
PWS TYPE: C = COMMUNITY CATG./CLASS: 4D REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: __/ __ END: __/ __ NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

SYSTEM NAME: TAMARAC_(EAST),_CITY_OF_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 7525_NW_88_AVE_____ PHONE: (305) 724 - 2430
CITY: TAMARAC_____ STATE: FL ZIP CODE: 33321 - ____

OWNER NAME: TAMARAC,_CITY_OF_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 6001_NOB_HILL_RD_____ PHONE: (305) 724 - 2400
CITY: TAMARAC_____ STATE: FL ZIP CODE: 33321 - ____
OWNER TYPE: C = CITY

INSPECTOR'S INITIALS: DO_
DATE OF VISIT: 06/ 08/ 92 CLASS: 01 PRIOR VISIT: 04/ 09/ 91 PRIOR CLASS: 01
PERSON CONTACTED: MIKE_COUZZO_____ TITLE: DIRECTOR-PUB_SERVICE
CONTACT PHONE: (305) 724 - 2400 SANITARY SURVEY: __/ __/ __
CREATE HISTORY OF MAILING/OWNER ? _

SCREEN ACTION _

PWS004 4061593 01 001 DRINKING WATER PROGRAM 07/31/92
SOURCE INFORMATION 13:42:00
LAST UPDATED: 07/25/89

MAILING NAME: TAMARAC (EAST), CITY OF ACTIVE COMMUNITY
PLANT NAME: TAMARAC (FT LAUD/FIVEASH) ACTIVE PLANT NUMBER: 1
SOURCE NAME: TAMARAC(EAST)/FIVEASH_____
SOURCE NUMBER: 001 SOURCE STATUS: A = ACTIVE
LATITUDE: 26 : 10 : 35 LONGITUDE: 80 : 09 : 36

SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: _____179,000 (GPD) % OF SYSTEM PRODUCTION: 100

SURFACE, IDENTIFY SOURCE: _____

100 PURCHASED GROUND, PWS ID: 4060486 _ NAME: FORT LAUDERDALE, CITY OF

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION: _

PWS002 4061925 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 2 13:42:26
LAST UPDATED: 12/29/88

MAILING NAME: DAVIE (HACIENDA VILLAGE) ACTIVE COMMUNITY

BACT NON COMPLIER: _
RET POP SERVED: _____120 BACT SAMPLES REQ'D: __2 RULE MIN: 2
DESIGN CAP: _____ (GPD) RADS SAMPLES REQ'D: ___
MAXIMUM DAY: _____ (GPD) RADS SAMPLES FREQY: __48 (MONTHS)
% DESIGN CAP: TTHM SAMPLES REQ'D: ___
AVG PRODUCTION: 12,000,000 (GPD) TTHM SAMPLES FREQY: _____ (MONTHS)
MAXIMUM/HOUR: _____ (G) SERVICE CONNECTIONS: _____110
TOT STORAGE CAP: _____ (G) NUMBER METERED: _____
METER CAP: _____ TYPE OF METER: _____
CONSEC INDIC: 3 = BACTERIA MONITORING

SERVICE AREA CHARACTERISTICS:
PRIMARY: SD = SUBDIVISION TOTAL # OF PLANTS: 1
SECONDARY: RO = RETAIL/GENERAL MERCH TOTAL # OF SOURCES: 1

PRIMARY PLANT: 1 LATITUDE: 26:10:35 LONGITUDE: 80:09:36
PRIMARY SOURCE: 1 LATITUDE: 26:06:15 LONGITUDE: 80:12:00

SCREEN ACTION _

PWS001 4061925 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 1 13:42:38
LAST UPDATED: 12/29/88

STATUS: A = ACTIVE RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __ INACT REASON: _ = ...
PWS TYPE: C = COMMUNITY CATG./CLASS: 4D REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: __/ __ END: __/ __ NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

SYSTEM NAME: DAVIE_(HACIENDA_VILLAGE)_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 6591_SW_45TH_STREET_____ PHONE: (305) 584 - 0576
CITY: DAVIE_____ STATE: FL ZIP CODE: 33314 - ____

OWNER NAME: TOWN_OF_DAVIE_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 6591_SW_45TH_STREET_____ PHONE: (305) 584 - 0576
CITY: DAVIE_____ STATE: FL ZIP CODE: 33314 - ____
OWNER TYPE: M = MUNICIPALITY
INSPECTOR'S INITIALS: ___
DATE OF VISIT: __/ __/ __ CLASS: __ PRIOR VISIT: __/ __/ __ PRIOR CLASS: __
PERSON CONTACTED: _____ TITLE: _____
CONTACT PHONE: (305) 584 - 0576 SANITARY SURVEY: __/ __/ __
CREATE HISTORY OF MAILING/OWNER ? _

SCREEN ACTION _

PWS004 4061925 01 001 DRINKING WATER PROGRAM 07/31/92
SOURCE INFORMATION 13:42:58
LAST UPDATED: 07/25/89

MAILING NAME: DAVIE (HACIENDA VILLAGE) ACTIVE COMMUNITY
PLANT NAME: DAVIE (HACIENDA VILLAGE) ACTIVE PLANT NUMBER: 1
SOURCE NAME: DAVIE(HACIENDA)/PEELE/DIXIE___
SOURCE NUMBER: 001 SOURCE STATUS: A = ACTIVE
LATITUDE: 26 : 06 : 15 LONGITUDE: 80 : 12 : 00

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                                                                    SYSTEM PRODUCTION: 100

ANN %                  SOURCE TYPE: P = PURCHASED
     GROUND,     NUMBER OF WELLS: ___

     SURFACE,    IDENTIFY SOURCE: ______________________________

 100 PURCHASED GROUND,   PWS ID: 4060486 _ NAME: FORT LAUDERDALE, CITY OF

 ___ PURCHASED SURFACE,  PWS ID: _______ _ NAME: ..............................

  LAST RECORD DISPLAYED                  SCREEN ACTION: _
PWS002 4060486                 DRINKING WATER PROGRAM                          07/31/92
                          SYSTEM INVENTORY INFORMATION PART 2                   13:43:39
                                                                LAST UPDATED: 06/19/92
MAILING NAME: FORT LAUDERDALE, CITY OF                  ACTIVE      COMMUNITY
                                                BACT NON  COMPLIER: _
 RET POP SERVED: __235,001                      BACT SAMPLES REQ'D: 150   RULE MIN: 150
     DESIGN CAP: ___90,000,000 (GPD)            RADS SAMPLES REQ'D: __1
    MAXIMUM DAY: ___53,000,000 (GPD)            RADS SAMPLES FREQY: __48  (MONTHS)
   % DESIGN CAP:  58.8                          TTHM SAMPLES REQ'D: __1
 AVG PRODUCTION:    52,000,000 (GPD)            TTHM SAMPLES FREQY: ____3 (MONTHS)
   MAXIMUM/HOUR: _____________ (G)             SERVICE CONNECTIONS: ___37,500
TOT STORAGE CAP: ___28,995,000 (G)                  NUMBER METERED: ___37,500
      METER CAP: ____________________               TYPE OF METER: ____________________
                                                CONSEC INDIC: 0 = NOT CONSECUTIVE

SERVICE AREA CHARACTERISTICS:
  PRIMARY: MC = MUNICIPAL/CITY                      TOTAL # OF PLANTS:     2
SECONDARY: __ = ........................           TOTAL # OF SOURCES:     2

    PRIMARY PLANT:   1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36
   PRIMARY SOURCE:   1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36

                                   SCREEN ACTION _
PWS001 4060486                 DRINKING WATER PROGRAM                          07/31/92
                          SYSTEM INVENTORY INFORMATION PART 1                   13:43:53
                                                                LAST UPDATED: 06/19/92

  STATUS: A = ACTIVE                  RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __ INACT REASON: _ = ........................
PWS TYPE: C = COMMUNITY      CATG./CLASS: 1A REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: __/ __ END: __/ __     NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

 SYSTEM NAME: FORT_LAUDERDALE,_CITY_OF______    GENERAL MAIL: N (Y OR N)
     ADDRESS: 1500_S_SR_7/4321_NW_9_AVE_____    PHONE: ( 305 ) 791 - 3480
        CITY: FT_LAUDERDALE_______ STATE: FL    ZIP CODE: 33312 - ____

  OWNER NAME: FORT_LAUDERDALE,_CITY_OF______    GENERAL MAIL: Y (Y OR N)
     ADDRESS: PO_BOX_14250_________________    PHONE: ( 305 ) 492 - 7865
        CITY: FT._LAUDERDALE_____ STATE: FL    ZIP CODE: 33302 - ____
  OWNER TYPE: C = CITY
                                                   INSPECTOR'S INITIALS: DO_
DATE OF VISIT: 06/ 03/ 92 CLASS: 01 PRIOR VISIT: 02/ 14/ 92 PRIOR CLASS: 01
PERSON CONTACTED: GREGORY_KISELA_______________  TITLE: UTILITIES_DIRECTOR__
CONTACT PHONE: ( 305 ) 492 - 7801        SANITARY SURVEY: 09/ 06/ 88
CREATE HISTORY OF MAILING/OWNER ? _
                                   SCREEN ACTION _
PWS004 4060486
PWS004 4060486 01 001          DRINKING WATER PROGRAM                          07/31/92
                                 SOURCE INFORMATION                             13:44:19
                                                                LAST UPDATED: 08/31/88

MAILING NAME: FORT LAUDERDALE, CITY OF          ACTIVE      COMMUNITY
  PLANT NAME: FORT LAUDERDALE PEELE/DIXIE       ACTIVE      PLANT NUMBER:  1
```

LATITUDE: 26 : 10 : 35 LONGITUDE: 80 : 09 : 36

SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: ___12,000,000 (GPD) % OF SYSTEM PRODUCTION: 23

ANN % SOURCE TYPE: G = GROUND
100 GROUND, NUMBER OF WELLS: _14

SURFACE, IDENTIFY SOURCE: _____

___ PURCHASED GROUND, PWS ID: _____ _ NAME: .....

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION:
PWS002 4060989 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 2 13:45:28
LAST UPDATED: 06/19/92

MAILING NAME: OAKLAND PARK CITY OF ACTIVE COMMUNITY
BACT NON COMPLIER: _
RET POP SERVED: ___34,796 BACT SAMPLES REQ'D: _40 RULE MIN: 40
DESIGN CAP: ___70,000,000 (GPD) RADS SAMPLES REQ'D: ___
MAXIMUM DAY: ___67,781,000 (GPD) RADS SAMPLES FREQY: __48 (MONTHS)
% DESIGN CAP: 96.8 TTHM SAMPLES REQ'D: __4
AVG PRODUCTION: 3,045,000 (GPD) TTHM SAMPLES FREQY: ____3 (MONTHS)
MAXIMUM/HOUR: _____ (G) SERVICE CONNECTIONS: ____7,850
TOT STORAGE CAP: ___29,995,000 (G) NUMBER METERED: ____7,850
METER CAP: _____ TYPE OF METER: _____
CONSEC INDIC: 3 = BACTERIA MONITORING

SERVICE AREA CHARACTERISTICS:
PRIMARY: MC = MUNICIPAL/CITY TOTAL # OF PLANTS: 1
SECONDARY: __ = ... TOTAL # OF SOURCES: 1

PRIMARY PLANT: 1 LATITUDE: 26:10:35 LONGITUDE: 80:09:36
PRIMARY SOURCE: 1 LATITUDE: 26:10:35 LONGITUDE: 80:09:36

SCREEN ACTION _
PWS004 4060989 01 001 DRINKING WATER PROGRAM 07/31/92
SOURCE INFORMATION 13:45:45
LAST UPDATED: 08/31/88

MAILING NAME: OAKLAND PARK CITY OF ACTIVE COMMUNITY
PLANT NAME: OAKLAND PARK (FT LAUD/FIVEASH) ACTIVE PLANT NUMBER: 1
SOURCE NAME: OAKLAND_PARK_(FT_LAUD/FIVEASH)
SOURCE NUMBER: 001 SOURCE STATUS: A = ACTIVE
LATITUDE: 26 : 10 : 35 LONGITUDE: 80 : 09 : 36

SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: ____3,045,000 (GPD) % OF SYSTEM PRODUCTION: 100

ANN % SOURCE TYPE: P = PURCHASED
GROUND, NUMBER OF WELLS: ___

SURFACE, IDENTIFY SOURCE: _____

100 PURCHASED GROUND, PWS ID: 4060486 _ NAME: FORT LAUDERDALE, CITY OF

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION: _
PWS002 4061574 DRINKING WATER PROGRAM 07/31/9
SYSTEM INVENTORY INFORMATION PART 2 13:46:2
LAST UPDATED: 06/19/9

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RET POP SERVED: ___14,601                  BACT SAMPLES REQ'D: _15   RULE MIN:  15
    DESIGN CAP: ____3,240,000 (GPD)        RADS SAMPLES REQ'D: ___
   MAXIMUM DAY: ____2,222,000 (GPD)        RADS SAMPLES FREQY: __48  (MONTHS)
  % DESIGN CAP:  68.5                      TTHM SAMPLES REQ'D: __1
AVG PRODUCTION:      1,481,000 (GPD)       TTHM SAMPLES FREQY: ___90 (MONTHS)
  MAXIMUM/HOUR: _____________ (G)        SERVICE CONNECTIONS: ____4,000
TOT STORAGE CAP: _____________ (G)            NUMBER METERED: ____4,000
     METER CAP: ____________________           TYPE OF METER: ____________________
                                          CONSEC INDIC: 3 = BACTERIA MONITORING

SERVICE AREA CHARACTERISTICS:
  PRIMARY: MC = MUNICIPAL/CITY                  TOTAL # OF PLANTS:     1
SECONDARY: __ = ........................       TOTAL # OF SOURCES:     1

   PRIMARY PLANT:    1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36
  PRIMARY SOURCE:    1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36

                                  SCREEN ACTION _
PWS004 4061574 01 001          DRINKING WATER PROGRAM                    07/31/92
                                SOURCE INFORMATION                       13:46:44
                                                          LAST UPDATED: 08/31/88

MAILING NAME: WILTON MANORS, CITY OF              ACTIVE      COMMUNITY
  PLANT NAME: WILTON MANOR (FT LAUD/FIVEASH)      ACTIVE      PLANT NUMBER:  1
        SOURCE NAME: WILTON_MANOR_(FT_LAUD/FIVEASH)
      SOURCE NUMBER: 001              SOURCE STATUS: A = ACTIVE
          LATITUDE: 26 : 10 : 35       LONGITUDE: 80 : 09 : 36

   SOURCE AVAILABILITY: P = PERMANENT
 SOURCE AVG PRODUCTION: ____1,481,000 (GPD)          % OF SYSTEM PRODUCTION: 100

ANN %                SOURCE TYPE: P = PURCHASED
    GROUND,    NUMBER OF WELLS: ___

    SURFACE,   IDENTIFY SOURCE: ____________________________

 100 PURCHASED GROUND,   PWS ID: 4060486 _ NAME: FORT LAUDERDALE, CITY OF

 ___ PURCHASED SURFACE,  PWS ID: _______ _ NAME: ..............................

  LAST RECORD DISPLAYED                  SCREEN ACTION: _
PWS002 4061934                 DRINKING WATER PROGRAM                    07/31/92
                          SYSTEM INVENTORY INFORMATION PART 2             13:47:07
                                                          LAST UPDATED: 06/18/92
MAILING NAME: BROWARD CHRISTIAN SCHOOL                ACTIVE      NONTRANS NONC
                                          BACT NON  COMPLIER: _
 RET POP SERVED: ______130                BACT SAMPLES REQ'D: __2   RULE MIN:   2
    DESIGN CAP: _____________ (GPD)       RADS SAMPLES REQ'D: __1
   MAXIMUM DAY: _____________ (GPD)       RADS SAMPLES FREQY: __48  (MONTHS)
  % DESIGN CAP:                           TTHM SAMPLES REQ'D: ___
 AVG PRODUCTION:          1,000 (GPD)     TTHM SAMPLES FREQY: _____ (MONTHS)
  MAXIMUM/HOUR: _____________ (G)        SERVICE CONNECTIONS: ________2
TOT STORAGE CAP: _____________ (G)            NUMBER METERED: _________
     METER CAP: ____________________           TYPE OF METER: ____________________
                                          CONSEC INDIC: 0 = NOT CONSECUTIVE

SERVICE AREA CHARACTERISTICS:
  PRIMARY: ES = ELEMENTARY SCHOOL               TOTAL # OF PLANTS:     1
SECONDARY: __ = ........................       TOTAL # OF SOURCES:     1

   PRIMARY PLANT:    1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36
  PRIMARY SOURCE:    1  LATITUDE: 26:10:35   LONGITUDE: 80:09:36

                                  SCREEN ACTION _
PWS001 4061934
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LAST UPDATED: 06/18/92

STATUS: A = ACTIVE RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __ INACT REASON: _ = ...
PWS TYPE: P = NONTRANS NONC CATG./CLASS: SD REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: 01/ 01 END: 12/ 31 NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

SYSTEM NAME: BROWARD_CHRISTIAN_SCHOOL_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 1490_N_FLAMINGO_RD._____ PHONE: (305) 472 - 5750
CITY: PLANTATION_____ STATE: FL ZIP CODE: 33323 - ____

OWNER NAME: FT_LAUDERDALE_BAPTIST_TEMPLE__ GENERAL MAIL: Y (Y OR N)
ADDRESS: 1490_N_FLAMINGO_RD_____ PHONE: (305) 472 - 5750
CITY: PLANTATION_____ STATE: FL ZIP CODE: 33323 - ____
OWNER TYPE: P = INVESTOR/LICENSED PU

INSPECTOR'S INITIALS: DD_
DATE OF VISIT: 06/ 17/ 92 CLASS: 01 PRIOR VISIT: 02/ 17/ 92 PRIOR CLASS: 01
PERSON CONTACTED: _____ TITLE: _____
CONTACT PHONE: (305) 472 - 5750 SANITARY SURVEY: __/ __/ __
CREATE HISTORY OF MAILING/OWNER ? _

SCREEN ACTION _
PWS004 4061934 01 001 DRINKING WATER PROGRAM 07/31/92
SOURCE INFORMATION 13:47:40
LAST UPDATED: 12/21/88

MAILING NAME: BROWARD CHRISTIAN SCHOOL ACTIVE NONTRANS NONC
PLANT NAME: BROWARD CHRISTIAN SCHOOL ACTIVE PLANT NUMBER: 1
SOURCE NAME: BROWARD_CHRISTIAN_SCHOOL_WELL_
SOURCE NUMBER: 001 SOURCE STATUS: A = ACTIVE
LATITUDE: 26 : 10 : 35 LONGITUDE: 80 : 09 : 36

SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: _____1,000 (GPD) % OF SYSTEM PRODUCTION: 100

ANN % SOURCE TYPE: G = GROUND
100 GROUND, NUMBER OF WELLS: __1

SURFACE, IDENTIFY SOURCE: _____

___ PURCHASED GROUND, PWS ID: _____ _ NAME: .....

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION: _

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PWS002 4061410                DRINKING WATER PROGRAM                          07/31/92
                         SYSTEM INVENTORY INFORMATION PART 2                  13:57:37
                                                                LAST UPDATED: 06/19/92
MAILING NAME: SUNRISE #1, CITY OF                      ACTIVE      COMMUNITY
                                                BACT NON  COMPLIER: _
 RET POP SERVED: ___66,500                      BACT SAMPLES REQ'D: _70   RULE MIN:  70
     DESIGN CAP: ___28,000,000 (GPD)            RADS SAMPLES REQ'D: __1
    MAXIMUM DAY: ___10,132,000 (GPD)            RADS SAMPLES FREQY: __48  (MONTHS)
   % DESIGN CAP:  36.1                          TTHM SAMPLES REQ'D: __1
 AVG PRODUCTION:     5,278,000 (GPD)            TTHM SAMPLES FREQY: ____3 (MONTHS)
   MAXIMUM/HOUR: _____________ (G)            SERVICE CONNECTIONS: ____8,593
TOT STORAGE CAP: ____5,295,000 (G)                 NUMBER METERED: ____8,593
      METER CAP: ____________________              TYPE OF METER: ____________________
                                                CONSEC INDIC: 0 = NOT CONSECUTIVE

SERVICE AREA CHARACTERISTICS:
  PRIMARY: MC = MUNICIPAL/CITY                      TOTAL # OF PLANTS:     1
SECONDARY: __ = ........................           TOTAL # OF SOURCES:     2

    PRIMARY PLANT:    1  LATITUDE: 26:10:42   LONGITUDE: 80:15:25
   PRIMARY SOURCE:    1  LATITUDE: 26:10:42   LONGITUDE: 80:15:25

                                   SCREEN ACTION _
PWS001 4061410                DRINKING WATER PROGRAM                          07/31/92
                         SYSTEM INVENTORY INFORMATION PART 1                  13:57:58
                                                                LAST UPDATED: 06/19/92

  STATUS: A = ACTIVE                  RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 02/ 78 INACT DT: __/ __/ __  INACT REASON: _ = ........................
PWS TYPE: C = COMMUNITY      CATG./CLASS: 1A REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: __/ __ END: __/ __     NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

 SYSTEM NAME: SUNRISE_#1,_CITY_OF___________     GENERAL MAIL: Y (Y OR N)
     ADDRESS: 4350_SPRINGTREE_DRIVE_________     PHONE: ( 305 ) 741 - 6570
        CITY: SUNRISE_____________ STATE: FL     ZIP CODE: 33321 - ____

  OWNER NAME: SUNRISE,_CITY_OF______________     GENERAL MAIL: Y (Y OR N)
     ADDRESS: 10770_W_OAKLAND_PARK_BLVD_____     PHONE: ( 305 ) 846 - 0441
        CITY: SUNRISE_____________ STATE: FL     ZIP CODE: 33321 - ____
  OWNER TYPE: C = CITY
                                                   INSPECTOR'S INITIALS: DO_
DATE OF VISIT: 06/ 02/ 92 CLASS: 01 PRIOR VISIT: 02/ 07/ 92 PRIOR CLASS: 01
PERSON CONTACTED: RICHARD_H_JACOBS______________   TITLE: UTILITIES_DIRECTOR__
CONTACT PHONE: ( 305 ) 846 - 0441        SANITARY SURVEY: 09/ 15/ 88
CREATE HISTORY OF MAILING/OWNER ? _
                                   SCREEN ACTION _
PWS004 4061410 01 001         DRINKING WATER PROGRAM                          07/31/92
                                SOURCE INFORMATION                            13:58:16
                                                                LAST UPDATED: 12/19/88

MAILING NAME: SUNRISE #1, CITY OF                      ACTIVE      COMMUNITY
  PLANT NAME: SUNRISE #1                               ACTIVE      PLANT NUMBER:  1
          SOURCE NAME: SUNRISE_#1_WELL_______________
        SOURCE NUMBER: 001              SOURCE STATUS: A = ACTIVE
            LATITUDE: 26 : 10 : 42       LONGITUDE: 80 : 15 : 25

   SOURCE AVAILABILITY: P = PERMANENT
 SOURCE AVG PRODUCTION: ____5,278,000 (GPD)          % OF SYSTEM PRODUCTION: 100

ANN %                 SOURCE TYPE: G = GROUND
 100 GROUND,     NUMBER OF WELLS: _16
```

___ PURCHASED GROUND, PWS ID: _____ _ NAME: .....

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

MORE DATA ON FILE SCREEN ACTION: _

PWS004 4061410 01 002 DRINKING WATER PROGRAM 07/31/92
SOURCE INFORMATION 13:58:32
LAST UPDATED: 04/16/91

MAILING NAME: SUNRISE #1, CITY OF ACTIVE COMMUNITY
PLANT NAME: SUNRISE #1 ACTIVE PLANT NUMBER: 1
SOURCE NAME: 4_WELLS_____
SOURCE NUMBER: 002 SOURCE STATUS: I = INACTIVE
LATITUDE: 26 : 08 : 50 LONGITUDE: 80 : 12 : 40

SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: _____ (GPD) % OF SYSTEM PRODUCTION:

ANN %
100 GROUND, SOURCE TYPE: G = GROUND
NUMBER OF WELLS: __4

SURFACE, IDENTIFY SOURCE: _____

___ PURCHASED GROUND, PWS ID: _____ _ NAME: .....

___ PURCHASED SURFACE, PWS ID: _____ _ NAME: .....

LAST RECORD DISPLAYED SCREEN ACTION: _

PWS002 4060787 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 2 13:59:10
LAST UPDATED: 06/19/92

MAILING NAME: LAUDERHILL, CITY OF ACTIVE COMMUNITY

BACT NON COMPLIER: _
RET POP SERVED: ___47,000 BACT SAMPLES REQ'D: _50 RULE MIN: 50
DESIGN CAP: ___16,000,000 (GPD) RADS SAMPLES REQ'D: __1
MAXIMUM DAY: ____8,364,041 (GPD) RADS SAMPLES FREQY: __48 (MONTHS)
% DESIGN CAP: 52.2 TTHM SAMPLES REQ'D: __1
AVG PRODUCTION: 6,000,000 (GPD) TTHM SAMPLES FREQY: ____3 (MONTHS)
MAXIMUM/HOUR: _____ (G) SERVICE CONNECTIONS: ____4,940
TOT STORAGE CAP: ____4,750,000 (G) NUMBER METERED: ____4,940
METER CAP: _____ TYPE OF METER: _____
CONSEC INDIC: 0 = NOT CONSECUTIVE

SERVICE AREA CHARACTERISTICS:
PRIMARY: MC = MUNICIPAL/CITY TOTAL # OF PLANTS: 1
SECONDARY: __ = ... TOTAL # OF SOURCES: 1

PRIMARY PLANT: 1 LATITUDE: 26:09:11 LONGITUDE: 80:12:47
PRIMARY SOURCE: 1 LATITUDE: 26:09:11 LONGITUDE: 80:12:47

SCREEN ACTION _

PWS001 4060787 DRINKING WATER PROGRAM 07/31/92
SYSTEM INVENTORY INFORMATION PART 1 13:59:26
LAST UPDATED: 06/19/92

STATUS: A = ACTIVE RE-ACTIVATION DT: __/ __/ __
BEGIN DT: 027 78 INACT DT: __/ __/ __ INACT REASON: _ = ...
PWS TYPE: C = COMMUNITY CATG./CLASS: 1A REG BY: D (D=DER OR H=HRS)
NC SEASON BEG: __/ __ END: __/ __ NUCLEAR FACIL: _ (REACTOR, WASTE OR OTHER)

SYSTEM NAME: LAUDERHILL,_CITY_OF_____ GENERAL MAIL: Y (Y OR N)
ADDRESS: 2001_NW_49_AVE_____ PHONE: (305) 730 - 2972
CITY: LAUDERHILL_____ STATE: FL ZIP CODE: 33313 - ____

```
      CITY: LAUDERHILL_________ STATE: FL   ZIP CODE: 33313 - ____
  OWNER TYPE: C = CITY
                                                INSPECTOR'S INITIALS: DO_
DATE OF VISIT: 05/ 08/ 92 CLASS: 01 PRIOR VISIT: 02/ 07/ 92 PRIOR CLASS: 01
PERSON CONTACTED: TAMIRA_WHALEN_____________ TITLE: UTILITIES_DIRECTOR__
CONTACT PHONE: ( 305 ) 730 - 2970      SANITARY SURVEY: 04/ 19/ 88
CREATE HISTORY OF MAILING/OWNER ? _
                                SCREEN ACTION _
PWS004 4060787 01 001          DRINKING WATER PROGRAM                07/31/92
                                 SOURCE INFORMATION                  13:59:41
                                                    LAST UPDATED: 08/01/88

MAILING NAME: LAUDERHILL, CITY OF              ACTIVE     COMMUNITY
 PLANT NAME: LAUDERHILL, CITY OF               ACTIVE     PLANT NUMBER:  1
          SOURCE NAME: LAUDERHILL_WELLFIELD_____________
        SOURCE NUMBER: 001          SOURCE STATUS: A = ACTIVE
            LATITUDE: 26 : 09 : 11     LONGITUDE: 80 : 12 : 47

  SOURCE AVAILABILITY: P = PERMANENT
SOURCE AVG PRODUCTION: ___6,000,000 (GPD)      % OF SYSTEM PRODUCTION: 100

ANN %                SOURCE TYPE: G = GROUND
 100 GROUND,     NUMBER OF WELLS: __7

    SURFACE,   IDENTIFY SOURCE: ______________________________

___ PURCHASED GROUND,   PWS ID: _______ _ NAME: ..............................

___ PURCHASED SURFACE,  PWS ID: _______ _ NAME: ..............................

 LAST RECORD DISPLAYED              SCREEN ACTION: _
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Reference 25

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SITE SCREENING SUPERFUND SUBSECTION
CONVERSATION RECORD

Date: July 31, 1992

File Name: Gate City

Time: 2:30 P.M.

Contact Person: Tamira Whalen
City of Lauderhill

From: Jim McCarthy, P.G.
Environ. Specialist III

Title: Utilities Director

To: Eric S. Nuzie
Environ. Manager

Phone No.: (305) 730-2970

Subject: Location of Lauderhill Municipal wells

Ms. Terry Whalen, the City of Lauderhill Utilities Director, has informed me that all 7 wells are currently active. One of the wells is located in a parking lot at the northeast corner of NW 21st Street and 49th Ave. N.W. The remaining six wells are located across the street (in close proximity to each other) southwest of the intersection,(south of 21st street and west of NW 49th Ave.)

enclosure-map

SW 88TH AV
PINE ISLAND RD
UNIVERSITY DR
SW 77TH AV
SW 74TH AV
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Reference 26

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
SITE SCREENING SUPERFUND SUBSECTION
CONVERSATION RECORD

Date: July 31, 1992

File Name: Gate City

Time: 3:30 P.M.

Contact Person: Janet Jarvis & Bill Karns
City of Ft. Lauderdale

From: Jim McCarthy, P.G.
Environ. Specialist III

Title: Utilities
Title: Peele/Dixie WTP Chief Operator

To: Eric S. Nuzie
Environ. Manager

Phone No.: (305) 492-7859

Subject: Status of Peele/Dixie Municipal wells

Janet Jarvis and Bill Karns of the Fort Lauderdale Water Dept. have informed me that the Peele/Dixie wellfield normally supplies 30%, while Five Ash WTP supplies 70 % of the systems water demand. Mr. Karns indicated that 17 wells are currently active, while 8 wells are out of service. No carbon filters are reported to exist on any of the active wells. A partial status report of wells within a 4-mile radius of the Gate City site is as follows:

Well#	Status
2	Active
3	Active
4	Active
10	Out of Service
11	Active
12	Out of Service
13	Active
14	Out of Service
24	Active
26	Active

Reference 27

Public-Supply Water Use in Florida, 1987

By Richard L. Marella

U.S. GEOLOGICAL SURVEY

Open-File Report 90-596

Prepared in cooperation with the
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
SUWANNEE RIVER WATER MANAGEMENT DISTRICT

Tallahassee, Florida
1990

Table 4. Public-supplied population and withdrawals by water source, by county, 1987

County	Population served and water withdrawn by source, in million gallons per day: Population and ground water withdrawals from principal aquifers: Population served	Total withdrawn	Surficial	Intermediate	Biscayne	Sand-and-gravel	Floridan aquifer system	Population and surface water withdrawals from primary source: Population served	Total withdrawn	Name of water body
Alachua	135,572	21.88	0.00	0.00	0.00	0.00	21.88	0	0.00	
Baker	4,315	.63	.00	.00	.00	.00	.63	0	.00	
Bay	33,852	6.47	.00	.00	.00	.00	6.47	62,973	16.06	Deer Point Lake
Bradford	8,648	1.49	.00	.00	.00	.00	1.49	0	.00	
Brevard	203,628	10.08	4.26	.00	.00	.00	5.82	126,890	15.61	Lake Washington
Broward	1,154,499	207.64	.00	.00	207.64	.00	.00	0	.00	
Calhoun	2,683	.40	.00	.00	.00	.00	.40	0	.00	
Charlotte	35,202	3.03	1.70	.89	.00	.00	.44	58,224	7.43	Peace River/Shell Creek
Citrus	48,057	7.79	.00	.00	.00	.00	7.79	0	.00	
Clay	69,687	9.92	.00	.00	.00	.00	9.92	0	.00	
Collier	88,529	24.69	17.43	7.26	.00	.00	.00	9,309	4.61	Warren Brothers Pit
Columbia	11,774	2.23	.00	.00	.00	.00	2.23	0	.00	
Dade	1,731,374	365.24	.00	.00	365.24	.00	.00	0	.00	
De Soto	7,787	.79	.00	.79	.00	.00	.00	140	.00	See Charlotte County
Dixie	3,896	.60	.00	.00	.00	.00	.60	0	.00	
Duval	561,345	94.28	.00	.00	.00	.00	94.28	0	.00	
Escambia	232,225	36.76	.00	.00	.00	36.76	.00	0	.00	
Flagler	17,502	2.56	1.74	.00	.00	.00	.82	0	.00	
Franklin	7,663	1.52	.00	.00	.00	.00	1.52	0	.00	
Gadsden	14,444	1.93	.00	.00	.00	.00	1.93	8,629	1.43	Quincy Creek
Gilchrist	1,468	.40	.00	.00	.00	.00	.40	0	.00	
Glades	2,254	.26	.00	.26	.00	.00	.00	0	.00	
Gulf	6,389	1.02	.00	.00	.00	.00	1.02	0	.00	
Hamilton	5,367	.83	.00	.00	.00	.00	.83	0	.00	
Hardee	8,941	1.35	.00	.00	.00	.00	1.35	0	.00	
Hendry	17,988	3.16	2.98	.18	.00	.00	.00	0	.00	
Hernando	77,398	10.48	.00	.00	.00	.00	10.48	0	.00	
Highlands	50,539	7.82	.00	.00	.00	.00	7.82	0	.00	
Hillsborough	316,655	63.64	.00	.00	.00	.00	63.64	386,260	58.96	Hillsborough River
Holmes	4,461	.88	.00	.00	.00	.00	.88	0	.00	
Indian River	49,207	11.98	8.59	.00	.00	.00	3.39	0	.00	
Jackson	15,740	2.47	.00	.00	.00	.00	2.47	0	.00	
Jefferson	2,898	.62	.00	.00	.00	.00	.62	0	.00	
Lafayette	938	.16	.00	.00	.00	.00	.16	0	.00	
Lake	91,493	17.66	.00	.00	.00	.00	17.66	0	.00	
Lee	210,912	30.96	7.72	23.24	.00	.00	.00	23,290	2.57	Caloosahatchee River
Leon	138,240	23.06	.00	.00	.00	.00	23.06	0	.00	
Levy	7,841	1.33	.00	.00	.00	.00	1.33	0	.00	
Liberty	1,366	.21	.00	.00	.00	.00	.21	0	.00	
Madison	6,390	1.36	.00	.00	.00	.00	1.36	0	.00	
Manatee	0	.00	.00	.00	.00	.00	.00	178,491	34.93	Manatee River/Braden River
Marion	82,533	13.21	.00	.00	.00	.00	13.21	0	.00	
Martin	51,955	10.11	9.87	.00	.00	.00	.24	0	.00	
Monroe	73,500	.00	.00	.00	.00	.00	.00	0	.00	
Nassau	20,735	3.54	.00	.00	.00	.00	3.54	0	.00	
Okaloosa	117,492	18.53	.00	.00	.00	.00	18.53	0	.00	
Okeechobee	0	.00	.00	.00	.00	.00	.00	15,240	2.00	Lake Okeechobee
Orange	586,968	139.74	.00	.00	.00	.00	139.74	0	.00	
Osceola	54,396	7.51	.00	.00	.00	.00	7.51	0	.00	
Palm Beach	647,528	137.02	96.75	.00	40.27	.00	.00	112,318	31.46	Lake Okeechobee/Lake Clear
Pasco	210,669	83.87	.00	.00	.00	.00	83.87	0	.00	
Pinellas	846,348	40.02	.00	.00	.00	.00	40.02	0	.00	
Polk	312,880	60.17	.00	.00	.00	.00	60.17	0	.00	
Putnam	20,831	3.28	.00	.00	.00	.00	3.28	0	.00	
St. Johns	58,132	7.56	4.49	.00	.00	.00	3.07	0	.00	
St. Lucie	81,503	12.33	12.18	.00	.00	.00	.15	0	.00	
Santa Rosa	64,608	9.15	.00	.00	.00	6.49	2.66	0	.00	
Sarasota	122,585	18.45	.84	12.61	.00	.00	5.00	76,773	1.33	Myakka River
Seminole	231,550	40.86	.00	.00	.00	.00	40.86	0	.00	
Sumter	9,704	1.13	.00	.00	.00	.00	1.13	0	.00	
Suwannee	8,689	1.33	.00	.00	.00	.00	1.33	0	.00	
Taylor	10,519	1.59	.00	.00	.00	.00	1.59	0	.00	
Union	4,000	.61	.00	.00	.00	.00	.61	0	.00	
Volusia	290,994	40.27	.00	.00	.00	.00	40.27	0	.00	
Wakulla	6,156	.68	.00	.00	.00	.00	.68	0	.00	
Walton	24,647	3.14	.00	.00	.00	.00	3.14	0	.00	
Washington	6,685	1.00	.00	.00	.00	.00	1.00	0	.00	
Totals	9,334,774	1,634.68	168.55	45.23	613.15	43.25	764.50	1,058,537	176.39	

the unnamed surficial aquifer (96.8 Mgal/d), and public suppliers in Lee County withdrew the largest quantity of water from the intermediate aquifer (23.2 Mgal/d). Only public suppliers in Broward, Dade, and Palm Beach Counties withdrew water from the Biscayne aquifer, and public suppliers in Escambia and Santa Rosa Counties used the sand-and-gravel aquifer. The general extent of these aquifers are shown in figure 14.

To make potable water available, public suppliers in several counties import water from adjacent counties to help meet demands. In 1987, an estimated 127.9 Mgal/d of public-supplied water was withdrawn from one county for use in another county (table 3). Of the six counties that imported water in 1987, Monroe County imported 100 percent of its water used for public supply from neighboring Dade County, and Pinellas County imported 67 percent of its water used for public supply from adjacent Hillsborough and Pasco Counties. Other counties involved in importing or exporting public-supply water during 1987 include Brevard, Charlotte, De Soto, Manatee, Orange, and

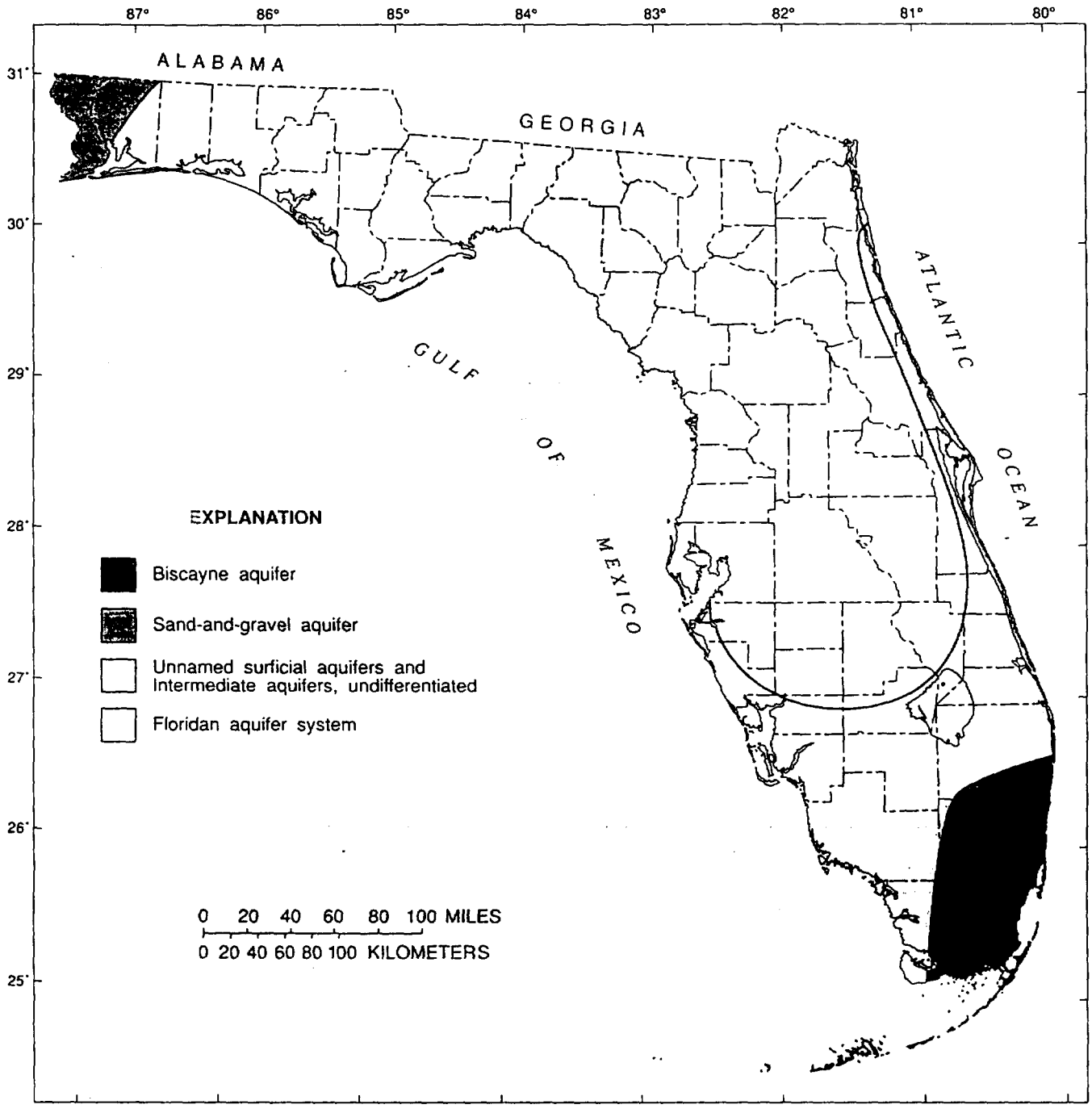

Figure 14. *General location of principal aquifers. (Modified from Vecchioli and Foose, 1984.)*

Table 9.--Brevard County public-supply water use by utility, 1987

[Mgal/d, million gallons per day; Per capita, in gallons per day; F, Floridan aquifer system; SJRWMD, St. Johns River Water Management District; R/O, reverse osmosis; U, unnamed surficial aquifers; GDU, General Development Utilities]

Utility/Owner	Water source	Public-supply water use Mgal/d	Population	Per capita	Water management district	Remarks
Aquarina Utilities	F	0.02	170	118	SJRWMD	R/O treated.
Avatar Utilities	U	.57	5,477	104	SJRWMD	
Cocoa Water System	F	23.49	123,673	190	SJRWMD	Withdrawal is in Orange County.
Melbourne, city of	Lake Washington	15.61	126,890	123	SJRWMD	
North Brevard Utilities	F	.57	5,500	104	SJRWMD	
GDU - Palm Bay	U	3.76	27,165	138	SJRWMD	Includes 0.07 Mgal/d from the F.
South Brevard Utilities	F	.04	430	93	SJRWMD	R/O treated.
Titusville, city of	F	5.12	41,213	124	SJRWMD	
Totals		49.18	330,518	149		

Table 10.--Broward County public-supply water use by utility, 1987

[Mgal/d, million gallons per day; Per capita, in gallons per day; B, Biscayne aquifer; SFWMD, South Florida Water Management District; I/D, Improvement District]

Utility/Owner	Water source	Public-supply water use Mgal/d	Population	Per capita	Water management district	Remarks
Broadview Park Water System	B	0.68	6,751	101	SFWMD	
Broward County Utilities	B	28.97	152,777	190	SFWMD	
Cooper City	B	2.04	14,974	136	SFWMD	Systems 1 and 2.
Coral Springs, city of	B	4.97	23,113	215	SFWMD	
Coral Springs I/D	B	3.52	34,931	101	SFWMD	
Dania, city of	B	2.06	13,471	153	SFWMD	
Davie, town of	B	2.48	22,794	109	SFWMD	
Deerfield Beach, city of	B	10.14	44,313	229	SFWMD	
Ferncrest Utilities	B	.37	4,995	74	SFWMD	
Fort Lauderdale, city of	B	52.75	215,194	245	SFWMD	
Hallandale, city of	B	5.64	39,749	142	SFWMD	
Hillsboro Beach, town of	B	.96	3,000	320	SFWMD	
Hollywood, city of	B	20.48	128,817	159	SFWMD	
Lauderhill, city of	B	7.25	44,122	164	SFWMD	
Margate, city of	B	6.59	46,901	141	SFWMD	
Miramar, city of	B	3.34	37,603	89	SFWMD	
North Lauderdale,city of	B	2.71	23,873	114	SFWMD	
North Springs I/D	B	.26	1,245	209	SFWMD	
Ocean Way Water System	B	.11	643	171	SFWMD	
Parkland Utilities	B	.08	548	146	SFWMD	
Pembroke Pines, city of	B	5.59	48,558	115	SFWMD	
Plantation, city of	B	9.48	49,802	190	SFWMD	Systems 1 and 2.
Pompano Beach, city of	B	18.76	70,496	266	SFWMD	
Royal Utilities	B	.18	1,000	180	SFWMD	
Seminole Indian Reservation	B	.32	3,300	97	SFWMD	
South Broward Utilities	B	.22	2,310	95	SFWMD	
Sunrise, city of	B	12.59	82,260	153	SFWMD	Sunrise systems 1,2,3, and 4.
Tamarac, city of	B	5.10	36,959	138	SFWMD	
Totals		207.64	1,154,499	180		

Table 11.--Calhoun County public-supply water use by utility, 1987

[Mgal/d, million gallons per day; Per capita, in gallons per day; F, Floridan aquifer system; NWFWMD, Northwest Florida Water Management District]

Utility/Owner	Water source	Public-supply water use Mgal/d	Population	Per capita	Water management district	Remarks
Blountstown, city of	F	0.40	2,683	149	NWFWMD	
Totals		.40	2,683	149		

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

02/23/91

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
BCUD - 1A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	10843 (C)	7	1	02/06/91	Emergency hookups with Ft. Lauderdale, Tamarac, and Lauderdale
BCUD - 1B	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	3397 (C)	5	1	03/15/90	In production 8 hrs/day, interconnect with BCUD-1A Emergency hookup with Ft. Lauderdale
BCUD - 2A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	18170 (C)	9	2	04/23/90	Emergency hookups with Deerfield Beach
CUD - 3A Other Emg. 960-3056	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	5305 (C)	6	1	04/23/90	Emergency hookups with Dania, Ft. Lauderdale
CUD - 3B	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	6207 (C)	4	1	03/15/90	Emergency hookups with Miramar and Hollywood
CUD - 3C	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	3648 (C)	3	1	03/15/90	System OFF-LINE; Purchasing water from City of Hollywood
ROADVIEW	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	2185 (C)	3	1	03/15/90	Emergency hookups with Tamarac and N. Lauderdale
ROADVIEW PARK W.D.	MIKE SCHWAB (305)583-4223	BROADVIEW PARK W.D. 1955 SW 50TH AVE PLANTATION, FL 33317	1800 (C)	1	1	03/19/90	Emergency hookups with Plantation
COCONUT CREEK	GARTH HINCKEL (305)973-6784	COCONUT CK WATER DPT 4800 W COPAND RD COCONUT CREEK, FL 33063	32000 (P)	0	0	04/23/90	Potable water supplied by BCUD - 2A
COOPER CITY	GEORGE HACKNEY (305)434-5519	COOPER CITY UTIL 90 SW 50TH PLACE COOPER CITY, FL 33328	7500 (C)	6	2	04/23/90	Emergency hookups with Dania and Bonaventure

Reference 28

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

02/23/91

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
CORAL SPRGS IMPRM DS	CHUCK PERRON (305)753-0380	CORAL SPRGS IMPRM DS 10300 NW 11TH MANOR CORAL SPRINGS, FL 33071	30000 (P)	7	1	03/19/90	Emergency hookups with Coral Springs
CORAL SPRINGS	AL PAZIN (305)344-1172	CITY OF CORAL SPRING 9551 W SAMPLE RD CORAL SPRINGS, FL 33075	40000 (P)	12	1	03/19/90	Emergency hookups with Coral Springs and North Springs Improvement Dist
DANIA	DON WINDHAM (305)921-7781	BERRY AND CALVIN INC 2 OAKWOOD BLVD ST120 HOLLYWOOD, FL 33020	4064 (C)	2	1	03/15/90	Additional potable water provided by BCUD, Ft. Lauderdale and Hollywood
DAVIE	DANIEL COLABELLA (305)797-1080	DAVIE WATER SYSTEM 6591 SW 45TH ST DAVIE, FL 33314	7000 (C)	16	2	03/19/90	Emergency hookups with Hollywood, Cooper City and Ft. Lauderdale
DEERFIELD BEACH	DALE HOLINBECK (305)480-4270	CITY OF DEERFIELD BC 150 NE 2ND AVE. DEERFIELD, FL 33441	10800 (C)	18	2	03/15/90	Emergency hookups with BCUD 2A, Hillsboro Bch and Boca Raton
FERNCREST UTILITIES	ROBERT SALERNO (305)989-6200	FERNCREST UTILITIES 3015 SW 54TH AVE. FT. LAUDERDALE, FL 33314	1600 (C)	2	1	03/15/90	Emergency hookups with Davie and Ft. Lauderdale
FT LAUDERDALE	Mike Bailey ~~JAMES SINDELAR~~ (305)492-7858	FT LAUDERDALE UTIL P.O. BOX 14250 FT. LAUDERDALE, FL 33302	56000 (C)	43	2	12/13/90	Supply potable water to Wilton Manor, Oakland Park, BCUD, BC Port Auth, Dania and Tamarac East
HILLSBORO BEACH	RODNEY MAIN (305)941-8937	HILLSBORO BCH WATER 925 NE SAMPLE RD POMPANO BEACH, FL 33064	185 (C)	3	1	03/15/90	Emergency hookups with BCUD 2A, Deerfield Beach, Seasonal pop from 2300 - 3800
HOLLANDALE	MIKE GOOD (305)458-3251	DEPT OF PUBLIC WORKS 308 S DIXIE HWY HOLLANDALE, FL 33009	5500 (C)	2	1	03/15/90	6 wells shut down, salt-water intrusion. Additional water supplied by N. Miami
HOLLYWOOD	MARSHALL BERGAKER (305)921-3251	CITY OF HOLLYWOOD UT P.O.BOX 229045 HOLLYWOOD, FL 33022	130000 (P)	20	2	03/28/90	Supplies potable water to Dania. Emergency hookups with surrounding municipalities

Robert Boyce
~~[illegible]~~

Rob Creighton
(305)921-3301

Ron Collins
(305)921-3320

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

02/23/91

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
LAUDERHILL	JOHN SCHRIEFFER (305)739-0100	CITY OF LAUDERHILL 2000 CITY HALL DRIVE LAUDERHILL, FL 33313	8600 (C)	7	1	04/11/90	Emergency hookups with Plantation and Sunrise
MARGATE	RICK VAN ACKER (305)972-0828	MARGATE UTILITIES 1001 W RIVER DR MARGATE, FL 33063	23723 (C)	12	2	03/19/90	Emergency hookups with N. Lauderdale and Pompano Beach
MIRAMAR	LOU BADAMI (305)989-6200	MIRAMAR CITY HALL 6740 MIRAMAR PKWY MIRAMAR, FL 33083	12100 (C)	9	2	03/15/90	Emergency hookups with BCUD 3C and Pembroke Pine
NORTH LAUDERDALE	ED GOEBELS (305)722-0900	CITY OF N LAUDERDALE 701 SW 71ST AVE NORTH LAUDERDAE, FL 33068	6328 (C)	3	1	03/19/90	Emergency hookups with Tamarac, BCUD, and Margate
NORTH SPRGS IMPRM DS	CHUCK PERRON (306)753-0380	NORTH SPRGS IMPRM DS 10300 NW 11TH MANOR CORAL SPRINGS, FL 33071	5000 (P)	2	1	03/19/90	Emergency hookups with Coral Springs. Two (2) new wells due 6/90
OAKLAND PARK	ROLLAND SALSBERRY (305)561-6259	OAKLAND PARK UTIL 3650 NE 12TH AVE OAKLAND PARK, FL 3334	2700 (C)	0	0	03/15/90	Potable water supplied by City of Ft. Lauderdale
PEMBROKE PINES	DAVE MARTINEZ (305)435-6540	CITY OF PEMBROKE PNS 7960 JOHNSON ST PEMBROKE PINES, FL 33024	31581 (C)	8	2	03/15/90	Emergency hookups with Cooper City, Hollywood and Miramar
PLANTATION CENTRAL	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 700 NW 91ST AVE PLANTATION, FL 33317	10043 (C)	10	1	03/23/90	Interconnected with Plantation East System
PLANTATION EAST	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 500 NW 65TH AVE PLANTATION, FL 33317	9891 (C)	10	1	03/28/90	Emergency hookups with Ft. Lauderdale, Sunrise and Broward Park. Interconnected with Pltn Cntrl
PLANTATION WEST	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 700 NW 91ST AVE PLANTATION, FL 33317	1336 (C)	0	0	03/23/90	Potable water supplied by Plantation Central

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

02/23/91

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
POMPANO BEACH	STAN LEMCKE (305)786-4105	POMPANO BCH PBLC WKS P.O.BOX 1300 POMPANO BEACH, FL 33061	16900 (C)	22	2	03/19/90	Emergency hookups with BCUD - 2A
ROYAL UTILITY	DOUGLAS BRIGHT (305)341-7565	ROYAL UTILITY CO 8900 NW 44TH COURT CORAL SPRINGS, FL 33065	173 (C)	3	1	03/19/90	No Emergency hookups
SUNRISE	WALTER GERRARD (305)741-6570	CITY OF SUNRISE 4350 SPRINGTREE DR SUNRISE, FL 33351	29742 (C)	28	3	03/22/90	Emergency hookups with Plantation and Lauderhill
TAMARAC	LONNIE SCOTT (305)726-2300	TAMARAC UTILITIES 7805 NW 61ST ST TAMARAC, FL 33321	17074 (C)	13	1	03/19/90	Emergency hookups with BCUD -1A and Lauderhill
WILTON MANOR	JOE MOSS (305)390-2190	CITY OF WILTON MANOR 524 NE 21ST COURT WILTON MANOR, FL 33305	4500 (C)	0	0	01/10/91	Potable water supplied by city of Ft. Lauderdale

CITY OF FORT LAUDERDALE
P.O. BOX 14250
FORT LAUDERDALE, FLORIDA 33
(305) 761-5048

Reference 29

OF TRANSMITTAL

DATE: 10/31/91	PROJECT NO.
ATTENTION: Jim McCarthy	
RE: City of Fort Lauderdale	
Water Production Wells	

TO: FDER

Bureau of Waste Cleanup

2600 Blair Stove Road

Tallahassee, FL 32399-2400

GENTLEMEN:

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☒ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			Prospect Well Field
1			Dixie Well Field

Bureau of Waste Cleanup
NOV 4 1991
Technical Review Section

THESE ARE TRANSMITTED as checked below:

☐ For your file ☐ Approved as submitted ☐ Resubmit _____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution

☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints

☐ For review and comment ☐ _____

REMARKS: _____

COPY TO: _____

SIGNED: M. F. Bailey
492-7858

If enclosures are not as noted, kindly notify us at once.

FORM M-177 Rev 6 88

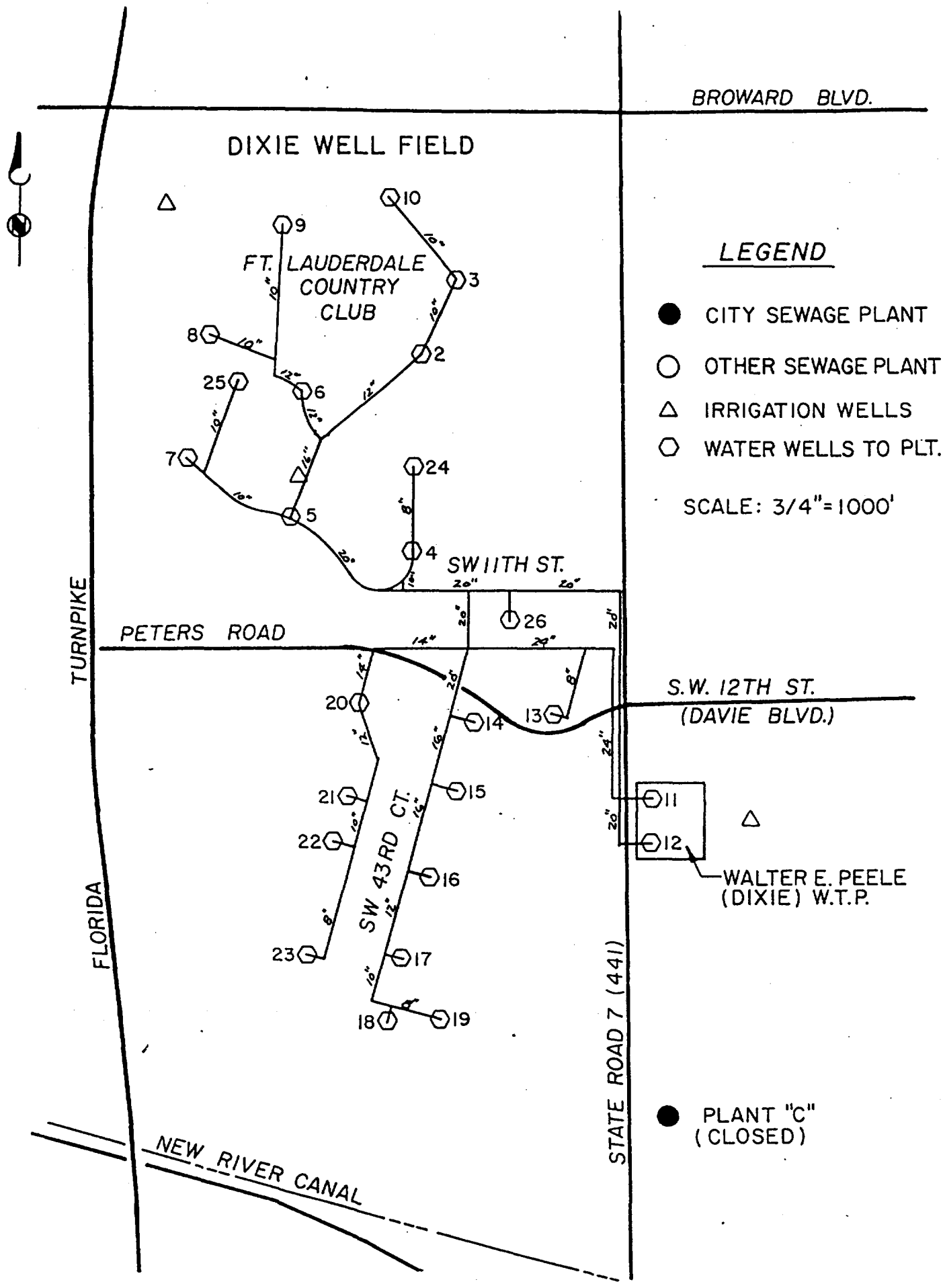

Figure 4-3 Dixie Well Field

[illegible] WELLFIELDS

CITY OF FORT LAUDERDALE, FLORIDA

P-4261

RAW WATER WELL USE PERMITS

MARCHESE DRAWN BY	OFFICE OF CITY ENGINEER	NOV - 75 DATE
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FIELD BOOK		OF 5 SHEET
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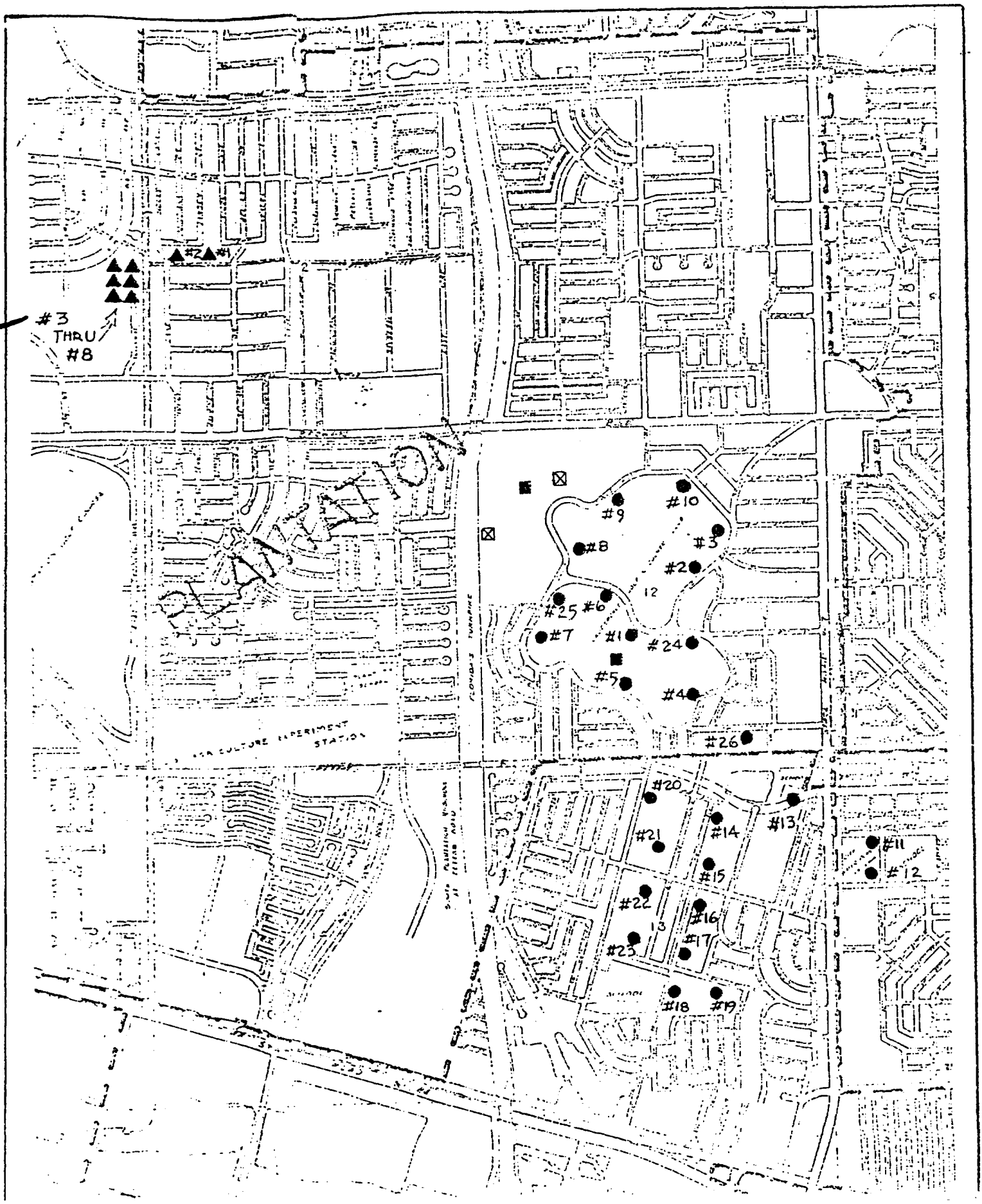
#1
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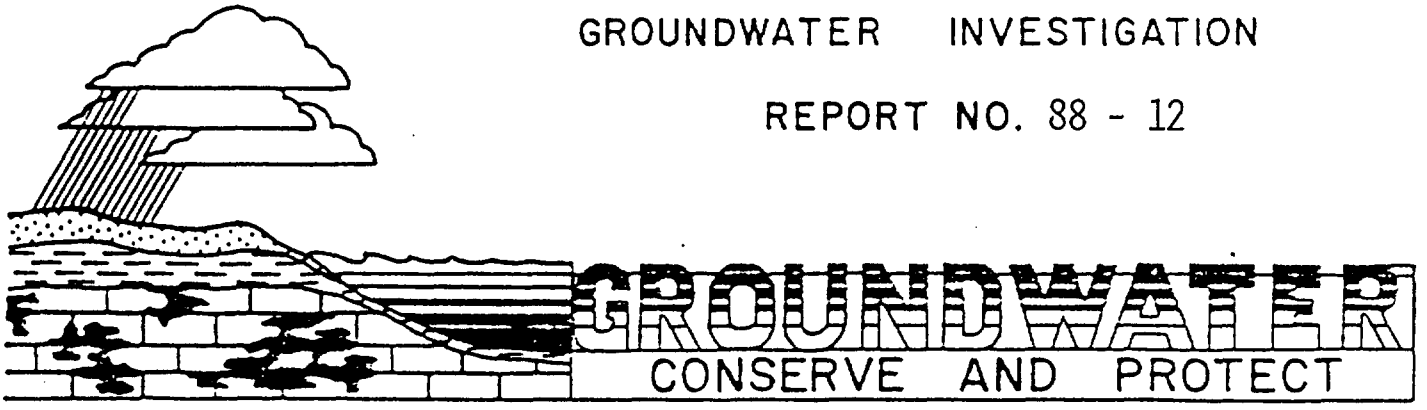
13
SEA CULTURE EXPERIMENT STATION

GROUNDWATER INVESTIGATION

REPORT NO. 88 - 12



BUREAU OF WASTE CLEANUP

PEELE-DIXIE WELLFIELD CONTAMINATION

BROWARD COUNTY

DECEMBER 1988

GEOFFREY B. WATTS

JOHN W. GLASSCOCK

MICHAEL R. CLARK

GEORGE E. WIEGAND

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
2600 BLAIRSTONE RD., TALLAHASSEE, FLORIDA 32301

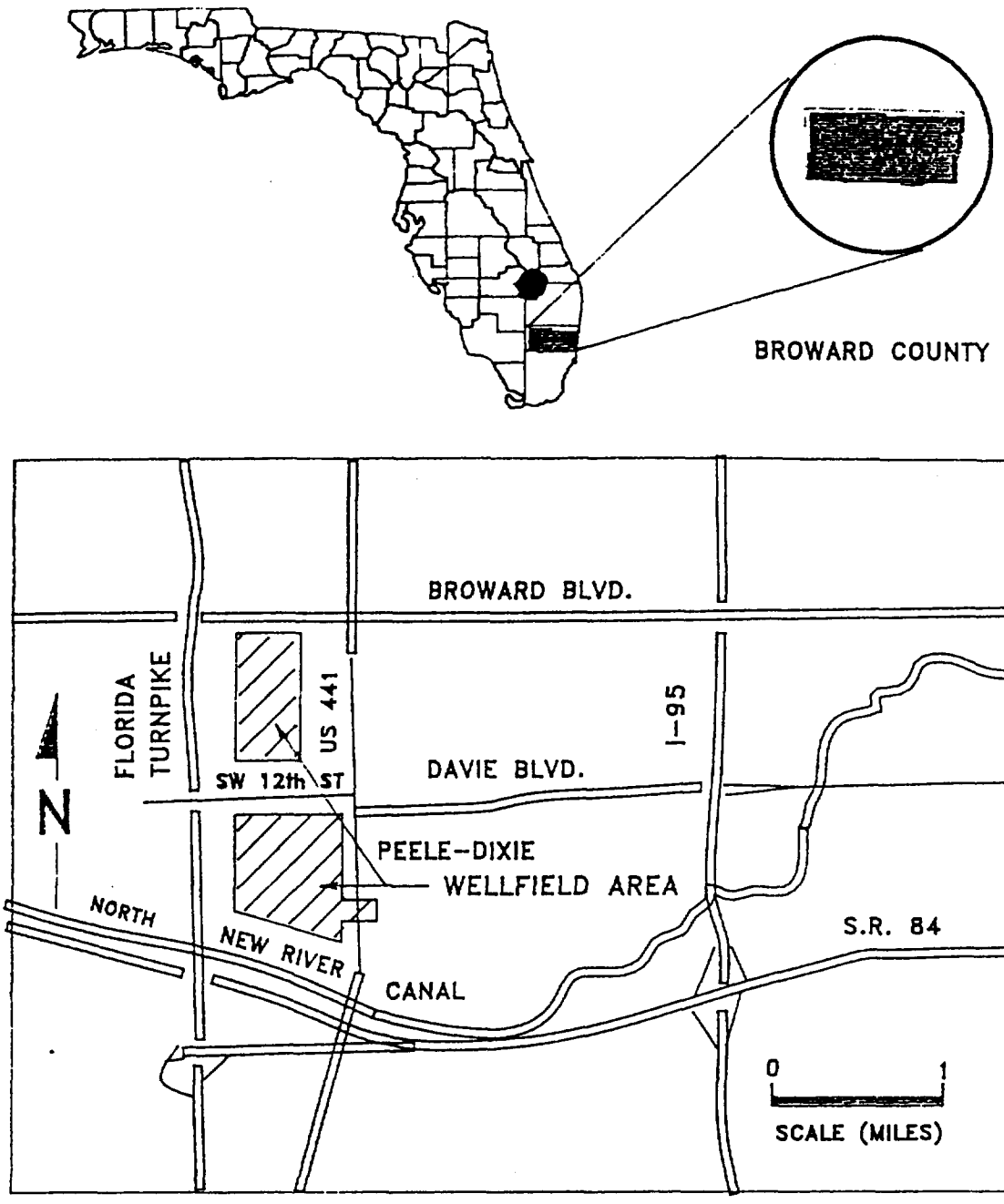


FIGURE 1. SITE LOCATION

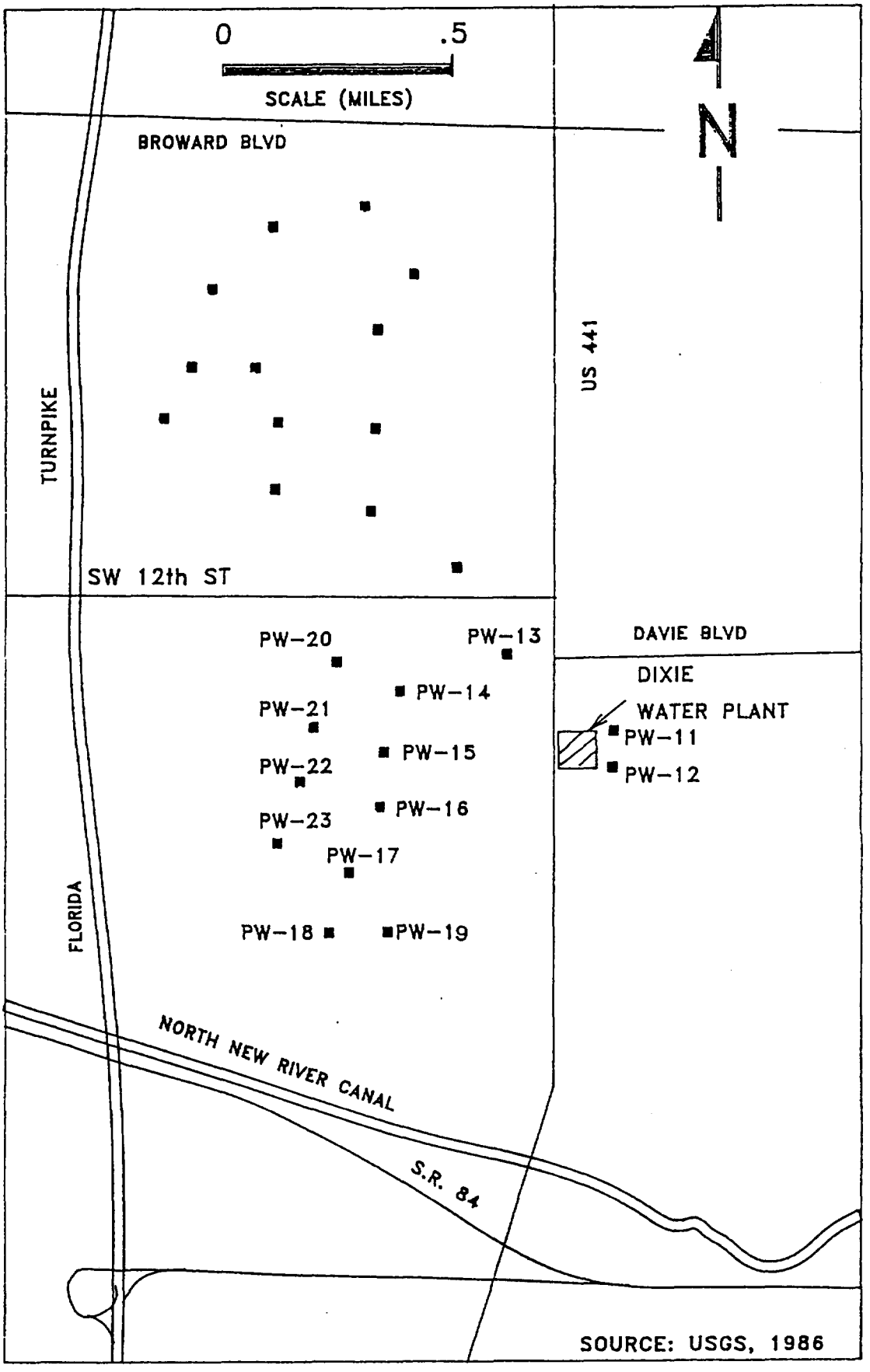


FIGURE 2. PEELE-DIXIE WELLFIELD

2.0 Background

2.1 Wellfield Description

There are a total of 26 supply wells that comprise the Peele-Dixie wellfield. Half of the wells are located in the northern part of the wellfield, north of the Southwest 12th Street and the remaining wells are situated in the southern wellfield, south of Southwest 12th Street (Figure 2). It is the northern half of the wellfield that supplies the majority of the residential water requirements. Because of concerns about salt water intrusion, the southern half of the wellfield is switched on only when the northern wellfield cannot sustain the demand, typically in the dry winter months. The pumping rate of the southern wellfield generally amounts to about 2% of that of the northern wellfield (Brietenstein, 1988). It should be noted that up until January 1987 the Broward County Utility Department could not switch supply wells off and on independently of each other. Hence when the southern wellfield was pumping all of the wells therein were operational.

2.2 Public Well Contamination

The wellfield contamination was discovered by accident. On December 18, 1986 a raw water sample from well PW-18 was utilized to test a piece of analytical equipment in the Broward County Utilities laboratory. The sample was found to be contaminated with about 300 ug/l of 1,2 dichloroethene (1,2 DCE). PW-18 was removed from service at that time. Prior to this occasion the wellfield raw water quality had been monitored only infrequently. For example, well PW-18 had been previously sampled and analyzed for VOCs in March 1984. It was found to be clean (Breitenstein 1988). On December 22, 1986,

PW-18 was placed back into service in order to resample the well. Wells PW-14 through PW-19 were also sampled at this time. The concentration of 1,2 DCE in PW-18 was unchanged however a trace amount of this same compound was detected in well PW-17.

Wells PW-17, PW-18 and PW-19 were sampled again on January 13, 1987 and the analytical results (Table 1) indicated that the aquifer contamination was becoming worse. The 1,2 DCE values in wells PW-17 and PW-18 had increased while, for the first time, a trace amount of DCE was detected in PW-19. Well PW-19 is located approximately 650 feet east of PW-18. Small amounts of 1,1,1 trichloroethane, 1,1 dichloroethane and trichloroethylene were also detected. (Wells PW-16 through PW-19 in the southern wellfield are all constructed similarly. They are finished at about 125 feet below land surface (BLS) and cased to 110 feet (BLS). Each has a pumping capacity of approximately 400 gpm.)

In order to slow the migration of chlorinated solvent contamination to the other wells in the wellfield, the Fort Lauderdale City Utilities Department shut down the southern half of the wellfield. PW-18 was then pumped (at a rate 400 gpm) and the water was discharged to newly excavated pits adjacent to the well. The water was pumped to one of two pits through spray heads designed to induce aeration and thus reduce the VOC concentrations in the discharge water. During this remedial work, the Fort Lauderdale Utilities Department regularly monitored the total VOC concentrations in the affected wells and pond. The results are summarized in Table 2.

2.3 Potential Contamination Sources

Chlorinated ethylene and ethane compounds are industrial chemicals

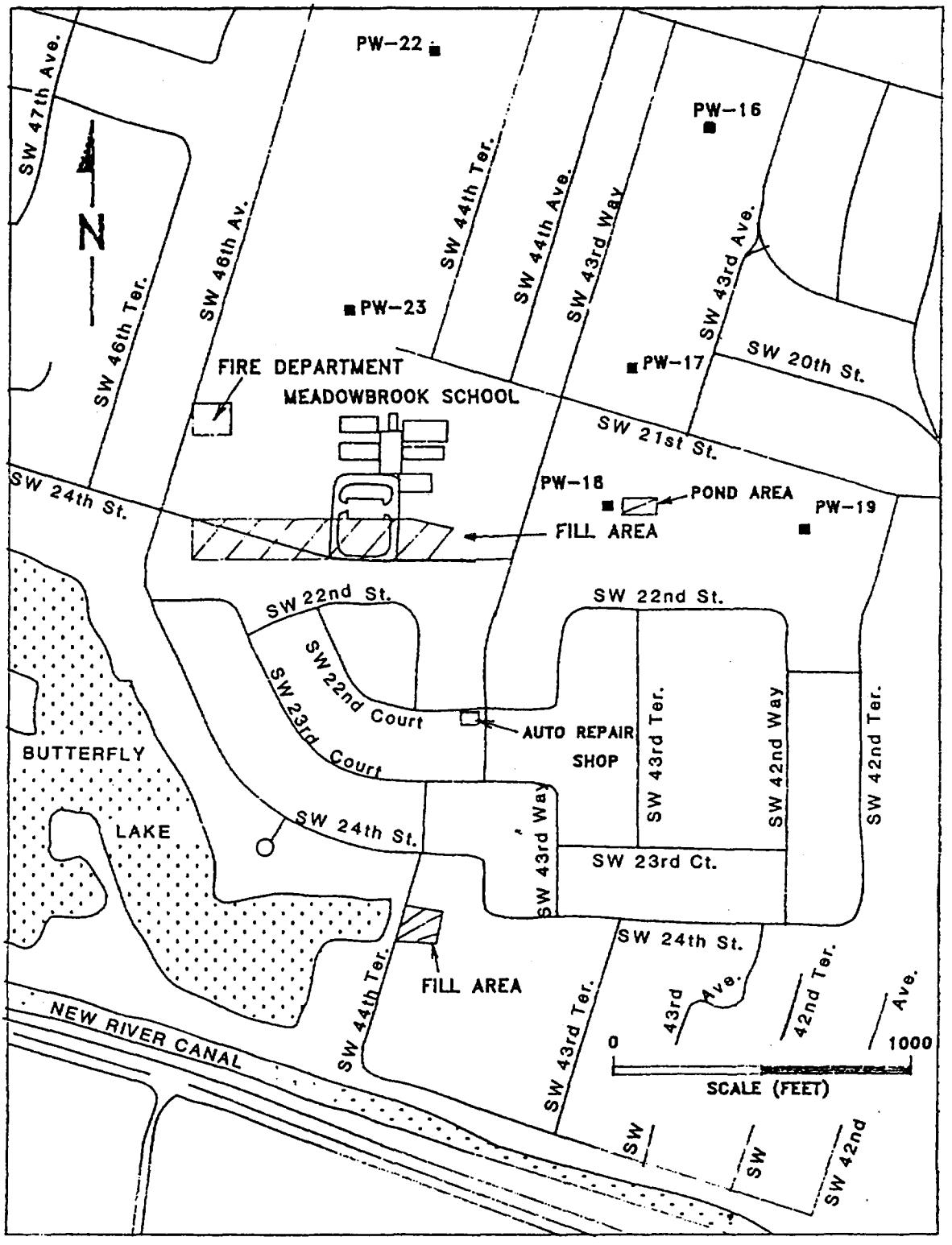


FIGURE 3. POTENTIAL CONTAMINATION SOURCES

R Shair OFFICE OF ENVIRONMENTAL SERVICES
DIVISION OF WATER RESOURCES MANAGEMENT
2401 NORTH POWERLINE ROAD, BUILDING 3
POMPANO BEACH, FLORIDA 33069

OFFICE OF
ENVIRONMENTAL SERVICES

Robert C. Shair, Ph.D., P.E.
Resource Projects Manager

Water Resources Management Division
2401 N. Powerline Rd., Pompano Beach, FL 33069 (305) 960-3175

MESSAGE

Reference 30

Mr. Craig Feeny
DER Bureau of Waste Cleanup
Technical Review Section
Twin Towers Bldg.
2600 Blair Stone Road.
Tallahassee, FL 32301

DATE

Room 538F.

Bureau of Waste Cleanup

APR 17 1991

Technical Review Section

Dear Craig.

We're happy to supply the enclosed two index maps which show the wellhead protection outermost Zone for all public wellfields over 1MGD in Broward County. Also enclosed is a paper describing the program.

Regards
Bob Shair

BY

SIGNED

INSTRUCTIONS TO SENDER:

... AND PINK COPIES WITH CARBON INTACT.

INSTRUCTIONS TO RECEIVER:

1. WRITE REPLY 2. DETACH STUB, KEEP PINK COPY, RETURN WHITE COPY TO SENDER.

OVERSIZED

DOCUMENT

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

FLORIDA RIVERS ASSESSMENT

1989

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Florida Department of Natural Resources
Division of Recreation and Parks
Bureau of Park Planning
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399

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Rick Hughes
Ichetucknee River

Back Cover

Top
Rick Hughes
Ichetucknee River

Middle
John Moran
Suwannee River

Bottom
John Moran
Hillsborough River

NEW RIVER

For most of its length, the New River is a canal that flows from Lake Okeechobee down into Fort Lauderdale. The primary purpose of this canal is to carry agricultural runoff from the interior out into the ocean. However, a small portion of the New River in Broward County near downtown Ft. Lauderdale is not channelized. This small, natural portion of the New River is the only area that is included in the Florida Rivers Assessment.

The portion of the New River that is being studied here starts at the intersection of the South New River Canal with U.S. Highway 441. From here, the New River flows northeastward and passes by several relatively large and undeveloped properties owned by Broward County or other governmental agencies. One of these areas is referred to as Pond Apple Slough or Ann Kolbe Park and is just south and west of where the New River crosses under Interstate I-595. The name "Pond Apple" comes from the large stands of the Pond Apples (Annona glabra) in the 243-acre sawgrass slough. From there the New River continues northeasterly until it meets the North Fork of the New River near where Fourth Avenue turns into Southwest Seventh Ave. From U.S. 441 up to the confluence of the forks is segment 22.30. From the confluence of the two forks, the New River flows eastward through downtown Fort Lauderdale until it meets the Stranahan River and the Intracoastal Waterway at a location by San Marco Drive. This length of river is segment 22.50.

From the above description, it is clear that for most of the short length of the New River included in this assessment, the New River is primarily an urban river running through Broward County. There are two reasons for including this river in the study. First, the South Fork of the New River is one of only four rivers in Broward County which remains within its original riverine corridor. Second, adjacent to the corridor is Pond Apple Slough. This is a stand of pond apple, red maple, and cypress that represents the largest and most functional freshwater swamp or marsh system in Broward County east of the South Florida Water Management District's Water Conservation Areas. Pond Apple Slough is over 200 acres in size and has been called a "Little Galapagos" for reasons discussed below.

INVENTORY FINDINGS

Water Quality and Classification:

Both segments of the South Fork of the New River are Class III water bodies, and both partially meet their designated use for recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife. Segment 22.30's Water Quality Index (WQI) is fair and 22.50's WQI is rated as poor. The major problems are an extremely high nutrient level and a low dissolved oxygen content. This is due to pesticides, bacteria, and suspended solids from agricultural runoff and the sugar mill retention ponds that the canal carries from the Lake Okeechobee area. Segment 22.30 also receives wastewater treatment plant discharge from the Plantation Canal.

In addition, Interstate 595, SR 84, SR 7, and the Broward County Resource Recovery Plant, and Ft. Lauderdale's Sludge Composting Facility are in such close proximity to each other and the slough that they have great potential to adversely affect the Pond Apple Slough area if runoff is not properly managed. This potential problem is compounded by the fact that the marsh needs the discharge of the area's runoff in order to maintain its integrity as a freshwater system.

There is also some evidence that salt water intrusion is starting to affect portions of the Pond Apple Slough area according to DER.

Geologic and Hydrologic Features:

The New River lies atop the Fort Thompson formation of the Pleistocene series. This formation is made up of a shell hash of alternating marine and freshwater mollusks, clay and sand. There are no known geologic features along the New River.

Biological Resources:

Historically, many rare or endangered plant and animal species occurred in the New River area. With the intense development currently surrounding the two river segments, it is doubtful that many of the designated species still occur within the New River corridor.

Instead, the area has become more of a location to find exotic species. An assortment of exotic fishes occur in the New River Canal, including Spotted Tilapia, Black Acara, Oscar, and the Walking Catfish (Florida Game and Fresh Water Fish Commission, 1989). Most of the berms surrounding the river have become infested with exotic plants, particularly the Brazilian Pepper Tree and Australian Pines along the shores and Water-hyacinth, Water Lettuce, Hydrilla, and Hygrophila in the water (Bureau of Aquatic Plant Management, 1989).

In the past, the New River represented a potential nesting area for alligators, Florida Sandhill Cranes, Ospreys, Southeastern American Kestrels, Florida Burrowing Owls, and a breeding and nursery area for fish, crab, and shrimp (U.S. Fish and Wildlife Services, 1982). The ability of the New River to serve these wildlife needs has vanished with the channelization of the New River. The only potential habitat remaining for most native plants and animals now is in the Pond Apple Slough area. Supporting the native plants and animals is a task Pond Apple Slough has done exceedingly well, even to this very day.

There are approximately 240 species of plants that have been recorded from Pond Apple Slough. There have been at least 10 species of air plants (Tillandsia) recorded from the slough and possibly an eleventh species (Stone, 1988). There are records for several State-designated endangered or threatened plant species in the Slough. Ferns are prolific in the slough.

The slough also supports a rich diversity of wildlife. Florida Black Bear tracks were seen in the slough as recently as 1985. A Florida Grasshopper Sparrow, an endangered species, was seen in the slough in 1983. Bobcats, although not rare on a state-wide level, still live in the slough. Although the habitat is now gone for a viable breeding population, the threatened Eastern Indigo Snake was present there until at least 1984 and Gopher Tortoises, a species of special concern, were present even more recently (Stone 1988).

Today, the slough continues to support viable populations of American Alligators. The endangered West Indian Manatee is found year round on the New River and can be found up to at least the Dahia Cutoff Canal by Pond Apple Slough. Because of the presence of the endangered manatee, proper management of power boat usage is necessary. The endangered Wood Stork and Peregrine Falcon use the slough during portions of the year, as do White Ibis, Roseate Spoonbill, Cooper's Hawk, Osprey, and Merlin. Several American Crocodiles have been seen or killed in the New River during the last few years. Florida bird specialties such as the Gray Kingbird, Smooth-billed Ani, and the Black-whiskered Vireo can be found breeding in the slough. In all, 178 species of birds and 30 species of reptiles have been recorded from this one area (Stone, 1988). The diversity of species within this small area has led some to compare Anne Kolbe Park to a "Little Galapagos," the islands where Charles Darwin developed the theory of evolution.

Archaeological and Historical Resources:

Even within an environment as urban as Ft. Lauderdale, there are twelve known archaeological sites along the two New River segments. Segment 22.30 has three known sites and 22.50 has nine known sites. Most of the sites are of the Glades Culture and prehistoric context. The archaeological features are mostly midden mounds.

According to the Master Site File, there are 380 historical structures within the two segments. Two are in segment 22.30 and the remaining 378 are in the historic restoration area of Ft. Lauderdale between First Street and Ninth Street. Of the 380 historic structures, two are on the National Register of Historic Places: the New River Inn and the Stranahan House. To protect any undetected sites a formal archaeological and historical survey should be conducted.

Land Use:

There have been extensive modifications to the natural channel of the New River. With the exception of the area immediately surrounding Pond Apple Slough and Hacienda Flores, the New River is either canalized, rip-rapped, or bermed to control water flow or increase navigability. Segment 22.30 is crossed by both the SR 85 and Interstate 95 bridges. In addition, there is a railroad bridge, several canals, and boat-launching slips within the river channel. Segment 22.50 is crossed by five bridges and a railroad trestle and has been modified by several boat-launching slips.

Because the New River flows through Ft. Lauderdale, corridor development is high along both segments of the river. An exception to this is the Pond Apple Slough area, including Hacienda Flores. Both of these are forested wetlands held by Broward County as conservation areas from development mitigation. The north side of Pond Apple Slough borders Interstate 595, and the south side borders on property which has been cleared, but not yet developed. Hacienda Flores is located immediately north of I-595. In addition, these areas are in the flight path of jets taking off or landing in the Ft. Lauderdale-Hollywood International Airport.

There are four recreation sites in segment 22.30 and 19 sites in segment 22.50. As would be expected, they are all urban recreation sites, city parks, or marinas rather than rustic or primitive recreation sites.

Both segments are designated Manatee Protection Zones, which place special restrictions on power boating to reduce the risk of collision and injury to the endangered West Indian Manatee. The Pond Apple Slough area has also recently been designated as the Broward County Wildlife Reserve.

MANAGEMENT NEEDS

Water Quality and Classification:

To preserve the integrity of the Pond Apple Slough (Anne Kolbe Park), the quality of the stormwater runoff into the slough must be carefully monitored from all sides and immediate corrective actions taken if a surrounding area's stormwater runoff water becomes substandard. The areas discharging in Anne Kolbe Park include the I-595/SR 84/SR 7 freeways, Broward County's Resource Recovery Plant, and Ft. Lauderdale's Sludge Composting Facility (Stone 1988).

The effects of salt water intrusion into the Pond Apple Slough area must be monitored and managed. Because the "headwaters" of the New River are dependent on agricultural water, it may be difficult to guarantee an adequate flow from this source. Other ways of controlling salt water intrusion may be necessary, such as installing flow control devices along other creeks in the area and/or establishing a freshwater head within the swamp itself. This need is of critical importance because salt water intrusion is starting to noticeably affect some of the pond apple stands in the slough. These flow control devices are potential threats for manatees and therefore should be properly managed and maintained (Stone 1988).

Biological Resources:

Because the New River has potentially supported many rare or endangered species in recent time, a complete inventory of the botanical and wildlife species that still use Pond Apple Slough is necessary in order to determine the best way to manage the area for the species that currently use the slough.

It is imperative that management plans and policies be developed immediately so as to best ensure the long-term survival of the endangered species that are still found in Pond Apple Slough such as the West Indian Manatee and the American Crocodile. For example, stricter regulations prohibiting the molestation of any alligator or crocodile-like reptile in this area may be warranted to protected the American Crocodile.

Exotic plants have become extensively established along the spoil berms on each side of the river. These plants need to be adequately controlled to prevent spread into the freshwater wetlands.

Land Use:

Much of the remaining aesthetic and natural value of the South Fork of the New River is centered on Pond Apple Slough. Much of this area is currently within public ownership. Coordination between agencies is necessary in order to eliminate the possibility of antagonistic purposes or duplication. The Broward County Wildlife Reserve will be a voice for the Pond Apple Slough area needs. However,

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this particular management effort will not be implemented until 1991 - 1992. With the many problems facing the Pond Apple Slough (e.g., salt water intrusion, small population size of many of the remnant species), a temporary management effort is needed to ensure that the resource values of the slough do not disappear before the permanent management team can begin their work.

The berms bordering the river must remain in place because of the urbanized environment of the New River. Therefore, erosion of the berm banks needs to be controlled and minimized.

LISTING OF INVENTORY FINDINGS

SPECIAL DESIGNATIONS

Designation:	Segment:
Manatee Protection Zone	22.30, 22.50

RECREATION SITES

Name:	Segment:
Secret Woods Park	22.30
Seventh Avenue Boat Ramp	22.30
Riverside Park	22.30
Bradford Marina	22.50
Hector Park	22.50
Hulls Triangle	22.50
Riverside Hotel	22.50
Roscioli Yachting Center	22.50
Lauderdale Isles Yacht/Tennis Club	22.50
Riverfront Marina	22.50
New River Yacht Club	22.50
Lauderdale Self Service	22.50
Yacht Haven Mobile Home Park	22.50
Summerfield Boats	22.50
Rolly Marine Service Inc.	22.50
Riverbend Marina	22.50
Chinnock Marine Inc.	22.50
Marina Bay Yacht Club	22.50
Lauderdale Yacht Basin	22.50
Ramgoh Marina	22.50
Herolds Boats	22.50

RECREATION AND CONSERVATION LANDS

Name:	Segment:
Broward County Wildlife Reserve (Pond Apple Slough/Anne Kolbe Park)	22.30
Hacienda Flores	22.30

BIOLOGICAL RESOURCES

DESIGNATED SPECIES

Plants

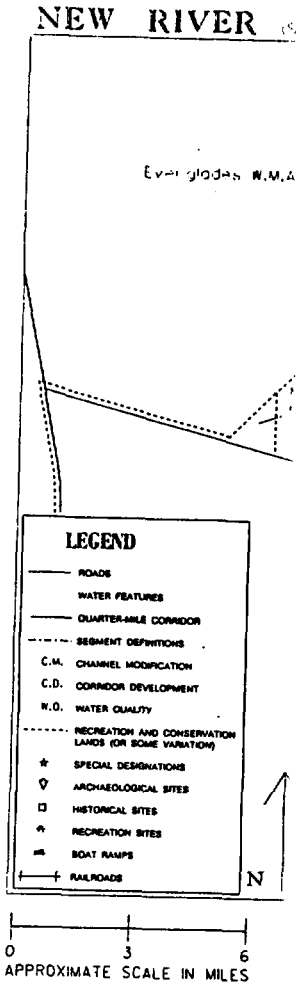
Scientific Name:	Common Name:
Asplenium dentatum	Slender Spleenwort
Asplenium serratum	Bird's Nest Spleenwort
Commelina gigas	Climbing Dayflower
Ernodea littoralis	Beach Creeper
Mallotonia gnaphalodes	Sea Lavender
Ophioglossum palmatum	Hand Fern
Tillandsia flexuosa	Twisted Air Plant
Zamia floridana	Florida Coontie

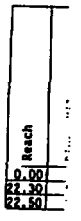
Invertebrates

Scientific Name:	Common Name:
Liguus fasciatus	Florida Tree Snail

Reptiles and Amphibians

Scientific Name:	Common Name:
Alligator mississippiensis	American Alligator
Crocodylus acutus	American Crocodile
Drymarchon corais couperi	Eastern Indigo Snake
Gopherus polyphemus	Gopher Tortoise
Rana areolata aesopus	Florida Gopher Frog





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LANDS

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Plant
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Snail

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gator
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Snake
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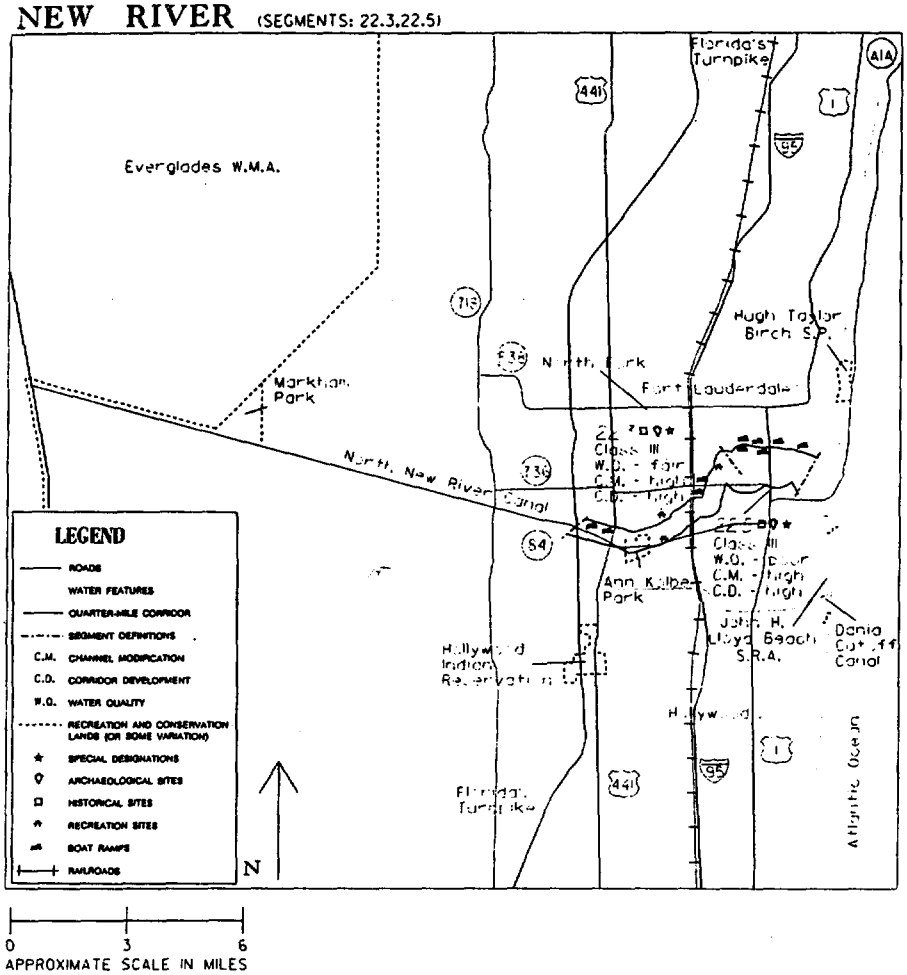
Frog

NEW RIVER (SEGMENTS: 22.3,22.5)



OTHER RESOURCE VALUES

Reach	River Miles	Corridor Development	Channel Modification	Recreation Sites	Biological Comm.	Botanical Species	Exotic Species	Fish Species	Exotic Fish	Wildlife Species	Exotic Wildlife	Spec. Wildlife Areas	Archaeologic Sites	Historic Structures
0.00		*	*	0	0	0	Y	0	Y	19	N	N	0	0
22.30	5.2	HIGH	HIGH	3	0	1	N	0	N	14	N	Y	1-3	1-2
22.50	2.0	HIGH	HIGH	10	0	2	N	0	N	19	N	Y	1-3	3?6

Birds

Scientific Name:	Common Name:
Aramus guarauna	Limpkin
Athene cunicularia floridana	Florida Burrowing Owl
Charadrius melodus	Piping Plover
Egretta caerulea	Little Blue Heron
Egretta thula	Snowy Egret
Egretta tricolor	Tricolored Heron
Falco peregrinus	Peregrine Falcon
Falco sparverius paulus	Southeastern American Kestrel
Grus canadensis pratensis	Florida Sandhill Crane
Haematopus palliatus	American Oystercatcher
Haliaeetus leucocephalus	Southern Bald Eagle
Mycteria americana	Wood Stork
Pandion haliaetus carolinensis	Osprey
Pelecanus occidentalis carolinensis	Eastern Brown Pelican
Picoides borealis	Red-cockaded Woodpecker
Sterna antillarum	Least Tern

Mammals

Scientific Name:	Common Name:
Peromyscus floridanus	Florida Mouse
Trichechus manatus latirostris	West Indian Manatee

OTHER RARE OR THREATENED SPECIES

Plants

Scientific Name:	Common Name:
Avicennia germinans	Black Mangrove
Coccothrinax argentata	Silver Palm
Rhizophora mangle	Red Mangrove

Invertebrates

Scientific Name:	Common Name:
Aratus pisonii	Mangrove Crab
Goniopsis cruentata	Mangrove Crab

Birds

Scientific Name:	Common Name:
Accipiter cooperii	Cooper's Hawk
Eudocimus albus	White Ibis
Falco columbarius	Merlin
Ixobrychus exilis exilis	Least Bittern
Nycticorax nycticorax	Black-crowned Night Heron
Nycticorax violaceus	Yellow-crowned Night Heron
Picoides villosus auduboni	Southern Hairy Woodpecker
Plegadis falcinellus	Glossy Ibis
Rallus longirostris scotti	Florida Clapper Rail
Rynchops niger	Black Skimmer
Sterna sandvicensis	Sandwich Tern
Vireo altiloquus	Black-whiskered Vireo

SIGNIFICANT EXOTIC SPECIES

Plants

Scientific Name:	Common Name:
Casuarina equistifolia	Australian Pine
Eichhornia crassipes	Floating Water-hyacinth
Hydrilla verticillata	Hydrilla
Hygrophila polysperma	Hygrophila
Pistia stratiotes	Water Lettuce
Schinus terebinthifolius	Brazilian Pepper

Scientific Name:
Astronotus ocellatus
Cichlasoma bimaculatum
Clarias batrachus
Tilapia mariae

Name:
Riverland Midden
Sayward Tom Tom Camp
Secret Woods Camp
Ackerman
Colee Hammock
Fort Lauderdale 1
New River Forks
New River Midden
NN
Rio Vista
Rivermount
Rose

Name:
Tom Bryan House
John Needham House
New River Inn
Stranahan House
378 Other Historical Structures, a
all in the historical restoration ar
Ft. Lauderdale between First St. a
Ninth St.

Common Name:

Limpkin
Florida Burrowing Owl
Piping Plover
Little Blue Heron
Snowy Egret
Tricolored Heron
Peregrine Falcon
Southeastern American Kestrel
Florida Sandhill Crane
American Oystercatcher
Southern Bald Eagle
Wood Stork
Osprey
Eastern Brown Pelican
Red-cockaded Woodpecker
Least Tern

Common Name:

lorida Mouse
'est Indian Manatee

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ck Mangrove
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grove Crab

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r's Hawk
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rn Hairy Woodpecker
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Clapper Rail
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h Tern
hiskered Vireo

Name:

n Pine
Water-hyacinth

a
tuce
Pepper

Fishes

Scientific Name:	Common Name:
Astronotus ocellatus	Oscar
Cichlasoma bimaculatum	Black Acara
Clarias batrachus	Walking Catfish
Tilapia mariae	Spotted Tilapia

ARCHAEOLOGICAL SITES

Name:	ID Number:	Segment:
Riverland Midden	8BD00206	22.30
Sayward Tom Tom Camp	8BD00207	22.30
Secret Woods Camp	8BD00202	22.30
Ackerman	8BD00204	22.50
Colee Hammock	8BD00002	22.50
Fort Lauderdale 1	8BD00102	22.50
New River Forks	8BD00003	22.50
New River Midden	8BD00196	22.50
NN	8BD00203	22.50
Rio Vista	8BD00038	22.50
Rivermount	8BD00087	22.50
Rose	8BD00205	22.50

HISTORIC STRUCTURES

Name:	Segment:
Tom Bryan House	22.30
John Needham House	22.30
New River Inn	22.50
Stranahan House	22.50
378 Other Historical Structures, almost all in the historical restoration area of Ft. Lauderdale between First St. and Ninth St.	22.50

Reference 31

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES

Marjory Stoneman Douglas Building • 3900 Commonwealth Boulevard • Tallahassee, Florida 32399
Tom Gardner, Executive Director

Reference 32

April 26, 1989

Mr. Charles Logan
Department of Environmental Regulation
Room 569-E
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Dear Mr. Logan:

Enclosed is the information you requested concerning outdoor recreation facilities in Florida. Should you have any questions or need further information, feel free to contact me at 904/488-2300.

Sincerely,

Phil Flood
Planner IV
Office of Policy and Planning
Division of Recreation and Parks

PF/sh
Enclosures

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	M00946	00	HOLLAND PARK	HOLLAND PARK	JOHNSON STREET AND 6TH AVENUE ON INTRACOASTAL WATERWAY HOLLYWOOD
BROW	M00952	00	SAILORS POINT	SAILORS POINT	9TH AVENUE AND NORTH LAKE DRIVE ON NORTH LAKE HOLLYWOOD
BROW	M00982	00	15TH STREET BOAT RAMP	15TH STREET BOAT RAMP	1770 SE 15TH STREET ON STRANAHAN RIVER FT LAUDERDALE
BROW	M00993	00	HOUSTON PARK/DANIA YACHT CLUB	HOUSTON PARK/DANIA YACHT CLUB	850 NE 3RD STREET DANIA
BROW	M01006	00	BOAT RAMP	BOAT RAMP	NE 12TH TERRACE AND 29TH STREET OAKLAND PARK
BROW	M01019	00	GEORGE ENGLISH PARK	GEORGE ENGLISH PARK	1101 BAYVIEW DRIVE AND SUNRISE BLVD ON MIDDLE RIVER FT LAUDERDALE
BROW	M01023	00	7TH AVENUE BOAT RAMP	7TH AVENUE BOAT RAMP	400 SW 7TH AVENUE ON NEW RIVER AT SW 4TH STREET FT LAUDERDALE 33315
BROW	M01053	00	DONALDSON PARK	DONALDSON PARK	900 NW 43RD AVENUE AND COCONUT CREEK PARKWAY COCONUT CREEK
BROW	M01054	00	SPOILS AREA	SPOILS AREA	52ND STREET AND 31ST AVENUE ON INTRA-COASTAL WATERWAY LIGHTHOUSE POINT
BROW	M02333	00	ALSDORF BOAT LAUNCH PARK	ALSDORF BOAT LAUNCH PARK	NE 14TH STREET ON INTRACOASTAL WATERWAY POMPANO BEACH
BROW	M03229	00	HOLLYWOOD MARINA	HOLLYWOOD MARINA	700 POLK STREET ON NORTH LAKE HOLLYWOOD

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	S00107	00	LLOYD BEACH	JOHN U. LLOYD BEACH STATE RECREATION AREA	6503 NORTH OCEAN DRIVE ON ATLANTIC OCEAN AND INTRACOASTAL WATERWAY DANIA 33004
BROW	X00268	00	BROWARD MARINE	BROWARD MARINE	1601 SW 20TH STREET ON INTRACOASTAL WATERWAY FT LAUDERDALE 33335
BROW	X00309	00	CALMAC MARINA	CALMAC MARINA	491 RAVENSWOOD ROAD ON CANAL FT LAUDERDALE 33312
BROW	X00867	00	HEROLDS BOATS	HEROLDS BOATS	1112 EAST LAS OLAS BLVD ON NEW RIVER FT LAUDERDALE 33316
BROW	X00889	00	HILLSBORO INLET MARINA BOATING AREA	HILLSBORO INLET MARINA BOATING AREA	2635 NORTH RIVERSIDE DRIVE ON INTRACOASTAL WATERWAY POMPANO BEACH 33062
BROW	X01312	00	LOUS TACKLE AND MARINA	LOUS TACKLE AND MARINA	3463 GRIFFIN ROAD ON ATLANTIC OCEAN FT LAUDERDALE 33312
BROW	X01354	00	MARINA 84	MARINA 84	3000 SR 84 ON NEW RIVER FT LAUDERDALE 33312
BROW	X01491	00	CHINNOCK MARINE INC	CHINNOCK MARINE INC	518 LAS OLAS BLVD ON NEW RIVER FT LAUDERDALE 33312
BROW	X01747	00	RAMGOH MARINA	RAMGOH MARINA	4500 SR 7 ON NEW RIVER FT LAUDERDALE 33316
BROW	X01795	00	RIVERBEND MARINE	RIVERBEND MARINE	1515 SW 20TH STREET ON NEW RIVER FT LAUDERDALE 33315
BROW	X01902	00	SEA LAND MARINE BASIN	SEA LAND MARINE BASIN	2700 SW 25TH TERRACE ON SOUTH FORK OF NEW RIVER FT. LAUDERDALE 33312

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	X02324	00	YACHT HAVEN MOBILE HOME PARK	YACHT HAVEN	2323 STATE ROAD 84 ON NEW RIVER FT. LAUDERDALE
BROW	X02647	00	LAUDERDALE SELF SERVICE	LAUDERDALE SELF SERVICE	1801 SW 20TH STREET ON NEW RIVER FT LAUDERDALE 33315

					FT LAUDERDALE 33312
BROW	X01747	00	RAMGOH MARINA	RAMGOH MARINA	4500 SR 7 ON NEW RIVER
					FT LAUDERDALE 33316
BROW	X01795	00	RIVERBEND MARINE	RIVERBEND MARINE	1515 SW 20TH STREET ON NEW RIVER
					FT LAUDERDALE 33315
BROW	X01902	00	SEA LAND MARINE BASIN	SEA LAND MARINE BASIN	2700 SW 25TH TERRACE ON SOUTH FORK OF NEW RIVER
					FT. LAUDERDALE 33312

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	X02324	00	YACHT HAVEN MOBILE HOME PARK	YACHT HAVEN	2323 STATE ROAD 84 ON NEW RIVER
					FT. LAUDERDALE
BROW	X02647	00	LAUDERDALE SELF SERVICE	LAUDERDALE SELF SERVICE	1801 SW 20TH STREET ON NEW RIVER
					FT LAUDERDALE 33315
BROW	Y00689	00	LAUDERDALE ISLES YACHT AND TENNIS CLUB	LAUDERDALE ISLES YACHT AND TENNIS CLUB	2637 WHALE HARBOR LANE ON NEW RIVER
					FT LAUDERDALE 33312
BROW	Y00692	00	FORT LAUDERDALE SMALL BOAT CLUB	FORT LAUDERDALE SMALL BOAT CLUB	1740 SW 42ND STREET
					FT LAUDERDALE 33314
BROW	Y00837	00	NEW RIVER YACHT CLUB	NEW RIVER YACHT CLUB	3001 SR 84 ON NEW RIVER
					FT LAUDERDALE 33312
BROW	Y01817	00	OLYMPIS CONDOMINIUM	OLYMPIS CONDOMINIUM	500 THREE ISLAND BLVD ON INTRACOASTAL WATERWAY
					HALLANDALE 33009

Public and Private Recreational Facilities With Freshwater Boat Ramps

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	C00296	00	MARKHAM PARK	MARKHAM PARK	16001 STATE ROAD 84 ON NORTH NEW RIVER CANAL FT. LAUDERDALE
BROW	C00301	00	TIGERTAIL LAKE	TIGERTAIL LAKE	4841 SW RAVENSWOOD ROAD HOLLYWOOD
BROW	M01047	00	WINFIELD PARK	WINFIELD PARK	WINFIELD BOULEVARD AND NW 65TH AVENUE MARGATE
BROW	M02207	00	PARKS AND RECREATION OFFICE	PARKS AND RECREATION OFFICE	1400 W RIVER DRIVE MARGATE
BROW	M02335	00	COLOHATCHEE NATURE PARK	COLOHATCHEE NATURE PARK	1975 NE 15TH AVE AND 22ND STREET ON SOUTH MIDDLE RIVER WILTON MANORS
BROW	M03756	00	TAMARAC VETERANS PARK AT CYPRESS CREEK COMMONS	TAMARAC VETERANS PARK AT CYPRESS CREEK COMMONS	7825 SOUTHGATE BLVD ON CYPRESS CREEK CANAL TAMARAC 33321
BROW	M04001	00	MARGATE MARINA	MARGATE MARINA	NW 1ST STREET AND ROCK ISLAND ROAD ON CANAL 14 MARGATE
BROW	M04871	00	GATES OF HILLSBORO PARK	GATES OF HILLSBORO PARK	4000 BLOCK OF NW 5TH ST ON HILLSBORO CANAL DEERFIELD BEACH
BROW	S01065	00	TERRY TOWN ACCESS AREA BOAT RAMP	TERRY TOWN ACCESS AREA BOAT RAMP	US 27 ON NEW RIVER CANAL L-38W NORTH OF ANDY TOWN
BROW	S01066	00	WEASEL TRAIL ACCESS AREA BOAT RAMP	WEASEL TRAIL ACCESS AREA BOAT RAMP	US 27 AT 26 MILE BEND WATER CONSERVATION AREA 2-A ON NEW RIVER CANAL NORTH OF ANDYTOWN
BROW	S01067	00	STUB CANAL ACCESS AREA BOAT RAMP	STUB CANAL ACCESS AREA BOAT RAMP	US 27 ON NEW RIVER CANAL L-38 NORTH OF ANDYTOWN

BROW	S01065	00	TERRY TOWN ACCESS AREA BOAT RAMP	TERRY TOWN ACCESS AREA BOAT RAMP	US 27 ON NEW RIVER CANAL L-38W NORTH OF ANDY TOWN
BROW	S01066	00	WEASEL TRAIL ACCESS AREA BOAT RAMP	WEASEL TRAIL ACCESS AREA BOAT RAMP	US 27 AT 26 MILE BEND WATER CONSERVATION AREA 2-A ON NEW RIVER CANAL NORTH OF ANDYTOWN
BROW	S01067	00	STUB CANAL ACCESS AREA BOAT RAMP	STUB CANAL ACCESS AREA BOAT RAMP	US 27 ON NEW RIVER CANAL L-38 NORTH OF ANDYTOWN

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	S01068	00	SPILLWAY 11A ACCESS AREA	SPILLWAY 11A ACCESS AREA	OFF US 27 WATER CONSERVATION AREA 3 ON NEW RIVER CANAL L-38 ANDYTOWN
BROW	S01069	00	SAWGRASS RECREATION AREA BOAT RAMP	SAWGRASS RECREATION AREA BOAT RAMP	US 27 WATER CONSERVATION AREA 2 ON NEW RIVER CANAL ANDYTOWN
BROW	S01070	00	ANDYTOWN ACCESS AREA BOAT RAMP	ANDYTOWN ACCESS AREA BOAT RAMP	US 27 NORTH OF SR 84 WATER CONSERVATION AREA 3 ON NEW RIFER CANAL 1 MILE NORTH OF ANDYTOWN
BROW	S01071	00	ALLIGATOR ALLEY BOAT RAMP	ALLIGATOR ALLEY BOAT RAMP	SR 84 WATER CONSERVATION AREA 3 ON MIAMI CANAL C-123 WEST OF ANDYTOWN
BROW	S01073	00	NEW RIVER CANAL NORTH BOAT RAMP	NEW RIVER CANAL NORTH BOAT RAMP	US 27 ON NEW RIVER CANAL 3 MILES NORTH OF ANDYTOWN
BROW	S01325	00	SEWELL LOCK BOAT RAMP	SEWELL LOCK BOAT RAMP	1 MILE W OF FLORIDA TURNPIKE AT SEWELL LOCK ON NEW RIVER CANAL PLANTATION
BROW	S01326	00	MACKS FISH CAMP	MACKS FISH CAMP	US 27 AT DADE/BROWARD COUNTY LINE ON MIAMI CANAL WEST OF MIRAMAR
BROW	S01405	00	NEW RIVER CANAL SOUTH BOAT RAMP	NEW RIVER CANAL SOUTH BOAT RAMP	US 27 ON NEW RIVER CANAL 2 MILES NORTH OF ANDYTOWN
BROW	S01427	00	S-36 BOAT RAMP	S-36 BOAT RAMP	PROSPECT ROAD ON CANAL 13 LAUDERDALE LAKES
BROW	S01428	00	S-8 BOAT RAMPS	S-8 BOAT RAMPS	NORTH SR 84 WATER CONSERVATION AREA 3 ON MIAMI CANAL WEST OF FORT LAUDERDALE
BROW	S01444	00	EVERGLADES HOLIDAY PARK	EVERGLADES HOLIDAY PARK	OFF US 27 ON SOUTH NEW RIVER CANAL SOUTH OF ANDYTOWN

FACILITY INDEX BY COUNTY / UNIT ID / SITE ID

COUNTY	UNIT ID	SITE	UNIT NAME	SITE NAME	ADDRESS
BROW	X00923	00	TWIN LAKES TRAVEL PARK	TWIN LAKES TRAVEL PARK	3055 BURRIS ROAD SR 84 AND SR 71 ON TWIN LAKES FT. LAUDERDALE
BROW	X02941	00	AQUA GOLF RV PARK	AQUA GOLF RV PARK	1970 S PARK ROAD PEMBROKE PARK
BROW	X03099	00	EVERGLADES HOLIDAY PARK	EVERGLADES HOLIDAY PARK	21940 GRIFFIN ROAD OFF US 27 FT LAUDERDALE 33332

Reference 33

Conversation Record

To: Eric Nuzie

From: Jim McCarthy

Date: 12/05/89

Time: 9:05 a.m.

File Name: Lindsley Lumber - Dania

Contact Person: Tom Ostertag-Biologist
The Nature Conservancy

Phone No.: (904) 224-8207

Subject: Endangered/Threatened Species near Lindsley Lumber and the Dania Cutoff Canal.

Mr. Tom Ostertag, a biologist with the Nature Conservancy, has informed me of the following habitats near Dania, Broward County.

1. Dania Cutoff Canal - West Indian Manatees Sighted
2. New River/Dania Cutoff Canal Intersection - Manatee Aggregation (Winter Habitat)
3. Port Everglades Turning Basin - Manatee Aggregation
4. Intracoastal Waterway/North of North Jetty - Bird Rookery - Least Tern

AJM/mlr

26080-A1-EI-250

West Palm Beach

FLORIDA

Library

1:250 000-scale map of

Gulf Coast Ecological Inventory

Produced by
U. S. FISH AND WILDLIFE SERVICE
1982

SYMBOL	SPECIES
	PLANTS (1-49)
	1 Turtle grass
	2 Widgeon grass
	3 Shoal grass
	INVERTEBRATES (50-99)
	50 Shrimp
	51 White shrimp
	52 Brown shrimp
	53 Pink shrimp
	54 Blue crab
	55 Stone crab
	56 Spiny lobster
	57 Eastern oyster
	58 Crayfish
	59 Brackish-water clam
	60 Sponges
	61 Southern quahog
	62 Northern quahog
	63 Sunray venus clam
	64 Bay scallop
	65 Rock shrimp
	66 Calico scallop
	67 Unicolor mussel (S)
	68 Fire coral
	69 Horny coral
	70 Stony coral
	71 Gorgonian coral
	72 Corals
	73 Queen conch
	74 Pygmy octopus
	75 Atlantic geoduck
	76 Loose coiled snail
	77 Athearns villosa
	FISH (100-299)
	100 Jack
	101 Sharks, skates, rays
	102 Grouper
	103 Mullet
	104 Catfish and bullheads
	105 Snapper
	106 Sunfish and bass
	107 Drum
	108 Spotted seatrout
	109 Weakfish
	110 Sand seatrout
	111 Atlantic croaker
	112 Red drum
	113 Black drum
	114 Star drum
	115 Spot
	116 Southern kingfish
	117 Northern kingfish
	118 Gulf kingfish
	119 Sheepshead
	120 Southern flounder
	121 Blue catfish
	122 White catfish
	123 Channel catfish
	124 Yellow bullhead
	125 Brown bullhead
	126 White crappie
	127 Black crappie
	128 Largemouth bass
	129 Spotted bass
	130 Green sunfish
	131 Longear sunfish
	132 Warmouth
	133 Bluegill
	134 Redear sunfish
	135 Striped mullet
	136 Red snapper
	137 Florida pompano
	138 Bluefish
	139 Cobia
	140 Atlantic spadefish
	141 Little tunny
	142 Spanish mackerel
	143 King mackerel
	144 Sea catfish
	145 Gulf menhaden
	146 Bay anchovy
	147 Gars
	148 Buffalos
	149 Freshwater drum
	150 Bowfin
	151 Carp
	152 Key silverside (S)
	153 Tarpon
	154 Ladyfish
	155 Permit
	156 Bonefish
	157 Cero
	158 Mutton snapper
	159 Yellowtail snapper
	160 Red grouper
	161 Gray snapper
	162 Grunts
	163 Atlantic bonito
	164 Sailfish
	165 Vermilion snapper
	166 Warsaw grouper
	167 Tilefish
	168 Great barracuda
	169 Dolphin
	170 Jewfish
	171 Snook
	172 Tripletail
	173 Lane snapper
	174 Nassau grouper
	175 Black grouper
	176 Gag
	177 White grunt
	178 Greater amberjack
	179 Pinfish
	180 Pigfish
	181 Wrasses

AQUATIC ORGANISMS (continued)

SYMBOL	SPECIES
	FISH (100-299)
	203 Blue runner
	204 Atlantic thread herring
	205 Chain pickerel
	206 Rivulus
	207 Key blenny
	208 Striped bass
	209 Atlantic sturgeon (S)
	210 Suwannee bass
	211 Redbreast sunfish
	212 Spotted sunfish
	213 Filefish
	214 Redfin pickerel
	215 Red porgy
	216 Alabama shad
	217 Skipjack herring
	218 Spanish sardine
	219 Bluestripe shiner (S)
	220 Shoal bass
	221 Blackmouth shiner (S)
	222 Saltmarsh topminnow
	223 Crystal darter (S)
	224 Harlequin darter
	225 Okaloosa darter (E)

AQUATIC ORGANISMS (continued)

SYMBOL	SPECIES
	FISH (100-299)
	247 Hinds
	248 Yellowfin grouper
	249 Scamp
	250 Yellowedge grouper
	251 Palometa
	252 Yellow jack
	253 Bar jack
	254 Horse-eye jack
	255 Hogfish
	256 Dwarf seahorse
	REPTILES AND AMPHIBIANS (300-349)
	300 Green sea turtle (F)
	301 Loggerhead sea turtle (F)
	302 Hawksbill sea turtle (F)
	303 Kemp's Ridley sea turtle (F)
	304 Leatherback sea turtle (F)
	MAMMALS (350-399)
	350 West Indian manatee (F)
	351 Atlantic bottlenose dolphin
	352 Atlantic spotted dolphin
	353 Finback whale (F)

TERRESTRIAL ORGANISMS

Shown in BROWN; species with special status shown in RED (F) or (S) indicates species protected by Federal or state legislation; all Latin names given in text.

SYMBOL	SPECIES
	PLANTS (400-499)
400	Lance-leaved wake-robin (S)
401	Florida royal palm (S)
402	Orchids (S)
403	Bromeliads (S)
404	Royal palm-bald cypress forest
405	Ferns (S)
406	Cacti (S)
407	Lignum vitae (S)
408	Palms (S)
409	Chapman's rhododendron (F)
410	Hollies (S)
411	Peppers (S)
412	Coonties (S)
413	Four-petal pawpaw (S)
414	Sandhill milkweed (S)
415	Sea lavender (S)
416	Catopsis (S)
417	Giant dewflower (S)
418	Pagoda dogwood (S)
419	Okeechobee gourd (S)
420	Manchineel (S)
421	Fall-flowering ixia (S)
422	Key cassia (S)
423	Ashe magnolia (S)
424	Dune lily-thorn (S)
425	Cupania (S)
426	White-top pitcher plant (S)
427	Grass of parnassus (S)
428	Florida yew (S)
429	Mahogany (S)
430	Timberland
431	Tree cactus (S)
432	Pride-of-big-pine (S)
433	Guzmania (S)
434	Cowhorn orchid (S)
435	Dollar orchid (S)
436	Narrow swamp fern (S)
437	Prickly-apple cactus (S)
438	Silver palm (S)
439	Hidden orchid (S)
440	Hand fern (S)
441	Auricled spleenwort (S)
442	Sinkhole fern (S)
443	Trailing arbutus (S)
444	Orange azalea (S)
445	Miccosukee gooseberry (S)
446	Red-flowered pitcher plant (S)
447	Florida torreya (S)
448	Mountain laurel (S)
449	Bartram's ixia (S)
450	Harper's beauty (F)
451	Overmature and original growth trees
452	Hartwrightia (S)
453	Pond-spice (S)
454	Trumpets (S)
455	Hooded pitcher plant (S)
456	Parrot pitcher plant (S)
457	Riparian autumngrass (S)
458	Pond cypress
459	Ogeeche tupelo
460	Croomia
461	Vahl's fimbry
462	Curtiss' lythrum
463	Piedmont water-milfoil
464	Fringed campion
465	Unique vegetation association
466	False-leaved false-foxglove
467	False-coco
468	Juneberry holly
469	Carolina lilaeopsis
470	Naked-stemmed panic-grass
471	Chapman's butterwort
472	Yellow fringeless orchid
473	American chaffseed
474	Drummond's yellow-eyed grass
475	Black mangrove
476	Laurel oak
477	Black lace cactus (F)
	INVERTEBRATES (500-549)
500	Bahama swallowtail butterfly (F)
501	Schaus swallowtail butterfly (F)
502	Stock Island tree snail (F)
503	Florida tree snail
504	Atala butterfly
505	Maesites hairstreak
	BIRDS (550-849)
	SHOREBIRDS (550-599)
550	Shorebirds
551	Gulls and terns
552	Sandpipers
553	Jacana
554	American oystercatcher
555	Plovers
556	Cuban snowy plover (S)
557	Least tern (S)
558	Long-billed curlew
559	Marbled godwit
560	Royal tern
561	Black tern
562	American avocet
563	Forster's tern
564	Sandwich tern
565	Gull-billed tern
566	Roseate tern (S)
567	Black skimmer
568	Laughing gull
569	Wilson's plover
570	Common snipe
571	Sooty tern
572	Black-necked stilt
573	Common tern
574	Whimbrel
575	Hudsonian godwit
	WADING BIRDS (600-649)
600	Wading birds
601	Herons
602	Egrets
603	Wood stork (S)
	(continued)

TERRESTRIAL ORGANISMS (continued)

SYMBOL	SPECIES
	WADING BIRDS (600-649)
604	Great blue heron
605	Reddish egret (S)
606	White-faced ibis (S)
607	White ibis
608	Roseate spoonbill
609	Great egret
610	Snowy egret
611	Louisiana heron
612	Black-crowned night heron
613	Little blue heron
614	Cattle egret
615	Ibises
616	Yellow-crowned night heron
617	Rails
618	Least bittern
619	Gallinules
620	Florida sandhill crane (S)
621	Great white heron
622	American bittern
623	Limpkin
624	Mississippi sandhill crane (F)
625	Whooping crane (F)
626	Least grebe
627	Sandhill cranes
	WATERFOWL (650-699)
650	Waterfowl
651	Dabbling ducks
652	Diving ducks
653	Geese
654	Anhinga
655	Canvasback
656	Northern shoveler
657	Pintail
658	Wood duck
659	Ruddy duck
660	Snow goose
661	Canada goose
662	Mottled duck
663	Fulvous whistling-duck
664	Masked duck
665	Redhead
666	White-fronted goose
667	Common loon
668	Teals
669	Lesser scaup
670	American coot
671	American wigeon
672	Black-bellied whistling-duck
	RAPTORS (700-749)
700	Raptors
701	Bird hawks
702	Swallow-tailed kite (S)
703	Mississippi kite
704	Everglade kite (F)
705	Owls
706	Marsh hawk
707	Bald eagle (F)
708	Audubon's caracara (S)
709	Peregrine falcon (F)
710	Hawks and eagles
711	Red-shouldered hawk
712	Osprey (S)
713	Southeastern American kestrel (S)
714	Florida burrowing owl
715	Short-tailed hawk
716	Sharp-shinned hawk
717	White-tailed hawk (S)
718	Harris' hawk
719	Zone-tailed hawk (S)
720	Gray hawk (S)
721	Black hawk (S)
722	White-tailed kite
	SEABIRDS (750-799)
750	Seabirds
751	Magnificent frigate-bird
752	Brown noddy
753	Olivaceous cormorant
754	Double-crested cormorant
755	Cormorants
756	Brown booby
757	Blue-faced booby
758	Horned grebe
759	White pelican
760	Brown pelican (F)
761	Gannet
762	Scoters
763	Eared grebe
	SONGBIRDS AND OTHERS (800-849)
800	Songbirds and others
801	Woodpeckers
802	Turkey
803	Bobwhite
804	Attwater's greater prairie chicken (F)
805	Scissor-tailed flycatcher
806	Black-whiskered vireo
807	Sparrows
808	Kirtland's warbler (F)
809	Red-cockaded woodpecker (F)
810	Antillean nighthawk
811	Gray kingbird
812	Cuckoos, roadrunners, anis
813	Mangrove cuckoo
814	Smooth-billed ani
815	Western kingbird
816	White-crowned pigeon (S)
817	Scarlet ibis
818	Cape Sable seaside sparrow (F)
819	Spotted-breasted oriole
820	Florida grasshopper sparrow (S)
821	Parrots and parakeets
822	Hummingbirds
	(continued)

TERRESTRIAL ORGANISMS (continued)

SYMBOL	SPECIES
	SONGBIRDS AND OTHERS (800-849)
	Florida scrub jay (S)
	Yellow-rumped warbler
	Tropical kingbird
	Long-billed thrasher
	Lichtenstein's oriole
	Green jay
	Black-headed oriole
	REPTILES AND AMPHIBIANS (850-899)
850	Reptiles and amphibians
851	American alligator (F)
852	American crocodile (F)
853	Eastern indigo snake (F)
854	Florida gopher frog
855	Florida key mole skink
856	Miami black-headed snake (S)
857	Gopher tortoise
858	Suwannee cooter
859	Key mud turtle (S)
860	Big Pine Key ringneck snake (S)
861	Florida brown snake (S)
862	Florida ribbon snake (S)
863	Short-tailed snake (S)
864	Sand skink (S)
865	Apalachicola kingsnake
866	Barbour's map turtle
867	One-toed amphiuma
868	Four-toed salamander
869	Georgia blind salamander
870	Southern copperhead
871	Pine barrens treefrog (F)
872	Seal salamander
873	Black pine snake (S)
874	Rainbow snake (S)
875	Yellow-blotched sawback turtle (S)
876	Ringed sawback turtle (S)
877	Southern hognose snake (S)
878	Texas indigo snake (S)
879	Cottonmouth
880	Mexican treefrog (S)
881	Rio Grande frog (S)
882	Giant toad (S)
883	Texas tortoise (S)
884	Texas horned lizard (S)
885	White-lipped frog (S)
886	Diamondback terrapin
	MAMMALS (900-999)
900	Red wolf (F)
901	Black bear (S)
902	Western cougar
903	Bobcat
904	Ocelot (S)
905	Jaguarundi (F)
906	Whitetail deer
907	Key deer (F)
908	Beaver
909	Mink
910	Eastern chipmunk
911	River otter
912	Gray fox
913	Nutria
914	Muskrat
915	Feral hog
916	Collared peccary
917	Coyote
918	Swamp rabbit
919	Marsh rabbit
920	Tree squirrels
921	Raccoon
922	Key Largo woodrat (S)
923	Lower keys cotton rat
924	Key Largo cotton mouse (S)
925	Florida mouse (S)
926	Sherman's fox squirrel
927	Gray bat (F)
928	Indiana bat (F)
929	Round-tailed muskrat
930	Silver rice rat (S)
931	Key Vaca raccoon (S)
932	Mangrove fox squirrel (S)
933	Florida black bear (S)
934	Everglades mink (S)
935	Florida panther (F)
936	Blacktail jackrabbit
937	Opossum, skunks, armadillo
938	Eastern cottontail
939	Red fox
940	Perdido Bay beach mouse (S)
941	Choctawhatchee beach mouse (S)
942	Badger
943	Marsh deer
944	Axis deer
945	Sambar deer
946	Fox squirrel
947	Coati

HABITAT USE

Shown in RED for species with special status, BLUE for aquatic organisms, and BROWN for terrestrial organisms.

a Breeding area	e Designated critical habitat	w Spring
b Nursery area	f Migratory area	x Summer
c Adult concentration area	g Commercial harvesting area	y Fall

NOTES

SPECIES WITH SPECIAL STATUS

Aquatic species with special status that may be found in the Atlantic Ocean and Gulf of Mexico depicted on the West Palm Beach sheet include:

300, 301, 302, 303, 304, 350, 354.

Critical habitat for West Indian manatees (350e) includes United States territorial waters adjoining the coast of Lee County, Florida (grid reference MV11 to MV02), and the coast south of Gordon Pass (grid reference MU18) depicted on the West Palm Beach sheet.

Right whales (355) may be found in the Atlantic Ocean depicted on the West Palm Beach sheet.

Terrestrial species with special status that may be found throughout the area depicted on the West Palm Beach sheet include:

402, 403, 405, 808f, 809, 851, 853.

Terrestrial species with special status that may be found in coastal areas depicted on the West Palm Beach sheet include:

412, 414, 707cz, 760.

Giant dewflowers (417) may be found in the central portion of the area depicted on the West Palm Beach sheet.

Terrestrial species with special status that may be found in the western portion of the area depicted on the West Palm Beach sheet include:

437, 708, 932, 934.

Cuban snowy plovers (556a) may nest on exposed outer beaches along the Gulf coast depicted on the West Palm Beach sheet.

Florida sandhill cranes and southeastern American kestrels (620, 713) may be found in the eastern portion of the area depicted on the West Palm Beach sheet.

Florida black bears (933) may be found in the southwest portion of the area depicted on the West Palm Beach sheet.

AQUATIC ORGANISMS

Due to scale limitations, only representative estuarine and riverine systems are shown. Species of importance in a particular river, creek, or sound are denoted on the map.

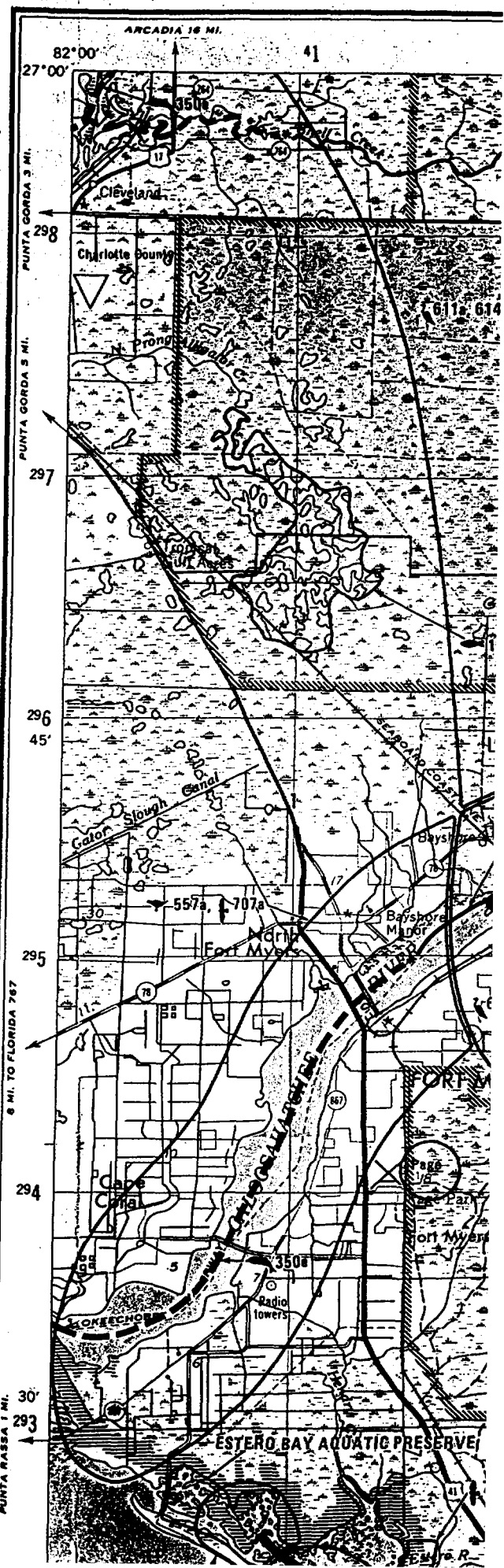
Species generally associated with reefs depicted on the West Palm Beach sheet include:

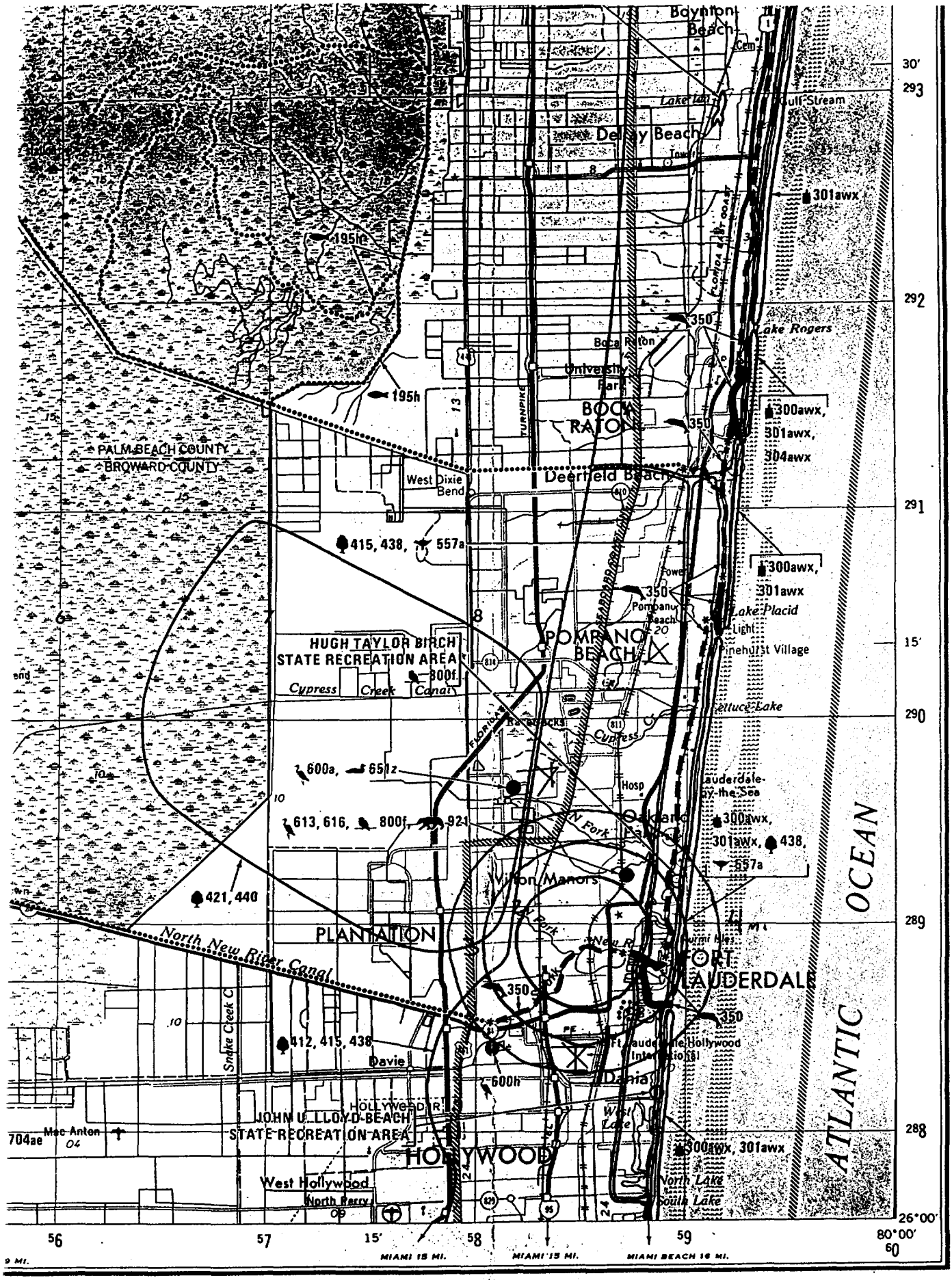
55gh, 56cgh, 136h, 143gh, 157gh, 158gh, 159gh, 160gh, 161gh, 162gh, 166gh, 168h, 170gh, 172gh, 173gh, 174gh, 175gh, 176gh, 178gh, 181, 182, 183, 184, 185.

Species that generally may be found in open waters depicted on the West Palm Beach sheet include:

53g, 54ag, 55agh, 56gh, 101gh, 102, 103, 105, 108agh, 112agh, 113ah, 118, 119agh, 135abg, 137agh, 138gh, 139abgh, 140, 141, 142agh, 143gh, 144, 146, 153abh, 154ah, 155, 159bgh, 160abgh, 161abgh, 162, 168, 170agh, 171abh, 176, 178, 179, 191, 192agh, 196ah, 199ag, 203, 351, 352, 356, 358, 361.

Species that generally may be found in open waters of the Atlantic Ocean depicted on the West Palm Beach sheet include:





LAND USE–LAND COVER SYMBOLS

Study area (within territorial limits of United States).....

Marsh or swamp.....

Coastal zone boundary or Federal-state demarcation.....

Beach/Dunes.....

Special land use areas, including refuges

Official Lists of

Endangered and Potentially

Endangered Fauna and Flora in Florida

1 August 1990

FLORIDA GAME AND FRESH WATER FISH COMMISSION

Compiled by Don A. Wood, Endangered Species Coordinator
Florida Game and Fresh Water Fish Commission

Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida
1 August 1990

Scientific Name	Common Name(s)	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
	VERTEBRATES				
Fish					
Acipenser brevirostrum	Shortnose sturgeon	E		E	I
Acipenser oxyrhynchus	Atlantic sturgeon	SSC		PT*	II
Ammocrypta asprella	Crystal darter	T		C2	
Centropomus undecimalis	Common snook	SSC			
Cyprinodon variegatus hubbsi	Lake Eustis pupfish	SSC			
Etheostoma histrio	Harlequin darter	SSC			
Etheostoma okaloosae	Okaloosa darter	E		E	
Etheostoma olmstedi maculaticeps	Southern tessellated darter	SSC			
Fundulus jenkinsi	Saltmarsh topminnow	SSC			
Menidia conchorum	Key silverside	T			
Micropterus notius	Suwannee bass	SSC			
Micropterus sp. (undescribed)	Shoal bass	SSC			
Notropis callitaenia	Bluestripe shiner			C2	
Notropis welaka	Bluenose shiner	SSC			
Notropis melanostomus	Blackmouth shiner	E		C2	
Rivulus marmoratus	Rivulus	SSC			
Starksia starcki	Key blenny	SSC			

*Applicable only to the subspecies *A.o. desotoi* (Gulf sturgeon)

Amphibians and Reptiles					
Alligator mississippiensis	American alligator	SSC		T(S/A)	II
Ambystoma cingulatum	Flatwoods salamander			C2	
Caretta caretta caretta	Atlantic loggerhead turtle	T		T	I
Chelonia mydas mydas	Atlantic green turtle	E		E	I
Crocodylus acutus	American crocodile	E		E	I
Dermochelys coriacea	Leatherback turtle	E		E	I
Diadophis punctatus acricus	Big Pine Key ringneck snake; Key ringneck snake	T		C2	
Drymarchon corais couperi	Eastern indigo snake	T		T	
Elaphe guttata guttata	Red rat snake	SSC*			
Eretmochelys imbricata imbricata	Atlantic hawksbill turtle	E		E	I
Eumeces egregius egregius	Florida Keys mole skink	SSC		C2	
Eumeces egregius insularis	Cedar Key mole skink			C2	
Eumeces egregius lividus	Blue-tailed mole skink	T		T	
Gopherus polyphemus	Gopher turtle	SSC		C2	
Graptemys barbouri	Barbour's map turtle	SSC		C2	
Haideotriton wallacei	Georgia blind salamander	SSC		C2	
Hyla andersonii	Pine Barrens treefrog	SSC			
Kinosternon bauri	Striped mud turtle	E*			
Lepidochelys kempi	Atlantic ridley turtle	E		E	I

Scientific Name	Common Name(s)	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
Macroclemys temmincki	Alligator snapping turtle	SSC		C2	
Neoseps reynoldsi	Sand skink	T		T	
Nerodia fasciata taeniata	Atlantic salt marsh water snake	T		T	
Ophisaurus compressus	Island glass lizard			C2	
Pituophis melanoleucus mugitus	Florida pine snake	SSC		C2	
Pseudemys concinna suwanniensis	Suwannee cooter	SSC			
Pseudobranchus striatus lustricolus	Gulf hammock dwarf siren			C2	
Rana areolata	Gopher frog; crawfish frog	SSC		C2	
Rana okaloosae	Bog frog	SSC		C2	
Sceloporus woodi	Florida scrub lizard			C2	
Stilosoma extenuatum	Short-tailed snake	T		C2	
Storeria dekayi victa	Florida brown snake	T*			
Tantilla oolitica	Miami black-headed snake; rimrock crowned snake	T		C2	
Thamnophis sauritus sackeni	Florida ribbon snake	T*			

*Applicable in lower Florida Keys only

Birds

Aimophila aestivalis	Bachman's sparrow			C2	
Ajaia ajaja	Roseate spoonbill	SSC			
Ammodramus maritimus juncicolus	Wakulla seaside sparrow	SSC		C2	
Ammodramus maritimus mirabilis	Cape Sable seaside sparrow	E		E	
Ammodramus maritimus nigriscens	Dusky seaside sparrow	E		E	
Ammodramus maritimus pelonotus	Smyrna seaside sparrow			C2	
Ammodramus maritimus peninsulae	Scott's seaside sparrow	SSC			
Ammodramus savannarum floridanus	Florida grasshopper sparrow	E		E	
Aphelocoma coerulescens coerulescens	Florida scrub jay	T		T	
Aramus guarauna	Limpkin	SSC			
Aquila chrysaetos	Golden eagle				II
Athene cunicularia	Burrowing owl	SSC			
Campephilus principalis	Ivory-billed woodpecker	E		E	
Charadrius alexandrinus tenuirostris	Southeastern snowy plover	T		C2	
Charadrius melodus	Piping plover	T		T	
Circus cyaneus	Marsh hawk; northern harrier				II
Cistothorus palustris griseus	Worthington's marsh wren	SSC			
Cistothorus palustris marianae	Marian's marsh wren	SSC			
Columba leucocephala	White-crowned pigeon	T		C2	
Dendroica dominica stoddardi	Stoddard's yellow-throated warbler			C2	

Scientific Name	Common Name(s)	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
Dendroica kirtlandii	Kirtland's warbler	E		E	
Egretta caerulea	Little blue heron	SSC			
Egretta rufescens	Reddish egret	SSC		C2	
Egretta thula	Snowy egret	SSC			
Egretta tricolor	Tricolored heron; Louisiana heron	SSC			
Falco columbarius	Pigeon hawk or merlin				II
Falco peregrinus tundrius	Arctic peregrine falcon	E		T	I
Falco sparverius paulus	Southeastern American kestrel	T		C2	II
Falco sparverius sparverius	Eastern American kestrel				II
Grus canadensis pratensis	Florida sandhill crane	T			II
Haematopus palliatus	American oystercatcher	SSC			
Haliaeetus leucocephalus	Bald eagle	T		E	I
Lanius ludovicianus migrans	Migrant loggerhead shrike			C2	
Mycteria americana	Wood stork	E		E	
Pandion haliaetus	Osprey	SSC*			II
Pelecanus occidentalis	Brown pelican	SSC			
Picoides borealis	Red-cockaded woodpecker	T		E	
Polyborus plancus audubonii	Audubon's crested caracara	T		T	
Rallus longirostris insularum	Mangrove clapper rail			C2	
Rostrhamus sociabilis	Snail kite	E		E	
Sterna antillarum	Least tern	T			
Sterna dougallii	Roseate tern	T		T	
Vermivora bachmanii	Bachman's warbler	E		E	

*Applicable in Monroe County only

Mammals

Balaena glacialis	Right whale	E		E	I
Balaenoptera borealis	Sei whale	E		E	II
Balaenoptera physalus	Finback whale	E		E	II
Blarina carolinensis (=brevicauda) shermani	Sherman's short-tailed shrew	SSC		C2	
Eumops glaucinus floridanus	Florida mastiff bat			C2	
Felis concolor coryi	Florida panther	E		E	I
Geomys pinetis goffi	Goff's pocket gopher	E			
Lutra canadensis	River otter				II
Lynx rufus	Bobcat				II
Megaptera novaeangliae	Humpback whale	E		E	I
Microtus pennsylvanicus dukecampbelli	Duke's saltmarsh vole; Florida saltmarsh vole	SSC		PE	
Mustela frenata peninsulae	Florida long-tailed weasel			C2	
Mustela vison evergladensis	Everglades mink	T		C2	
Mustela vison lutensis	Florida mink			C2	
Myotis austroriparius	Southeastern bat			C2	
Myotis grisescens	Gray bat	E		E	
Myotis sodalis	Indiana bat	E		E	
Neofiber alleni	Round-tailed muskrat			C2	

Scientific Name	Common Name(s)	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
Neotoma floridana smalli	Key Largo woodrat	E		E	
Odocoileus virginianus clavium	Key deer	E		E	
Oryzomys argentatus	Silver rice rat	E			
Oryzomys palustris planirostris	Pine Island rice rat			C2	
Oryzomys palustris sanibeli	Sanibel Island rice rat	SSC		C2	
Peromyscus floridanus	Florida mouse	SSC		C2	
Peromyscus gossypinus allapaticola	Key Largo cotton mouse	E		E	
Peromyscus gossypinus restrictus	Chadwick Beach cotton mouse	E			
Peromyscus polionotus allophrys	Choctawhatchee beach mouse	E		E	
Peromyscus polionotus decoloratus	Pallid beach mouse	E			
Peromyscus polionotus leucocephalus	Santa Rosa beach mouse			C2	
Peromyscus polionotus niveiventris	Southeastern beach mouse	T		T	
Peromyscus polionotus peninsularis	St. Andrews beach mouse	E		C2	
Peromyscus polionotus phasma	Anastasia Island beach mouse	E		E	
Peromyscus polionotus trissyllepsis	Perdido Key beach mouse	E		E	
Physeter catodon	Sperm whale	E		E	
Plecotus rafinesquii	Southeastern big-eared bat			C2	
Procyon lotor auspicatus	Key Vaca raccoon			C2	
Procyon lotor incautus	Key West raccoon			C2	
Scalopus aquaticus bassi	Englewood mole			C2	
Sciurus niger avicennia	Big Cypress fox squirrel	T		C2	
Sciurus niger shermani	Sherman's fox squirrel	SSC		C2	
Sigmodon hispidus insulicola	Insular cotton rat			C2	
Sorex longirostris eionis	Homosassa shrew	SSC		C2	
Sylvilagus palustris hefneri	Lower Keys rabbit	E		E	
Tamias striatus	Eastern chipmunk	SSC			
Trichechus manatus latirostris	West Indian manatee	E		E	I
Ursus americanus floridanus	Florida black bear	T*		C2	

*Not applicable in Baker and Columbia counties and Apalachicola National Forest

Scientific Name	Common Name(s)	Designated status[1] FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
Vicia ocalensis	Ocala vetch		E	C1	
Viola hastata	Halberd-leaved yellow violet		E		
Vittaria lineata	Shoestring fern		T		
Warea amplexifolia	Clasping warea; wide-leaf warea		E	E	
Warea carteri	Carter's mustard		E	E	
Woodsia obtusa	Blunt-lobed woodsia		T		
Woodwardia areolata	Netted chain fern		T		
Xanthorhiza simplicissima	Yellowroot		E		
Xyris drummondii	Drummond's yellow-eyed grass			C2	
Xyris isoetifolia	Quillwort yellow-eyed grass; panhandle yellow-eyed grass			C2	
Xyris longisepala	Karst pond yellow-eyed grass; Kral's yellow-eyed grass		E		
Xyris scabrifolia	Harper's yellow-eyed grass; harsh-leaf yellow-eyed grass		T	C2	
Zamia floridana	Florida coontie		CE		II
Zamia integrifolia	Florida arrowroot		CE		II
Zamia umbrosa	East coast coontie		CE		II
Zanthoxylum americanum	Prickly ash		E		
Zanthoxylum flavum	Yellowheart		E		
Zephyranthes (all white species)	Rain lilies		T		
Zephyranthes simpsonii	Simpson zephyr lily		E		
Zizia latifolia	Bristol golden alexander			C2	
Ziziphus celata	Florida jujube; Florida ziziphus		E	E	

[1]E = Endangered
T = Threatened
T(S/A) = Threatened Due to Similarity of Appearance
PE = Proposed Endangered
PT = Proposed Threatened
C1 = A candidate for federal listing, with enough substantial information on biological vulnerability and threats to support proposals for listing. See note below.
C2 = A candidate for listing, with some evidence of vulnerability, but for which not enough data exist to support listing. See note below.
SSC = Species of Special Concern
CE = Commercially Exploited
I = Appendix I Species
II = Appendix II Species

[2]Florida Game and Fresh Water Fish Commission (list published in Section 39-27.03-05, Florida Administrative Code).
[3]Florida Department of Agriculture and Consumer Services (list published in Preservation of Native Flora of Florida Act, Section 581.185-187, Florida Statutes).
[4]United States Fish and Wildlife Service (list published in List of Endangered and Threatened Wildlife and Plants 50 CFR 17.11-12).
[5]Convention on International Trade in Endangered Species of Wild Fauna and Flora.

*Note: Although C1 and C2 species are not protected under the Endangered Species Act, in the Federal Register notice (Volume 55, Number 35, pages 6184-6229) designating them as "candidates," the U.S. Fish and Wildlife Service "...encourages their consideration in environmental planning..."

Reference 35

THE MERCK INDEX

AN ENCYCLOPEDIA OF
CHEMICALS, DRUGS, AND BIOLOGICALS

ELEVENTH EDITION

Susan Budavari, *Editor*
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Ann Smith, *Assistant Editor*
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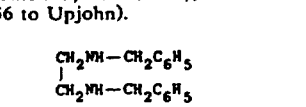
1989

amino)ethane; DBED. $C_{16}H_{20}N_2$; mol wt 240.34. C 79.95%, H 8.39%, N 11.66%. Prepd from *N,N'*-dibenzenesulfonyl-*N,N'*-dibenzylethylenediamine by heating with concd HCl in bomb tube at 170-180°: Bleier, *Ber.* 32, 1829 (1899); from ethylene chloride and benzylamine: Frost *et al., J. Am. Chem. Soc.* 71, 3842 (1949); by reduction of *N,N'*-dibenzylideneethylenediamine: Ger. pat. 98,031 (1898 to Schering); *Chem. Zentr.* 1898, II, 743; Van Alphen, *Rec. Trav. Chim.* 54, 93 (1935); Lob, *ibid.* 55, 859 (1936); Szabo *et al., Antibiot. & Chemother.* 1, 499 (1951); Rebenstorf, U.S. pat. 2,773,098 (1956 to Upjohn).



Oily liquid, mp 26°. d_4^{20} 1.024. bp_{12} 212-213°; bp_4 195°. n_D^{20} 1.5624. Insol in water. Freely sol in the usual organic solvents except CS_2, with which it gives a solid addition product.

Diacetate, $C_{16}H_{20}N_2.2CH_3COOH$, needles, mp 111°. Soly in water: 253 mg/ml.

Dihydrobromide, $C_{16}H_{20}N_2.2HBr$, shiny leaflets, dec 300°. Soly in water: 30 mg/ml.

Dihydrochloride, $C_{16}H_{20}N_2.2HCl$, shiny leaflets, dec 298°. Soly in water: 23.9 mg/ml.

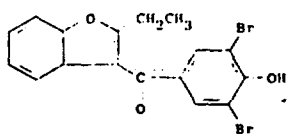
Sulfate, $C_{16}H_{20}N_2.H_2SO_4$, crystals, dec 247-250°. Soly in water: 15.8 mg/ml.

Disalicylate, $C_{16}H_{20}N_2.2C_6H_5(OH)COOH$, crystals, mp 85°. Soly in water: 2.43 mg/ml.

Penicillin salt, benzathine penicillin, *see* separate entries.

USE: Manuf of a repository form of penicillin.

1073. Benzbromarone. *(3,5-Dibromo-4-hydroxyphenyl)-(2-ethyl-3-benzofuranyl)methanone; 3,5-dibromo-4-hydroxyphenyl 2-ethyl-3-benzofuranyl ketone;* 3-(3,5-dibromo-4-hydroxybenzoyl)-2-ethylbenzofuran; 2-ethyl-3-benzofuranyl 4-hydroxy-3,5-dibromophenyl ketone; 2-ethyl-3-(3,5-dibromo-4-hydroxybenzoyl)benzofuran; 2-ethyl-3-(3,5-dibromo-4-hydroxybenzoyl)oxaindene; 2-ethyl-3-benzofuryl 3,5-dibromo-4-hydroxyphenyl ketone; L 2214; MJ 10061; Azubromaron; Besuric; Desuric; Max-Uric; Minuric; Narcaricin; Normurat; Uricovac; Urinorm. $C_{17}H_{12}Br_2O_3$; mol wt 424.11. C 48.15%, H 2.85%, Br 37.68%, O 11.32%. Prepn: Belg. pat. 553,621 (1957 to Labaz); Buu-Hoi *et al., J. Chem. Soc.* 1957, 625; Buu-Hoi, Beaudet, U.S. pat. 3,012,042 (1961 to Soc. Belge l'Azote Prod. Chim. Marly). Structure-activity study: Delbarre *et al., Chim. Ther.* 3, 470 (1968). Pharmacology of hypouricemic effect: D. S. Sinclair, I. H. Fox, *J. Rheumatol.* 2, 437 (1975). Pharmacokinetic and clinical studies: T. F. Yu, *ibid.* 3, 305 (1976). Pharmacokinetics and biotransformation in man: H. Ferber *et al., Eur. J. Clin. Pharmacol.* 19, 431 (1981). HPLC determn in serum: H. Vergin *et al., J. Chromatog.* 183, 383 (1980).



Yellowish prisms, mp 151°.

THERAP CAT: Uricosuric.

1074. Benzene. Benzol; cyclohexatriene. C_6H_6; mol wt 78.11. C 92.25%, H 7.75%. Discovered by Faraday in compressed oil gas in 1825. Obtained in the coking of coal and in the production of illuminating gas from coal. Purification by washing with water: Brit. pat. 863,711 (1961 to Schloven-Chemie and H. Koppers GmbH), *C.A.* 55, 16971f (1961). Lab prepn from aniline: Gattermann-Wieland, *Praxis des organischen Chemikers* (de Gruyter, Berlin, 40th ed., 1961) p 247. Production of pure benzene: French, *Ind. Chemist* 39, 9-12 (1963). Manuf: Faith, Keyes & Clark's *Industrial Chemicals*, F. A. Lowenheim, M. K. Moran, Eds. (Wiley-Interscience, New York, 4th ed., 1975) pp 126-137. Physical properties: Thorne *et al., Ind. Eng. Chem. Anal. Ed.* 17, 481 (1945). Solubility studies: F. P. Schwarz, *Anal. Chem.* 52, 10 (1980). Toxicity data: Kimura *et al., Toxicol. Appl. Pharmacol.* 19, 699 (1971). Review of toxicology: E. Browning, *Toxicity and Metabolism of Industrial Solvents* (Elsevier, New York, 1965) pp 3-65; R. Snyder *et al., Rev. Biochem. Toxicol.* 3, 123-154 (1981). *Review:* W. P. Purcell in Kirk-Othmer *Encyclopedia of Chemical Technology* vol. 3 (Wiley-Interscience, New York, 3rd ed., 1978) pp 744-771.

Clear, colorless, highly flammable liquid; characteristic odor. d_4^{15} 0.8787. bp 80.1°. mp +5.5°. n_D^{20} 1.50108. Flash pt, closed cup: 12°F (−11°C). Soly in water at 23.5°C (w/w): 0.188%. Miscible with alcohol, chloroform, ether, carbon disulfide, carbon tetrachloride, glacial acetic acid, acetone, oils. *Keep in well-closed containers in a cool place and away from fire.* LD_{50} orally in young adult rats: 3.8 ml/kg (Kimura).

Sodium deriv, C_6H_5Na, *phenyl sodium.* Prepn: Schlosser, *Angew. Chem.* 76, 267 (1964). Solid mass, dec by water, acids, alkalies. Sol in liquid ammonia, tetrahydrofuran.

Human Toxicity: Acute (from ingestion or inhalation): Irritation of mucous membranes, restlessness, convulsions, excitement, depression. Death may follow from respiratory failure. *Chronic:* Bone marrow depression and aplasia; rarely, leukemia. Harmful amts may be absorbed through skin. Benzene has been listed as a known carcinogen: *Fourth Annual Report on Carcinogens* (NTP 85-002, 1985) p 34.

USE: Manuf of medicinal chemicals, dyes and many other organic compounds, artificial leather, linoleum, oil cloth, airplane dopes, varnishes, lacquers; as solvent for waxes, resins, oils, etc.

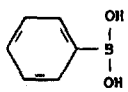
THERAP CAT (VET): Destroys screwworm larvae in wounds.

1075. Benzenearsonic Acid. Phenylarsonic acid. $C_6H_7AsO_3$; mol wt 202.03. C 35.67%, H 3.49%, As 37.08%, O 23.76%. $C_6H_5AsO(OH)_2$.

Cryst powder. mp 158-162° with dec. Sol in 40 parts water, 50 parts alcohol; insol in chloroform.

USE: Reagent for tin.

1076. Benzeneboronic Acid. *Phenylboronic acid;* phenylboric acid; phenylboron dihydroxide. $C_6H_7BO_2$; mol wt 121.94. C 59.10%, H 5.79%, B 8.87%, O 26.24%. Prepd by the reaction of phenylmagnesium bromide with methyl borate: Washburn *et al., Advances in Chemistry Series* 23, 102-128 (1959). Crystal and molecular structure: S. J. Rettig, J. Trotter, *Can. J. Chem.* 55, 3071 (1977).



Crystals from water. Spontaneous conversion to C_6H_5BO, *benzene boronic anhydride* or *phenylboroxide* on standing in dry air, although the best method is by azeotropic dehydration with toluene. mp 215-216° (anhydride). Ka 13.7. Dipole moment 1.72 (dioxane). Soly in water at 25°: 2.5%, benzene: 1.75%, xylene: 1.2%, ether: 30.2%, methanol: 178%.

1077. Benzenestibonic Acid. *Dihydroxyphenylstibine oxide;* phenylstibonic acid; phenylstibinic acid. $C_6H_7O_3Sb$; mol wt 248.87. C 28.95%, H 2.84%, O 19.29%, Sb 48.92%. $C_6H_5SbO(OH)_2$. Arylstibonic acids exist in the solid state as polymers of high mol wt, associated by H-bonds. The ions exist probably in the form $[ArSb(OH)_5]^-$. Benzenestibonic acid is prepd from benzenediazonium chloride and antimony trioxide in the presence of alkali: Schmidt, *Ann.* 421, 176, 188 (1920); Ger. pat. 254,421; *Chem. Zentr.* 1913, I, 345; *Frdl.* 11, 1084. From the double compd of benzenediazonium chloride and antimony trichloride by the action of alkali: May, *J. Chem. Soc.* 101, 1033 (1912); U.S. pat. 1,260,707.

Minute crystals from acetic acid, larger diamond-shaped, glistening crystals from alcohol-chloroform mixture on the addition of water. Not melted at 250°, dec at higher temps. Insol in water; slightly sol in alc; more sol in acetone, in alcohol + benzene, alcohol + ether, sol in warm chloroform or amyl ace of sodium hydroxide, sodium carbo

1078. Benzenesulfonic Acid. C C 45.56%, H 3.82%, O 30.35%, Made by treating benzene with f mann-Wieland, *Praxis des organisch* ter, Berlin, 40th ed., 1961) p 168.

Sesquihydrate, deliquescent pla When anhydrous mp 50-51°, also r $25° = 2 \times 10^{-1}$. Freely sol in v benzene; insol in ether, carbon dis Ethyl ester, $C_8H_{10}O_3S$, *ethyl ben* to slightly yellow, almost odorless l Slightly sol in water; misc with a ether.

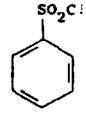
Sodium salt, $C_6H_5NaO_3S$, *sodium benzosulfonate.* Crystals. Sol i

USE: Manuf phenol by fusion Highly irritant to skin, eyes, muco

1079. Benzenesulfonic Anhydri 298.33. C 48.31%, H 3.38%, O 26 $SO_2)_2O$. Prepd by heating benzene phosphorus pentoxide mixed with *Am. Chem. Soc.* 74, 394 (1952). Light tan solid, mp 60-85° (softe crystallized from ether, mp 88-91° uefies upon exposure to air for 2. when mixed with 90-95% H_2O_2.

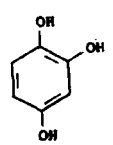
USE: In Friedel-Crafts sulfone sy ation reactions.

1080. Benzenesulfonyl Chloride ride; benzenesulfonic (acid) chlori 176.62. C 40.80%, H 2.85%, C 18.15%. Prepd from benzene an from the sodium salt of benzenes $POCl_3$: R. Adams, C. S. Marvel, ed., 1964) p 84; H. T. Clarke *et al*



Colorless, oily liquid. d_{15}^{15} 1.384 bp_{760} 251-252° (decompn); bp_{100} and stable toward cold water; sol

1081. 1,2,4-Benzenetriol. Hy oxyquinol. $C_6H_6O_3$; mol wt 126.1 38.06%. Prepd by hydrolysis of t methanol, the triacetate being for anhydride on quinone: Vliet, *Org* 1941) p 317.



Monoclinic prismatic leaflets fr sol in water, alcohol, ether, eth chloroform, carbon disulfide, ligr Trimethyl ether, $C_9H_{12}O_3$, bp Triacetate, $C_{12}H_{12}O_6$, needles fr Readily hydrolyzed by acids or USE: In gas analysis; 1,2,4-ben just as good an absorbent for ox

1082. Benzestrol. *4,4'-(1,2 panediyl)bisphenol;* 3-ethyl-2,4- ane; Octofollin; Ocestrol; Cheme 298.41. C 80.49%, H 8.78%, O possible. The compound accepts

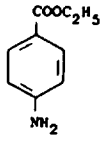
istries and arts, renders it entirel
a beverage. The most common
lone or in combination, are the
phor. Aldehol, amyl alcohol, ga
l, benzene, castor oil, acetone, n
admium iodide, pyridine bases,
yl phthalate. *Formula 1* is 5
hol added to 100 gal of 95%
benzene added to 100 gal of 95
la 3A contains 5 gal commercial
ains 0.5 gal pyridine bases, *formu*
la 13A 10 gal ethyl ether, *formu*
etone and 1 gal kerosene, *formul*
. *formula 23A* 10 gal acetone, *f*
ormula 28A 1 gal gasoline, *form*
nula 32 5 gal ethyl ether, *formul*
mula 35A 5 gal ethyl acetate, *fo*
hthalate; *formula 44* contains
nal permissible formulas are g
ons No. 3, Formulae for Complet
Alcohol, published by the U.S. T
dustrial Alcohol. Reprinted in
Chemistry.
nts, particularly methanol, may
mptoms caused by ingestion and

. *Ethanamine;* monoethylamine
ol wt 45.08. C 53.28%, H 15.6
Prepn from ethyliodide + liq am
hem. Soc. 69, 836 (1947); from
s *et al.*, U.S. pat. 2,609,394 (1
. U.S. pat. 3,022,349 (1962 t

mmonia odor; strong alkaline r
Solidif −80°. Miscible with
tightly closed and in cold plac
/kg, H. F. Smyth *et al., Arch. Ind*
1954).
$H_7N.HCl$, crystals from ethan
22. Soluble in 0.4 part water; fre
n chloroform or acetone. Pra
well closed.
.HI, hygroscopic crystals, mp
water or alcohol. Practically
ep well closed and protected fro
ommercial prepn is a 5% soln
dyne.
istry; stabilizer for rubber late
, medicinals; in oil refining; in
Irritating to skin, mucous mem

e as a sclerosing agent.

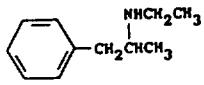
obenzoate. *4-Aminobenzoic ac*
nericaine; Anesthesin; Anesthol
rathesin. $C_9H_{11}NO_2$; mol wt 16
8.48%, O 19.37%. Prepd by the
nzoic acid: Salkowski, *Ber.*
Meyer, *Ann.* 320, 135 (1902);
itrobenzoate: Limpricht, *ibid.*
L. Cohen, *Org. Syn.* coll.
ndustrial practice the reducin
ter in the presence of a
iption: S. L. Ali in *Analytica*
l. 12, K. Florey, Ed. (Acade
73-104.



ether, mp 88-90°. Stable
ut 2500 ml water, 5 ml alco
4 ml ether, and in 30 to 50

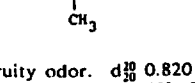
ressed almond oil or olive oil. Also sol in dil acids. pK_a
5.
THERAP CAT: Topical anesthetic.
THERAP CAT (VET): Local (usually surface) anesthetic.

3720. *N*-Ethylamphetamine. *N-Ethyl-α-methylbenzeneethanamine; N-ethyl-α-methylphenethylamine; N*-ethyl-ω-phenylisopropylamine; 2-ethylamino-1-phenylpropane; Adiparthrol; Apetinil. $C_{11}H_{17}N$; mol wt 163.25. C 80.92%, H 10.50%, N 8.58%. Prepn: Keil, Dobke, Ger. pat. 767,263 (1952 to Theodor H. Temmler); Leonard *et al., J. Am. Chem. Soc.* 80, 4858 (1958). Separation of isomers: Brit. pat. 814,339 (1959 to Sterling Drug).



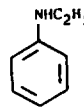
bp_{14} 104.5-106°. n_D^{25} 1.4986.
d-Form hydrochloride, $C_{11}H_{18}ClN$, mp 154-156°. $[\alpha]_D^{25}$ +17.2° (c = 2 in water).
l-Form hydrochloride, $C_{11}H_{18}ClN$, mp 155-156°. $[\alpha]_D^{25}$ −17.3° (c = 2 in water).
Note: This is a controlled substance (stimulant) listed in the U.S. Code of Federal Regulations, Title 21 Part 1308.11 (1985).
THERAP CAT: Anorexic.

3721. Ethyl Amyl Ketone. *5-Methyl-3-heptanone;* amyl ethyl ketone; EAK. $C_8H_{16}O$; mol wt 128.21. C 74.94%, H 12.58%, O 12.48%. *Review:* Buller, *Ind. & Eng. Chem.* 48, 1323 (1956).



Liquid. Mild fruity odor. d_{20}^{20} 0.820-0.824. One gallon weighs 6.83 lbs at 20°. bp_{760} 157-162°. Flash pt 59° (138°F). Evaporation rate 0.3 (*n*-butyl acetate = 1.0). n_D^{25} 1.4195. Slightly miscible with water. Compatible with alcohols, ketones, ethers, many other organic solvents.
USE: Solvent for nitrocellulose-alkyd, nitrocellulose-maleic and vinyl resins. *Caution:* Narcotic in high concns.

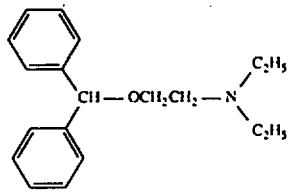
3722. Ethylaniline. *N-Ethylbenzenamine;* ethylphenylamine. $C_8H_{11}N$; mol wt 121.18. C 79.29%, H 9.15%, N 11.56%. Produced by heating aniline hydrochloride and alcohol at 180°.



Very refractive liquid; rapidly becomes brown on exposure to light and air. Aniline-like odor. d_{25}^{25} 0.958. bp 204.5°. Freezes below 80°. mp −63.5°. n_D^{20} 1.5559. Insol in water; miscible with alc, ether and many other organic solvents. *Keep well closed and protected from light.* LD_{50} orally in rats: 1.67 g/kg.

3723. Ethylbenzene. C_8H_{10}; mol wt 106.16. C 90.50%, H 9.50%. $C_6H_5C_2H_5$. Prepn from acetophenone: Clemmensen, *Ber.* 46, 1838 (1913); Gattermann-Wieland, *Praxis des Organischen Chemikers* (de Gruyter, Berlin, 40th ed., 1961) p 222. By Huang-Minlon modification of Wolff-Kishner reduction: A. I. Vogel, *Practical Organic Chemistry* (Longmans, 3rd ed., 1959) p 516. Physical properties: L. C. Smith *et al., J. Am. Chem. Soc.* 68, 1130 (1946). Manuf: Keyes & Clark's *Industrial Chemicals*, F. A. Lowenheim, K. Moran, Eds. (Wiley-Interscience, New York, 1975) pp 365-370. Toxicity: H. F. Smyth *et al., Ind. Hyg. Assoc J.* 23, 95 (1962).
Colorless liquid; flammable. d_{25}^{25} 0.866. bp 136.25°. mp −94.97°. n_D^{25} 1.4932. Flash pt, closed cup: 64°F (18°C). Practically insol in water; misc with the usual organic solvents. LD_{50} orally in rats: 5.46 g/kg (Smyth).
Caution: Irritating to eyes, skin, mucous membranes, and, in high concns, narcotic.
USE: For conversion to styrene monomer; as resin solvent.

3724. Ethylbenzhydramine. *2-(Diphenylmethoxy)-N,N-diethylethanamine;* 2-(benzhydryloxy)triethylamine; β-diethylaminoethyl benzhydryl ether; 2-(benzhydryloxy)-*N,N*-diethylethylamine; benzhydryl 2-diethylaminoethyl ether; etanautine. $C_{19}H_{25}NO$; mol wt 283.40. C 80.52%, H 8.89%, N 4.94%, O 5.65%. Prepn: Martin *et al.*, U.S. pat. 2,397,799 (1946 to Geigy); Rieveschl, U.S. pat. 2,421,714 (1947 to Parke, Davis).

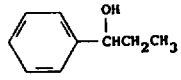


$bp_{0.15}$ 140-142°.
Hydrochloride, $C_{19}H_{24}ClNO$, *Antiparkin, Rigidyl.* Prisms from alcohol + ethyl acetate, mp 140°. Bitter taste. Freely sol in water; sol in alcohol, acetone, chloroform; very slightly sol in benzene, ether. pH of 1% aq soln about 5.5.
Methyl iodide, $C_{20}H_{28}INO$, *Esyntin, Metropin.* A quaternary ammonium deriv of the base covered in the Geigy pat.
THERAP CAT: Hydrochloride as antiparkinsonian; methyl iodide as anticholinergic.

3725. Ethyl Benzoate. *Benzoic acid ethyl ester.* $C_9H_{10}O_2$; mol wt 150.17. C 71.98%, H 6.71%, O 21.31%. $C_6H_5COOC_2H_5$.
Colorless, clear, refractive liq; aromatic odor; vapors cause cough. d_4^{25} 1.050. bp 211-213°. mp −34°. n_D^{20} 1.506. Almost insol in water; miscible with alcohol, chloroform, ether, petr ether. LD_{50} orally in rats: 6.48 g/kg, Smyth *et al., Arch. Ind. Hyg. Occup. Med.* 10, 61 (1954).
USE: In perfumery under the name *Essence de Niobe;* in manuf of *Peau d'Espagne;* artificial fruit essence.

3726. Ethyl Benzoylacetate. *β-Oxobenzenepropanoic acid ethyl ester.* $C_{11}H_{12}O_3$; mol wt 192.21. C 68.73%, H 6.29%, O 24.97%. $C_6H_5COCH_2COOC_2H_5$.
Liquid; pleasant odor; becomes yellow on exposure to air and light. d^{15} 1.122. bp 265-270° with decompn. Volatile with steam. n_D^{20} 1.5338. Insol in water; miscible with alcohol, ether. *Keep protected from air and light.*

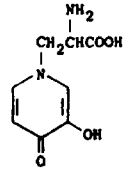
3727. α-Ethylbenzyl Alcohol. *α-Ethylbenzenemethanol;* ω-ethylbenzyl alcohol; 1-phenyl-1-propanol; 1-phenylpropyl alcohol; ethyl phenyl carbinol; α-hydroxypropylbenzene; SH 261; Ejibil; Livonal; Phenycholon; Phenicol; Phenychol; Fenicol; Felicur; Felitrope. $C_9H_{12}O$; mol wt 136.19. C 79.37%, H 8.88%, O 11.75%. Prepd from benzaldehyde or from ethyl phenyl ketone: Norris, Cortese, *J. Am. Chem. Soc.* 49, 2640 (1927).



Oily liquid. Weak, ester-like odor. Sweetish, slightly irritating taste. bp_{760} 219°; bp_{15} 107°; bp_3 78°. d_4^{25} 0.9915. n_D^{23} 1.5169. uv max (methanol): 250, 260 nm (ε 173, 114). Misc with methanol, ethanol, ether, benzene, toluene, olive oil. LD_{50} orally in rats: 1.6 ml/kg, O. Linét *et al., Arzneimittel-Forsch.* 12, 347 (1962).
USE: As heat transfer medium; in perfumery.
THERAP CAT: Choleretic.

3728. Ethylbenzylaniline. *N-Ethyl-N-phenylbenzenemethanamine; N-ethyl-N-phenylbenzylamine.* $C_{15}H_{17}N$; mol wt 211.29. C 85.26%, H 8.11%, N 6.63%. Prepn: Martin, MacQueen, U.S. pat. 1,887,772 (1933 to Dow); Burgstahler, *J. Am. Chem. Soc.* 73, 3021 (1951).

isoln: N. K. Hart *et al., Heterocycles* 7, 265 (1977). Structure: Adams, Jones, *J. Am. Chem. Soc.* 69, 1803 (1947). Synthesis: Adams, Johnson, *ibid.* 71, 705 (1949). Identity of mimosine and leucenol: Kleipool, Wibaut, *Rec. Trav. Chim.* 69, 37 (1950); Wibaut, Schuhmacher, *ibid.* 71, 1017 (1952). Crystal structure: A. Mostad *et al., Acta Chem. Scand.* 27, 164 (1973). Shown to cause inhibition of hair growth and loss of hair in mice: Crounse *et al., Nature* 194, 694 (1962). Explanation of the toxicity in animals: J. F. Thompson *et al., Ann. Rev. Biochem.* 38, 137 (1969).



dl-Form, crystals from water, mp 235-236°. Slightly sol in water, much less sol in methanol and ethanol; practically insol in the higher alcohols, in dioxane, ethyl acetate, ether, benzene, chloroform, glacial acetic acid, pyridine, Cellosolve. Sol in dil acids or bases and may be recovered from these solns by adjusting the pH so that it is just acid to bromcresol green. uv max: 282 nm (log ε 4.23).

dl-Hemihydrate, crystals, darkens at 215-226°, mp 227-228°.

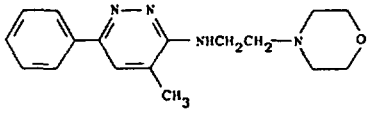
l-Form, crystals from water, mp 225°. $[\alpha]_D^{22}$ −20°.

Hydrochloride, $C_8H_{11}ClN_2O_4$, dec 175°, sol in water.

Hydrobromide, $C_8H_{11}BrN_2O_4$, dec 179.5°, sol in water.

USE: Depilatory agent, Hegarty *et al., Aust. J. Agr. Res.* 15, 153 (1964), *C.A.* 60, 16405e (1964).

6119. Minaprine. *N-(4-Methyl-6-phenyl-3-pyridazinyl)-4-morpholineethanamine; 4-[2-[(4-methyl-6-phenyl-3-pyridazinyl)amino]ethyl]morpholine.* $C_{17}H_{22}N_4O$; mol wt 298.40. C 68.43%, H 7.43%, N 18.78%, O 5.36%. Prepn: H. Laborit, Ger. pat. 2,229,215; *idem*, U.S. pat. 4,169,158 (1973, 1979 to Centre Etudes Exper. Clin. Physio-Biologie); C.-G. Wermuth, A. Exinger, *Agressologie* 13, 285 (1972). Pharmacology: H. Laborit *et al., ibid.* 291. Metabolism of ^{14}C-minaprine: A. G. Rico *et al., J. Pharmacol.* 9, 170 (1978). Pharmacokinetics: J. P. Jeanniot *et al., ibid.* 169. Clinical evaluation: A. Garcia-Maffla, M. H. de Garcia, *Pharmatherapeutica* 2, 265 (1979). Pharmacological evaluation in depression: K. Bizière *et al., Arzneimittel-Forsch.* 32, 824 (1982). Toxicologic study: A. G. Mazure *et al., Agressologie* 13, 319 (1972).



Fine buff-colored needles from isopropanol, mp 122°. Insol in water. Slightly sol in cold ethanol, sol in hot ethanol, chloroform.

Dihydrochloride, $C_{17}H_{24}Cl_2N_4O$. *Agr 1240, CB-30038, Brantur, Cantor.* Crystals from abs ethanol, mp 182°.

THERAP CAT: Psychotropic.

6120. Mineral Spirits. *Petroleum spirits;* white spirits; turpentine substitutes. Name applied to various types of hydrocarbon solvents, primarily petroleum distillates, which have flash points above 100°F (38°C) and distillation ranges between 300°F (149°C) and 415°F (213°C). *See: A.S.T.M. Standard Specifications* D 235-83, 71-73 (1983).

Type I, *Stoddard solvent, Texsolve S, Varsol 1.* Regular mineral spirits. Clear liquid. Flash pt (min): 38°C (100°F). $d_{15.6}^{15.6}$ 0.754-0.820. Distillation range: initial bp (min), 149°C (300°F); 50% recovered (max), 182°C (360°F); dry pt (max), 208°C (407°F).

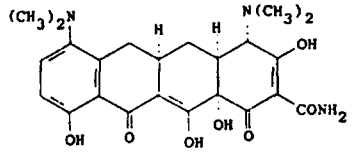
Type II. High flash point mineral spirits. Flash pt (min): 60°C (140°F). $d_{15.6}^{15.6}$ 0.768-0.820. Distillation range: initial bp (min), 177°C (350°F); 50% recovered (max), 196°C (385°F); dry pt (max), 211°C (412°F).

Type III. Odorless mineral spirits. Flash pt (min): 38°C (100°F). $d_{15.6}^{15.6}$ 0.775 (max). Distillation range: initial bp (min), 149°C (300°F); 50% recovered (max), 196°C (385°F); dry pt (max), 213°C (415°F).

Type IV, *Texsolve S-2, Varsol 3.* Low dry point mineral spirits. Flash pt (min): 38°C (100°F). $d_{15.6}^{15.6}$ 0.754-0.800. Distillation range: initial bp (min), 149°C (300°F); 50% recovered (max), 174°C (345°F); dry pt (max), 185°C (365°F).

USE: Solvent; paint thinner. In the coatings and dry cleaning industries.

6121. Minocycline. *4,7-Bis(dimethylamino)-1,4,4a,5,5a,6,11,12a-octahydro-3,10,12,12a-tetrahydroxy-1,11-dioxo-2-naphthacenecarboxamide;* 7-dimethylamino-6-demethyl-6-deoxytetracycline; Minocyn. $C_{23}H_{27}N_3O_7$; mol wt 457.49. C 60.38%, H 5.95%, N 9.18%, O 24.48%. Semi-synthetic antibiotic effective against tetracycline-resistant staphylococci. Prepn: Boothe, Petisi, U.S. pats. 3,148,212 and 3,226,436 (1964 and 1965 to Am. Cyanamid). Synthesis: Martell, Boothe, *J. Med. Chem.* 10, 44 (1967); Church *et al., J. Org. Chem.* 36, 723 (1971); Bernardi *et al., Farmaco Ed. Sci.* 30, 736 (1975). Activity data: Kradolfer *et al., Antimicrob. Ag. Chemother.* 1966, 359. Metabolism: Kelly, Kanegis, *Toxicol. Appl. Pharmacol.* 11, 171 (1967). Toxicity studies: Noble *et al., ibid.* 128. Clinical evaluation: Frisk, Tunevall, *Antimicrob. Ag. Chemother.* 1968, 335; Cappel, Klastersky, *Curr. Ther. Res.* 13, 227 (1971). Comprehensive description: V. Zbinovsky, G. P. Chrekian in *Analytical Profiles of Drug Substances* vol. 6, K. Florey, Ed. (Academic Press, New York, 1977) pp 323-339.



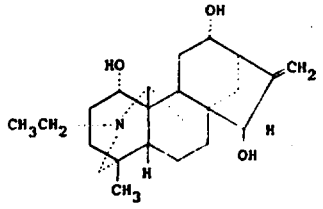
Bright yellow-orange amorphous solid. $[\alpha]_D^{25}$ −166° (c = 0.524). uv max (0.1*N* HCl): 352, 263 nm (log ε 4.16, 4.23); (0.1*N* NaOH): 380, 243 nm (log ε 4.30, 4.38).

Hydrochloride, $C_{23}H_{28}ClN_3O_7$. *Minocin, Klinomycin, Minomycin, Vectrin.* Yellow crystalline powder. Slightly hygroscopic; sensitive to light and to surface oxidation.

THERAP CAT: Antibacterial.

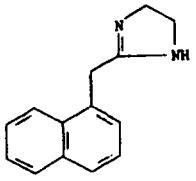
6122. Minoxidil. *6-(1-Piperidinyl)-2,4-pyrimidinediamine 3-oxide; 6-amino-1,2-dihydro-1-hydroxy-2-imino-4-piperidinopyrimidine;* 2,3-dihydro-3-hydroxy-2-imino-6-(1-piperidinyl)-4-pyrimidinamine; 2,4-diamino-6-piperidinopyrimidine 3-oxide; 6-piperidino-2,4-diaminopyrimidine 3-oxide; PDP; U-10,858; Alopexil; Alostil; Loniten; Lonolox; Minoximen; Prexidil; Regaine; Rogaine; Tricoxidil. $C_9H_{15}N_5O$; mol wt 209.25. C 51.66%, H 7.22%, N 33.47%, O 7.65%. Prepn: Neth. pat. Appl. 6,615,385; W. C. Anthony *et al.*, U.S. pat. 3,382,247 (1967, 1968 both to Upjohn); J. M. McCall *et al., J. Org. Chem.* 40, 3304 (1975). *See also* W. C. Anthony, U.S. pat. 3,644,364 (1972 to Upjohn). Metabolism: R. C. Thomas *et al., J. Pharm. Sci.* 64, 1360 (1975). Pharmacology and pharmacokinetics: D. T. Lowenthal *et al., J. Clin. Pharmacol.* 18, 500 (1978). Percutaneous absorption and excretion: T. J. Franz, *Arch. Dermatol.* 121, 203 (1985). Clinical studies: O. Andersson, R. Sivertsson, *Acta Med. Scand.* 205, 213 (1979); M. Moser, *Advan. Cardiol.* 26, 38 (1979). Clinical trial in early male pattern baldness: E. A. Olsen *et al., J. Am. Acad. Dermatol.* 13, 185 (1985). Toxicology: R. G. Carlson, E. S. Feenstra, *Toxicol. Appl. Pharmacol.* 39, 1 (1977). Review of pharmacology and therapeutic use: V. M. Campese, *Drugs* 22, 257-278 (1981). Review of topical application in baldness: E. Novak *et al., Int. J. Dermatol.* 24, 82 (1985). Comprehensive description: D. K. J. Gorecki in *Analytical Profiles of Drug Substances* vol. 17, K. Florey, Ed. (Academic Press, New York, 1988) 185-219.

isoln procedures is a mixture of at least three compounds. Structure: Wiesner, Valenta, *Fortschr. Chem. Org. Naturst.* 16, 53 (1958). Related stereochemical studies: Okamoto *et al., Chem. Pharm. Bull.* 13, 1270 (1963). Total synthesis of racemic napelline: Wiesner *et al., Can. J. Chem.* 52, 2353, 2355 (1974); S. P. Sethi *et al., ibid.* 58, 1889 (1980).



Rectangular plates from ether + petr ether.
Hydrochloride, $C_{22}H_{34}ClNO_3$, solvated crystals, dec 200-222°. $[\alpha]_D^{25}$ −93.9° (c = 5). Sol in water.

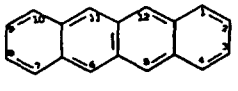
6287. Naphazoline. *4,5-Dihydro-2-(1-naphthalenylmethyl)-1H-imidazole; 2-(1-naphthylmethyl)imidazoline.* $C_{14}H_{14}N_2$; mol wt 210.27. C 79.97%, H 6.71%, N 13.32%. α-Adrenergic agonist. Prepd by reacting the acetic acid anhydride of naphthoimidic acid with ethylenediamine: U.S. pat. 2,161,938 (1939); by reacting naphthylthioacetamide with ethylenediamine: Dan. pat. 62,889 (1944), *C.A.* 40, 4398 (1946). Toxicity data: J. Gylfe *et al., Fed. Proc.* 9, 280 (1950).



Hydrochloride, $C_{14}H_{15}ClN_2$, *Ak-Con, Clera, Coldan, Naphcon, Niazol, Opcon, Privine hydrochloride, Rhinantin, Rhinoperd, Sanorin, Sanorin-Spofa, Strictylon, Vasocon.* Bitter crystals, mp 255-260°. Freely sol in water (40 g dissolve in 100 ml) and in alcohol. Slightly sol in chloroform. Insol in benzene, ether. A 1% aq soln has a pH of about 6.2. LD_{50} s.c. in rats: 385 mg/kg (Gylfe).

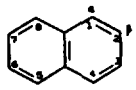
THERAP CAT: Adrenergic (vasoconstrictor); decongestant.

6288. Naphthacene. Tetracene; 2,3-benzanthracene; rubene; chrysogen. $C_{18}H_{12}$; mol wt 228.28. C 94.70%, H 5.30%. Occurs in coal tar. Contaminates commercial anthracene to which it imparts a yellow color. Isoln: Cook *et al., Proc. Roy. Soc. London* B111, 455 (1932). Isoln from crude anthracene by chromatography: Winterstein *et al., Z. Physiol. Chem.* 230, 159 (1934). Synthesis by condensing succinic acid and phthalic anhydride in the presence of sodium acetate: Gabriel, Michael, *Ber.* 10, 1559, 2207 (1877); 11, 1682 (1878); Roser, *Ber.* 17, 2744 (1884); Nathanson, *Ber.* 26, 2582 (1893); Gabriel, Leupold, *Ber.* 31, 1159, 1272 (1898); Wanag, *Ber.* 70, 274 (1937); from 1-naphthol and phthalic anhydride: Deichler, Weizmann, *Ber.* 36, 547, 719 (1903); Ger. pat. 298,345 (1916); from 1,5-dihydroxynaphthalene and phthalic anhydride: Bentley *et al., J. Chem. Soc.* 91, 411, 1588 (1907); from tetralin and phthalic anhydride: Schroeter, *Ber.* 54, 2242 (1921); Ger. pat. 346,673 (1918); *cf.* Fieser, *J. Am. Chem. Soc.* 53, 2329 (1931). Other syntheses: Coulson, *J. Chem. Soc.* 1935, 77; Weizmann *et al., ibid.* 1939, 398.



Orange leaflets from xylene. d 1.35. Sublimes *in vacuo.* mp 341° (open capillary tube), mp 357° (copper block). Absorption spectrum: Clar, *Ber.* 69, 607 (1936). Fluorescence maxima: Krishman, Seshan, *Z. Krist.* 89, 538 (1934). Difficultly sol in most solvents. Solns show slight green fluorescence in daylight. Does not form a picrate.

6289. Naphthalene. Naphthalin; naphthene; tar camphor. $C_{10}H_8$; mol wt 128.16. C 93.71%, H 6.29%. Most abundant single constituent of coal tar. Dry coal tar contains about 11%. Crystallizes from the middle or "carbolic oil" fraction of the distilled tar. Purified by hot pressing, which may be followed by washing with H_2SO_4, NaOH, and water, then by fractional distillation or by sublimation. Manuf: Faith, Keyes & Clark's *Industrial Chemicals,* F. A. Lowenheim, M. K. Moran, Eds. (Wiley-Interscience, New York, 4th ed., 1975) pp 556-562. *Review:* R. M. Gaydos in Kirk-Othmer *Encyclopedia of Chemical Technology* vol. 15 (Wiley-Interscience, New York, 3rd ed., 1981) pp 698-719.



Monoclinic prismatic plates from ether or by sublimation; also sold as white scales, powder, balls, or cakes, mp 80.2°. Odor of moth balls. Volatilizes appreciably at room temp. d_4^{20} 1.162. d_4^{100} 0.9628. Sublimes appreciably at temps above mp; volatile with steam. bp_{760} 217.9°; bp_{400} 193.2°; bp_{200} 167.7°; bp_{100} 145.5°; bp_{60} 130.2°; bp_{40} 119.3°; bp_{20} 101.7°; bp_{10} 85.8°. Flash pt, open cup 174°F (79°C); closed cup 190°F (88°C). Autoignition temp 1053°F (567°C). n_D^{100} 1.58212. Purple fluorescence in Hg light (petr ether soln). Ultraviolet absorption: Several characteristic bands between 217.5 and 320 nm *in hexane. Insol in water. One gram dissolves in* 13 ml methanol or ethanol, in 3.5 ml benzene or toluene, in 8 ml olive oil or turpentine, in 2 ml chloroform or carbon tetrachloride, in 1.2 ml carbon disulfide. Very sol in ether, hydronaphthalenes, in fixed and volatile oils.

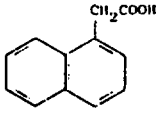
Human Toxicity: Poisoning may occur by ingestion of large doses, inhalation, or skin absorption. *Symptoms and signs:* nausea, vomiting, headache, diaphoresis, hematuria, hemolytic anemia, fever, hepatic necrosis, convulsions, coma. *Clinical Toxicology of Commercial Products,* R. E. Gosselin *et al.,* Eds. (Williams & Wilkins, Baltimore, 4th ed., 1976) Section III, pp 242-246.

USE: Manuf phthalic and anthranilic acids which are used in making indigo, indanthrene, and triphenylmethane dyes. Manuf of hydroxyl (naphthols), amino (naphthylamines), sulfonic acid and similar compds used in the dye industries. Manuf of synthetic resins, celluloid, lampblack, smokeless powder. Manuf of hydronaphthalenes (Tetralin, Decalin) which are used as solvents, in lubricants, and in motor fuels. The use of naphthalene as a moth repellent and insecticide is decreasing due to the introduction of chlorinated compds such as *p*-dichlorobenzene.

THERAP CAT: Has been used as antiseptic (topical and intestinal); anthelmintic (Cestodes).

THERAP CAT (VET): Has been used in dusting powders, as an insecticide and internally as an intestinal antiseptic and vermicide.

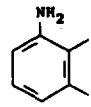
6290. 1-Naphthaleneacetic Acid. α-Naphthaleneacetic acid; naphthylacetic acid; NAA; Fruitone-N; Phyomone; Planofix; Rootone; Tre-Hold. $C_{12}H_{10}O_2$; mol wt 186.20. C 77.40%, H 5.41%, O 17.18%. Prepn from naphthalene + chloroacetic acid: Ogata, Ishiguro, *J. Am. Chem. Soc.* 72, 4302 (1950); Southwick *et al., ibid.* 76, 754 (1954); U.S. pat. 2,655,531 (1953 to FMC); from naphthylacetonitrile: Wenner, U.S. pat. 2,489,348 (1949 to Hoffmann-La Roche); *J. Org. Chem.* 15, 548 (1950). Activity: F. E. Gardiner *et al., Science* 90, 208 (1939). Crystal structure: S. S. Rajan, *Acta Crystallogr.* B34, 998 (1978).



Needles from water, mp 134.5-135.5°. Sol in about 30 parts alcohol; freely sol in acetone, ether, chloroform. Soly

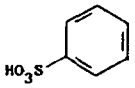
in water at 17°: 0.38 g/l. LD_{50}
G. W. Bailey, J. L. White, *Resi*
USE: Plant growth regulator.

6291. 1,8-Naphthalenediami
lene. $C_{10}H_{10}N_2$; mol wt 158.2
17.71%. Prepd by reducing
phosphorus triiodide: Meyer,



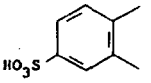
Crystals from dil alc, mp 66.
$d_4^{99.4}$ 1.1265. Sublimable. Turns
in alcohol or ether; slightly sol
Dihydrochloride, $C_{10}H_{12}Cl_2N_2$
USE: Antioxidant for lubricat
nium and nitrites.

6292. 1,6-Naphthalenedisulfo
$C_{10}H_8O_6S_2$; mol wt 288.30. C 41
22.24%. Prepn: Fierz-David,
1134 (1923).



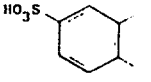
Crystals. Very sol in water;
insol in ether.

6293. 2,6-Naphthalenedisul
β-acid. $C_{10}H_8O_6S_2$; mol wt 288.
33.30%, S 22.24%. Prepn:
Chim. Acta 28, 257 (1945).



Deliquesc crystals. Very sol i
insol in ether.

6294. 2,7-Naphthalenedisul
α-acid. $C_{10}H_8O_6S_2$; mol wt 288.
33.30%, S 22.24%. Prepn fro
H_2SO_4: Fierz-David, Blangey, *F*
Chemistry (Interscience, New Y



Very deliquesc crystals. Very
ally insol in ether.
USE: In dye chemistry.

6295. 1-Naphthalenesulfonic
onic acid. $C_{10}H_8O_3S$; mol wt 2
23.05%, S 15.40%. Made by s
H_2SO_4 at 0°.

Crystals. mp 90° (dihydrate).
slightly in ether.

gioides (L.) Pers., *Labiatae. Habit.* Canada to Florida and west to Nebraska. *Constit.* Volatile oil (1%), bitter principles, tannin.

THERAP CAT: Diaphoretic, emmenagogue.

7054. Pentaborane(9). Pentaboron nonahydride. B_5H_9; mol wt 63.17. B 85.64%, H 14.36%. Prepd from diborane: Stock, Mathing, *Ber.* **69B**, 1456 (1936); Schlesinger, Burg, *J. Am. Chem. Soc.* **53**, 4321 (1931); **55**, 4009 (1933). Molecular structure determination by rotational spectroscopy: D. Schwoch *et al., Inorg. Chem.* **16**, 3219 (1977). Review of toxicity: *see* Decaborane(14). *Review:* Greenwood in *Comprehensive Inorganic Chemistry* vol. 1, J. C. Bailar, Jr. *et al.*, Eds. (Pergamon Press, Oxford, 1973) pp 792-801.

Liquid. mp −46.6°; bp 60°. d_4^0 0.61; vp 66 mm Hg at 0°. Dec very slowly at 150°. Ignites spontaneously in air. Hydrolyzes in water after long heating. Reacts with ammonia to form a diammoniate.

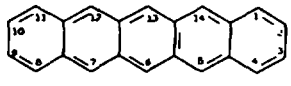
7055. Pentaborane(11). Dihydropentaborane(9); pentaboron undecahydride. B_5H_{11}; mol wt 65.19. B 82.99%, H 17.01%. Prepd from diborane: Burg, Schlesinger, *J. Am. Chem. Soc.* **55**, 4009 (1933).

Liquid. mp −123°. bp 63°; bp_{53} 0°. Unstable. When heated or allowed to stand for long periods of time, it produces diborane, tetraborane, hydrogen, pentaborane, decaborane and brown nonvolatile liqs and solids. Ignites spontaneously in air. Hydrolyzes in water to boric acid and hydrogen. Reacts with ammonia to form a tetraammoniate.

7056. Pentabromoacetone. *1,1,1,3,3-Pentabromo-2-propanone.* C_3HBr_5O; mol wt 452.62. C 7.96%, H 0.22%, Br 88.28%, O 3.53%. $CBr_3COCHBr_2$. Prepd by the addition of 12 parts bromine to 1 part acetone: Mulder, *Jahresbericht über die Fortschritte der Chemie* **1864**, 330.

Orthorhombic needles or prisms from alcohol or ether. Penetrating odor. mp 76° (sublimes above mp). Volatile with steam. Practically insol in water. Freely sol in organic solvents. Forms bromoform under the influence of alkalies.

7057. Pentacene. Benzo[*b*]naphthacene; 2,3,6,7-dibenzoanthracene; *lin*-naphthoanthracene. $C_{22}H_{14}$; mol wt 278.35. C 94.93%, H 5.07%. Synthesis from *m*-xylene or from 4-benzyl-1,3-dimethylbenzene and benzoyl chloride in presence of aluminum chloride or from terephthalyl chloride and *o*-tolylmagnesium bromide: Clar, John, *Ber.* **62**, 940 (1929); **63**, 2967 (1930); **64**, 981 (1931). Synthesis by reduction of 6,13-pentacenequinone: Bruckner *et al., Tetrahedron Letters* **1960**, no. 1, 5; Bruckner, Tomasz, *Acta Chim. Acad. Sci. Hung.* **28**(4), 405 (1961). Structure: Campbell *et al., Acta Cryst.* **14**, 705 (1961).



Deep blue needles with violet luster from hot nitrobenzene. Sublimes in CO_2 stream under reduced pressure at about 300° (Clar, John, *loc. cit.*). In presence of air dec above 300°. Practically insol in water; sparingly sol in organic solvents.

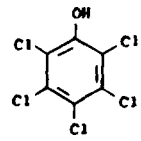
Note: Anthracene (3 linear rings) is colorless; naphthacene (4 linear rings) is orange; pentacene (5 linear rings) is blue; hexacene (6 linear rings) is green.

7058. Pentachloroethane. Pentalin. C_2HCl_5; mol wt 202.31. C 11.87%, H 0.50%, Cl 87.63%. CCl_3CHCl_2. Toxicity data: G. S. Barsoum, K. Saad, *Quart. J. Pharm. Pharmacol.* **7**, 205 (1934).

Liquid; chloroform-like odor. d_4^{25} 1.6712; bp 161-162°. mp −29°. n_D^{25} 1.5054. Insol in water. Miscible with alcohol, ether. MLD (mg/kg) in dogs: 1750 orally; 100 i.v.; in rabbits: 700 s.c. (Barsoum, Saad).

Caution: Irritant; narcotic.

7059. Pentachlorophenol. Penta; PCP; penchlorol; Santophen 20. C_6HCl_5O; mol wt 266.35. C 27.05%, H 0.38%, Cl 66.56%, O 6.01%. Prepd by the chlorination of phenol in the presence of a catalyst.

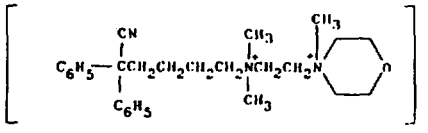


Needle-like crystals, mp 190-191°; bp about 309-310° (dec). d_4^{22} 1.978. Very pungent odor only when hot. Sublimes in needles. Almost insol in water (8 mg in 100 ml); freely sol in alc, ether; sol in benzene; slightly sol in cold petr ether. LD_{50} orally in male, female rats: 146, 175 mg/kg, T. B. Gaines, *Toxicol. Appl. Pharmacol.* **14**, 515 (1969).

Forms a sodium salt, sodium pentachlorophenate; *sodium pentachlorophenoxide, Santobrite, Dowicide G,* which is sol in water.

USE: Insecticide for termite control; pre-harvest defoliant; general herbicide. Has been recommended for use in the preservation of wood, wood products, starches, dextrins, glues. *Caution:* Ingestion causes increase then decrease of respiration, blood pressure, urinary output; fever; increased bowel action; motor weakness; collapse with convulsions and death. Causes lung, liver, kidney damage; contact dermatitis. May be absorbed through skin. More toxic in organic solvents. Dust causes sneezing. *See:* Patty's *Industrial Hygiene and Toxicology,* vol. 2A, G. D. Clayton, F. E. Clayton, Eds. (Wiley-Interscience, New York, 1981) pp 2604-2612.

7060. Pentacynium Bis(methyl sulfate). *4-[2-[(5-Cyano-5,5-diphenylpentyl)dimethylammonio]ethyl]-4-methylmorpholinium bis(methyl sulfate); N¹-*(5-cyano-5,5-diphenylpentyl)-*N¹,N¹,N²*-trimethylethylene-1-ammonium-2-morpholinium bis(methyl sulfate); ethylene-1-[(5-cyano-5,5-diphenylpentyl)dimethylammonium]-(4-methylmorpholinium) bis(methyl sulfate); pentacyone mesylate; Presidal. $C_{29}H_{45}N_3O_9S_2$; mol wt 643.83. C 54.10%, H 7.05%, N 6.53%, O 22.37%, S 9.96%. Prepn: Billinghurst, U.S. pat. 2,851,458 (1958 to Burroughs Wellcome). Ganglionic blocker.

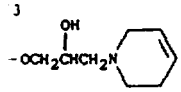


Crystals from ethanol, mp 173-175°. Sol in water.

THERAP CAT: Antihypertensive.

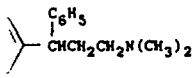
7061. 3-Pentadecylcatechol. *3-Pentadecyl-1,2-benzenediol; 3-pentadecylpyrocatechol;* tetrahydrourushiol; hydrourushiol; dihydrorhengol; 3-PDC. $C_{21}H_{36}O_2$; mol wt 320.50. C 78.69%, H 11.32%, O 9.98%. Constituent of the irritant oil of poison ivy (*Toxicodendron radicans* (L.) Kuntze) and other *Toxicodendron* spp. *(Anacardiaceae).* Prepn by hydrogenation of extracts from fruits of *Semecarpus heterophylla:* Backer, Haack, *Rec. Trav. Chim.* **57**, 225 (1938). Synthesis from 2,3-dimethoxybenzaldehyde and tetradecyl chloride: Mason, *J. Am. Chem. Soc.* **67**, 1538 (1945); from *o*-veratraldehyde: Backer, Haack, *loc. cit.;* Dawson *et al., J. Am. Chem. Soc.* **68**, 534 (1946); Keil *et al.*, U.S. pat. 2,451,955 (1948); from 2,3-dibenzyloxybenzaldehyde: Loev, Dawson, *J. Org. Chem.* **24**, 980 (1959); from furan derivs: Boehme, *J. Am. Chem. Soc.* **82**, 499 (1960); from catechol: Hanafusa, Yukawa, *Chem. & Ind. (London)* **1961**, 23. Criticism of reported syntheses and synthesis of dimethyl deriv: Byck, Dawson, *J. Org. Chem.* **32**, 1084 (1967). Total synthesis: E. Wenkert *et al., J. Am. Chem. Soc.* **105**, 2021 (1983). Evaluation of diagnostic patch test: M. V. Dahl *et al., Arch. Dermatol.* **120**, 1022 (1984).

-Δ³-piperidino-3-*o*-toloxypropa
hydroxy-γ-*o*-toloxypropane; P
wt 247.33. C 72.84%, H 8.56%
Beasley *et al., J. Pharm. Pharm*
(not claimed): Brit. pat. 889,0
g, U.S. pat. 3,085,938 (1962, 19
harmacology: Monacelli, *Path*



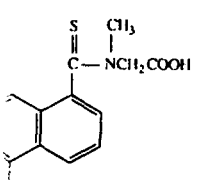
ClNO₂, crystals, dec 136-137
water. pH of a 10% aq soln abo
to heat, but unstable to acids an
mice: 146 ±5.4 mg/kg (Berge

N,N,4-Trimethyl-γ-phenylbenzen
thyl-3-phenyl-3-p-tolylpropylamine
enyl-1-*p*-tolylpropane; Pragma
wt 253.37. C 85.32%, H 9.15%, N
l, Stein, Ger. pat. 925,468 (1955);
Chem. 34, 312 (1966). Pharma
Therapie 15, 119 (1960).



N.HCl, mp 182-184°.
ntihistaminic, antipruritic.

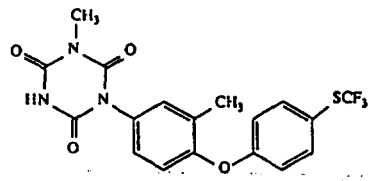
[[6-Methoxy-5-(trifluoromethyl)-1
yl]-N-methylglycine; tolrestatin; AY
F₃NO₃S; mol wt 357.35. C 53.78%
3.92%, O 13.43%, S 8.97%. Orally
nhibitor. Prepn and pharmacology
pat. Appl. 59,596 (1982 to Ayer
255 (1984). Prevention of cataract
Simard-Duquesne *et al., Proc. Ex*
985). Kinetics and metabolism
al., Clin. Pharmacol. Ther. 36, 49
HPLC determn in serum: D.
Drug Monit. 6, 328 (1984). Effe
evels in diabetic patients: P. Rask
Ther. 38, 625 (1985).



₃NO₃S, mp 109-110°.
nt of diabetic neuropathy.

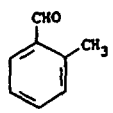
1-Methyl-3-[3-methyl-4-[4-[(trifluo
phenyl]-1,3,5-triazine-2,4,6(1H,3H
-[4-[*p*-[(trifluoromethyl)thio]ph
e-2,4,6(1*H*,3*H*,5*H*)-trione; Ba
₃N₃O₄S; mol wt 425.38. C 50.82%
88%, O 15.04%, S 7.54%. Triazi
eneral prepn: Belg. pat. 826,900;
pat. 3,966,725 (1975, 1976 both
as animal growth promotant: Bel
orn *et al.*, U.S. pat. 4,219,552 (19
ries of articles on efficacy vs coccidi
et al., Wien. Tierärztl. Monatssch.

321-340 (1985). Field trial in sheep: B. Gjerde, O. Helle, *Acta Vet. Scand.* 27, 124 (1986); in chickens: H. D. Chapman, *J. Comp. Path.* 97, 21 (1987).



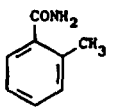
mp 194°.
THERAP CAT (VET): Coccidiostat.

9453. *o*-Tolualdehyde. *2-Methylbenzaldehyde; o*-toluylaldehyde. C_8H_8O; mol wt 120.14. C 79.97%, H 6.71%, O 13.32%. Prepd by reacting nitropropane with *o*-xylyl bromide in the presence of sodium ethanoate: Hass, Bender, *Org. Syn.* 30, 99 (1950).



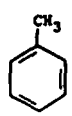
Liquid. d_4^{19} 1.0386. bp_{760} 200-202°; bp_{15} 94-96°; bp_6 68-72°. n_D^{25} 1.5430; n_D^{19} 1.549; n_a^{19} 1.5423; n_β^{19} 1.5650; n_γ^{19} 1.5798.

9454. *o*-Toluamide. *2-Methylbenzamide.* C_8H_9NO; mol wt 135.16. C 71.09%, H 6.71%, N 10.36%, O 11.84%. Prepd by reacting *o*-tolunitrile, hydrogen peroxide, 95% alcohol, and sodium hydroxide at 40-50°: Noller, *Org. Syn.* coll. vol. II, 586 (1943). Also prepared by reacting the nitrile with boron fluoride in dil acetic acid: Hauser, Hoffenberg, *J. Org. Chem.* 20, 1448 (1955).



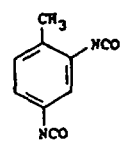
Crystals from water, mp 144-145°. Very sol in alcohol, hot water, concd HCl, less sol in ether. Sparingly sol in benzene. Practically insol in cold water.
Caution: Explosive. Keep away from open flame.

9455. Toluene. *Methylbenzene;* toluol; phenylmethane; Methacide. C_7H_8; mol wt 92.13. C 91.25%, H 8.75%. Obtained mainly from tar oil. Review of mfg processes: Faith, Keyes & Clark's *Industrial Chemicals*, F. A. Lowenheim, M. K. Moran, Eds. (Wiley-Interscience, New York, 4th ed., 1975) pp 822-830. Solubility: F. P. Schwarz, *Anal. Chem.* 52, 10 (1980). Myelotoxic potential: L. Greenburg *et al., J. Am. Med. Assoc.* 118, 573 (1942). Comparison with benzene of effects on hematopoiesis and bone marrow metabolism: H. W. Gerard, *AMA Arch. Ind. Health* 13, 468 (1956). Acute toxicity: H. F. Smyth *et al., Am. Ind. Hyg. Assoc. J.* 30, 470 (1969). Evaluation of chronic occupational exposure: H. Tahti *et al., Int. Arch. Occup. Environ. Health* 48, 61 (1981). *Review:* M. C. Hoff in Kirk-Othmer *Encyclopedia of Chemical Technology* vol. 23 (Wiley-Interscience, New York, 3rd ed., 1983) pp 246-273.



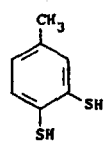
Flammable, refractive liq; benzene-like odor. d_4^{20} 0.866. mp −95°. bp 110.6°. n_D^{20} 1.4967. Flash pt, closed cup: 40°F (4.4°C). Soly in water at 23.5°C (w/w): 0.067%. Very slightly sol in water; misc with alc, chloroform, ether, acetone, glacial acetic acid, carbon disulfide. LD_{50} orally in rats: 7.53 g/kg (Smyth).
Caution: Narcotic in high concns: E. Browning, *Toxicity and Metabolism of Industrial Solvents* (Elsevier, New York, 1965) pp 66-76; Patty's *Industrial Hygiene and Toxicology* vol. 2B, G. D. Clayton, F. E. Clayton, Eds. (Wiley-Interscience, New York, 3rd ed., 1981) pp 3283-3291.
USE: In manuf benzoic acid, benzaldehyde, explosives, dyes, and many other organic compds; as a solvent for paints, lacquers, gums, resins, in the extraction of various principles from plants; as gasoline additive.

9456. Toluene 2,4-Diisocyanate. 2,4-Diisocyanatotoluene; 2,4-tolylene diisocyanate; TDI; Nacconate 100. $C_9H_6N_2O_2$; mol wt 174.15. C 62.07%, H 3.47%, N 16.09%, O 18.37%. Usually prepd from toluene-2,4-diamine and phosgene. *Review:* Astle, *Industrial Organic Nitrogen Compounds* (New York, 1961) pp 284-313; Faith, Keyes & Clark's *Industrial Chemicals*, F. A. Lowenheim, M. K. Moran, Eds. (Wiley-Interscience, New York, 4th ed., 1975) pp 831-835.



Liquid at room temperature. Sharp, pungent odor. mp 19.5-21.5°. d_4^{20} liq 1.2244. bp_{760} 251°; bp_{11} 126°. Darkens on exposure to sunlight. Reacts with water with evolution of carbon dioxide. Flash pt, open cup: 132° (270°F). Misc with alcohol (decompn), diglycol monomethyl ether, ether, acetone, carbon tetrachloride, benzene, chlorobenzene, kerosene, olive oil. Concd alkaline compds such as NaOH or *tert*-amines may cause run-away polymerization.
Caution: Vapor is irritating to eyes, skin and respiratory tract: *Clinical Toxicology of Commercial Products*, R. E. Gosselin *et al.*, Eds. (Williams & Wilkins, Baltimore, 5th ed., 1984) Section II, p 414. This substance may reasonably be anticipated to be a carcinogen: *Fourth Annual Report on Carcinogens* (NTP 85-002, 1985) p 190.
USE: In the manuf of polyurethane foams and other elastomers.

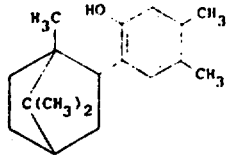
9457. Toluene-3,4-dithiol. 1,2-Dimercapto-4-methylbenzene; "dithiol". $C_7H_8S_2$; mol wt 156.27. C 53.80%, H 5.16%, S 41.04%. Prepd from toluene-3,4-disulfonyl chloride with tin and hydrochloric acid: Mills, Clark, *J. Chem. Soc.* 1936, 178.



Crystals, mp 31°. bp_{84} 185-187°. Sol in benzene, in aq alkali hydroxide solns.
USE: For the detection of bismuth, molybdenum, rhenium, tin, tungsten, *see* Bickford *et al., J. Am. Pharm. Assoc., Sci. Ed.* 37, 255 (1948).

9458. *p*-Toluenesulfinic Acid. $C_7H_8O_2S$; mol wt 156.20. C 53.82%, H 5.16%, O 20.49%, S 20.53%. $CH_3C_6H_4SO_2H$. Prepd by reduction of *p*-toluenesulfonyl chloride with zinc dust: Whitmore, Hamilton, *Org. Syn.* 2, 89 (1922). Because the sulfinic acid is difficult to dry without partial conversion to the sulfonic acid, the sodium salt, $CH_3C_6H_4SO_2Na.2H_2O$, is usually prepd. The free sulfinic acid is then obtained as needed by dissolving the sodium salt in cold water and carefully acidifying the soln with the exact amt of HCl needed.
Long, rhombic plates or needles from water. mp 85°. Freely sol in alc, ether; sparingly sol in water, hot benzene.

9459. *p*-Toluenesulfonic Acid. *4-Methylbenzenesulfonic acid;* tosic acid. $C_7H_8O_3S$; mol wt 172.20. C 48.82%, H 4.68%, O 27.87%, S 18.62%. $CH_3C_6H_4SO_3H$. Prepd by sulfonation of toluene with 96-100% H_2SO_4; when carried out at 75° the compn of the reaction product is 75% *para*-, 19% *ortho*- and 6% *meta*-toluenesulfonic acid. Convenient lab prepn: L. F. Fieser, *Experiments in Organic Chemistry*,

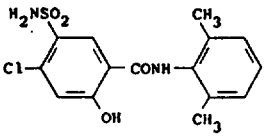


Crystals from petr ether, mp 94-96°, bp_3 165-168°. Also reported as very viscous, pale yellow liquid: bp_9 185-189°. d_4^{20} 1.0240. n_D^{20} 1.5382 (Starkov, Glushkova).

USE: Rubber antioxidant.

THERAP CAT: Antibacterial.

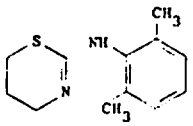
9986. Xipamide. *4-Chloro-5-sulfamoyl-2',6'-salicylox-ylidide;* 4-chloro-2',6'-dimethyl-5-sulfamoylsalicylanilide; 4-chloro-5-sulfamylsalicyloyl-2',6'-dimethylanilide; Bei 1293; Aquaphor; Diurexan; Lumitens. $C_{15}H_{15}ClN_2O_4S$; mol wt 354.81. C 50.78%, H 4.26%, Cl 9.99%, N 7.89%, O 18.04%, S 9.04%. Salicylic acid derivative. Prepn: Neth. pat. Appl. 6,607,680 corresp to Liebenow, U.S. pat. 3,567,777 (1966 and 1970 to P. Beiersdorf). Clinical studies: O. Hammer, U. Dembowski, *Med. Klin.* 64, 1862 (1969); R. Fischer, A. Lenhartz, *Med. Welt* 1970, 270. Review of pharmacology and therapeutic efficacy: B. N. C. Prichard, R. N. Brogden, *Drugs* 30, 313-332 (1985).



Crystals from methanol-water, mp 256°.

THERAP CAT: Diuretic. Antihypertensive.

9987. Xylazine. *N-(2,6-Dimethylphenyl)-5,6-dihydro-4H-1,3-thiazin-2-amine; 5,6-dihydro-2-(2,6-xylidino)-4H-1,3-thiazine;* 2-(2,6-dimethylphenylamino)-4H-5,6-dihydro-1,3-thiazine; BAY 1470; BAY VA 1470; Wh7286; Rompun (also the hydrochloride). $C_{12}H_{16}N_2S$; mol wt 220.33. C 65.42%, H 7.32%, N 12.71%, S 14.55%. Prepn: Behner *et al.*, Ger. pat. 1,173,475 (1964); *C.A.* 61, 13323e (1964); *eidem*, Belg. pat. 634,552 (1964) corresp to U.S. pat. 3,235,550 (1966) (all to Bayer). Pharmacology: G. Sagner *et al.*, *Deut. Tieraerztl. Wochenschr.* 75, 565 (1968); Kronenberg, Schlossman, *Arch. Pharmakol. Exp. Pathol.* 268, 348 (1971). Metabolic studies: Duhm *et al.*, *Berlin. München. Tieraerztl. Wochenschr.* 82, 104 (1969). Veterinary clinical studies: Clarke, Hall, *Vet. Rec.* 85, 512 (1969); Burns, McMullan, *Vet. Med.* 67, 77 (1972).



Colorless, almost tasteless crystals from benzene + ligroin, mp 140-142°. Also reported as mp 136-139°. Soluble in dilute acids, benzene, acetone, chloroform; sparingly sol in petr ether. Practically insol in water, alkalies. LD_{50} in mice (mg/kg): 43 i.v.; 121 s.c.; 240 orally (Sagner).

Hydrochloride, $C_{12}H_{17}ClN_2S$, crystals from ethanol + ethyl ether, mp 236-239°.

THERAP CAT (VET): Sedative, analgesic, muscle relaxant.

9988. Xylene. *Dimethylbenzene;* xylol. C_8H_{10}; mol wt 106.16. C 90.50%, H 9.50%. $C_6H_4(CH_3)_2$. First isolated from a crude wood distillate: Cahours, *Compt. Rend.* 30, 319 (1850). Obtained from coal tar: Fittig, *Ann.* 153, 265 (1870). The xylene of commerce is a mixture of the three isomers *o-*, *m-* and *p*-xylene, the *m*-isomer predominating. Manuf from pseudocumene: Seubold, U.S. pat. 2,960,545 (1960 to Union Oil); by catalytic isomerization of a hydrocarbon fraction: Berger, U.S. pat. 3,078,318 (1963 to Universal Oil Prod.). Separation of isomers by clathration: Schaeffer, U.S. pat. 3,029,300 (1962 to Union Oil). Toxicology: E. Browning, *Toxicity and Metabolism of Industrial Solvents* (Elsevier, New York, 1965) pp 77-89. Use as clearing agent: K. Kubota, *J. Polym. Sci.* 5, 1179 (1967); J. R. Matthews, *J. Clin. Pathol.* 34, 103 (1981). Review of mfg processes: Faith, Keyes & Clark's *Industrial Chemicals*, F. A. Lowenheim, M. K. Moran, Eds. (Wiley-Interscience, New York, 4th ed., 1975) pp 874-881. Toxicity: H. F. Smyth *et al.*, *Am. Ind. Hyg. Assoc. J.* 23, 95 (1962).

Mobile, flammable liquid; d about 0.86; bp 137-140°. Flash pt 29°. Practically insol in water. Miscible with alc, alcohol, ether, and many other organic liquids.

m-Xylene, colorless liquid; d_4^{15} 0.8684; mp −47.4°; bp 139.3°; n_D^{20} 1.4973. Flash pt, closed cup: 77°F (25°C). Insol in water. Miscible with alcohol, ether, and many other organic solvents. LD_{50} orally in rats: 7.71 ml/kg (Smyth).

o-Xylene, colorless liquid; d_4^{20} 0.8801; mp −25°; bp 144°; n_D^{20} 1.5058. Flash pt, closed cup: 63°F (17°C). Insol in water. Miscible with alc, ether.

p-Xylene, colorless plates or prisms at low temp; d 0.86104; mp 13-14°; bp 137-138°; n_D^{20} 1.49575: Thorne *et al.*, *Ind. Eng. Chem. Anal. Ed.* 17, 481 (1945). Flash pt, closed cup: 77°F (25°C). Insol in water. Sol in alcohol, ether, and many other organic solvents.

Caution: May be narcotic in high concns. Chronic toxicity not well defined, but is less toxic than benzene.

USE: As solvent; raw material for production of benzoic acid, phthalic anhydride, isophthalic and terephthalic acids as well as their dimethyl esters used in the manufacture of polyester fibers; manuf dyes and other organics; sterilizing catgut; with Canada balsam as oil-immersion in microscopy, clearing agent in microscope technique.

9989. Xylenol. *Dimethylphenol.* $C_8H_{10}O$; mol wt 122.16. C 78.65%, H 8.25%, O 13.10%. $(CH_3)_2C_6H_3OH$. Constituent of "cresylic acid." There are 6 isomers of xylenol. They are only slightly sol in water but freely sol in alcohol, chloroform, ether, benzene, etc.; also sol in NaOH soln. Prepn and physical properties: R. J. L. Andon *et al.*, *J. Chem. Soc.* 1960, 5246.

2,3-Dimethylphenol, *vic-o-xylenol.* Needles from water or dil alc, mp 75°, bp 218°: Thöl, *Ber.* 18, 2561 (1885); also reported as mp 72.57° ±0.02°, bp_{760} 216.87° ±0.001° (Andon).

2,4-Dimethylphenol, *as-m-xylenol.* Crystals, bp_{766} 211.5°; mp 25.4-26°: Jacobsen, *Ber.* 11, 17 (1887); 18, 3463 (1885); also reported as mp 24.54° ±0.01°, bp_{760} 210.931° ±0.001° (Andon).

2,5-Dimethylphenol, *p-xylenol.* Crystals from alcohol + ether, mp 74.5°, bp_{762} 211.5°: Jacobsen, *loc. cit.* bp 213.5°; Würtz, *Ann.* 147, 372 (1868); also reported as mp 74.85° ±0.02°, bp_{760} 211.132° ±0.002° (Andon).

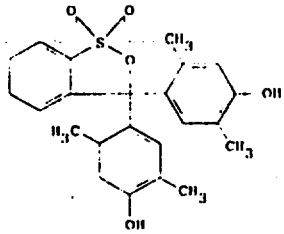
2,6-Dimethylphenol, *vic-m-xylenol.* Needles, mp 49°, bp 203°: Gattermann, *Ann.* 357, 313 (1907); also reported as mp 45.62° ±0.01°, bp_{760} 201.030° ±0.001° (Andon).

3,4-Dimethylphenol, *as-o-xylenol.* Needles from water, mp 62.5°, bp 225°: Jacobsen, *Ber.* 17, 159 (1884); also reported as mp 65.11° ±0.01°, bp_{760} 226.947° ±0.001° (Andon).

3,5-Dimethylphenol, *sym-m-xylenol.* Needles from water, mp 64°, bp 219.5°: Thöl, *Ber.* 18, 359 (1885); also reported as mp 63.27° ±0.02°, bp_{760} 221.962° ±0.003° (Andon).

USE: For the prepn of coal tar disinfectants: manuf of artificial resins.

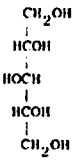
9990. Xylenol Blue. *4,4'-(3H-2,1-Benzoxathiol-3-ylidene)bis[2,5-dimethylphenol] S,S-dioxide; p*-xylenolsulfonephthalein; 1,4-dimethyl-5-hydroxybenzenesulfonephthalein; α,4,4'-trihydroxy-2,5,2',5'-tetramethyltriphenylmethane-



sulfonic acid γ-sultone. $C_{23}H_{22}O_5S$
30%, H 5.40%, O 19.49%, S 7.81%.
benzoic acid dichloride or *o*-sulfobenzoic
xylenol in the presence of zinc chloride
31 (1922).
brown crystals from alcohol.
Indicator, used in 0.02% soln:
9.6 blue.

Xylidine. *ar,ar-Dimethylbenz*
aminodimethylbenzene. $C_8H_{11}N$
H 9.15%, N 11.56%. $(CH_3)_2C_6$
meric xylidines. Prepd by reducti
compounds: Allchin, U.S. pat.
ical properties of all six isomers also
Chem. Soc. 71, 1362 (1949); va
Chim. 79, 977 (1960); Bergmann
26, 919 (1961).
all except *o*-4-xylidine are liquids abo
bp between 213° and 226°. They
sol in alcohol and form more or l
mineral acids.
Chiefly in the manuf of dyes.

Xylitol. *xylo*-Pentane-1,2,3,
Kannit; Klinit; Kylit; Newtol;
C_5O_5; mol wt 152.15. C 39.47%, H 7.9
diate in metabolism of D-glucose
in livers. Prepd by reduction of x
Soc. Chim. France [3] 5, 555 (18
Ber. 24, 538 (1891). Prepn of
Wolfrom, E. J. Kohn, *J. Am.*
of stable form: J. F. Carson
Crystal structure: H. S. Kim,
Crystallogr. 25B, 2607 (1969). Use in
E. Grunberg *et al.*, *Int. J. Vit.*
A. Scheinin, K. K. Makinen,
to Hoffmann-La Roche), *C.A.*
Acute toxicity: S. Salminen *et al.*, *Toxico*
(1983). Reviews of toxicity, metabo
additive: *International Symposi*
Physiology and Clinical Uses of Pentoses
Horecker *et al.*, Eds. (Springer-Verlag, N
Sugars in Nutrition, H. L. Sipple, K
(Academic Press, New York, 1974) *pass*
Lopoulos, H. Amos, *World Rev. Nut*
(1978); R. Ylikahri, *Adv. Food Res.* 2
Xylitol, J. N. Counsel, Ed. (Appli
191 pp.



ble form: orthorhombic needles
ethanol; mp 93-94.5°; d 1.52. Meta
monoclinic, lath-shaped crystal
hanol; hygroscopic; mp 61-61.5°.
00 g soln): abs methanol 6.0; abs
Relative sweetness equal to sucr
approx. 22 g/kg (Salminen).
As oral and intravenous nutrient:

Xylometazoline. *2-[[4-(1,1-I*
thylphenyl]methyl]-4,5-dihydro-1H
utyl-2,6-dimethylbenzyl)-2-imida
wt 244.37. C 78.63%, H 9.90%,
U.S. pat. 2,868,802 (1959 to Ciba
Morimoto, Tanaka, *C.A.* 72, 2

Reference 36

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March 1991

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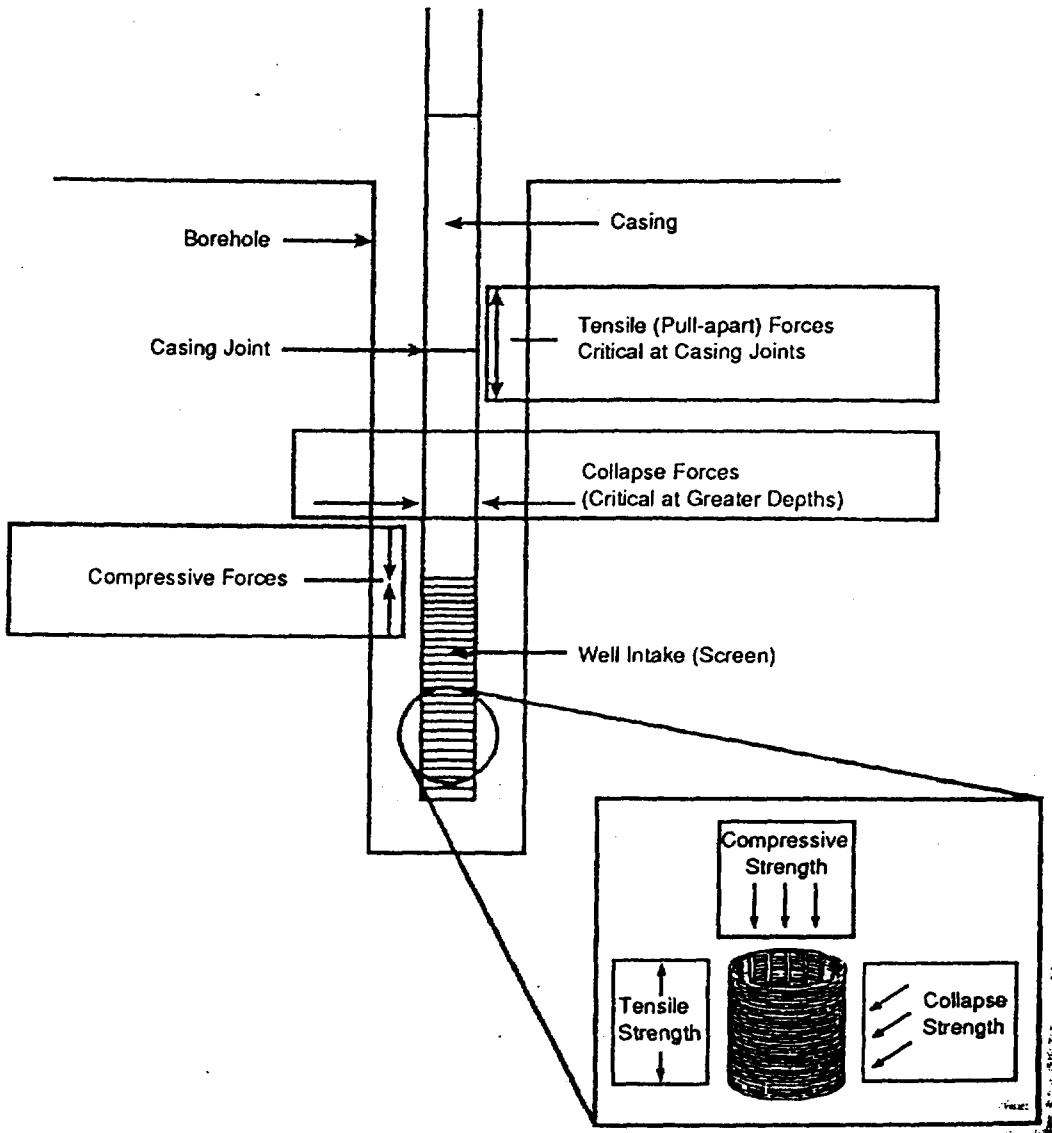
Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells



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March 1991

Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells

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aries of contaminant plumes. The dissolved portion of certain organic contaminant plumes can also have a density similar to water and migrate with the ground water. Monitoring and detection schemes for plumes of these contaminants must be based on the calculated effects of advection, dispersion, chemical attenuation and subsurface hydrogeology.

Relatively Immiscible/Insoluble Contaminants —

In both the saturated and unsaturated zones, immiscible compounds exist as either free liquids or as dissolved constituents depending on the relative solubility of the contaminant. The migration of dissolved constituents in the aqueous phase is primarily governed by the processes of advection-dispersion and biological/chemical attenuation (Schwarzenbach and Giger, 1985). The distribution of free liquids is complexly interrelated to capillary pressure, density (gravitational forces) and viscosity (shear forces) (Kovski, 1984; Villaume, 1985). The relative density of the contaminant affects the occurrence and movement of the contaminant in the subsurface and must be considered when locating monitoring wells and when determining the interval(s) to be screened in the aquifer.

Figure 18 illustrates the migration of a low density, immiscible contaminant. The contaminant moves downward through the vadose zone and accumulates at the top of the water table and/or within the capillary fringe. A residual amount of fluid is retained in the vadose zone in response to surficial and interstitial forces (Kovski, 1984; Yaniga and Warburton, 1984). The contaminant plume accumulates on the water table and typically elongates parallel to the direction of ground-water flow (Gillham et al., 1983). The movement and accumulation of immiscible hydrocarbons in the subsurface has been discussed by Blake and Hall (1984), Kovski (1984), Yaniga and Warburton (1984), and Hinchee and Reisinger (1985). Depending on the physical properties of the contaminant, a volatile gas phase may accumulate in the unsaturated zone.

Monitoring wells designed to detect or assess low density immiscible contaminants should be screened in the upper part of the aquifer. In many instances the screen should span the vadose zone and the upper portion of the aquifer to allow the floating contaminant to enter the well. Many immiscible contaminants depress the water table in the well and create an apparent free liquid thickness that is greater than the thickness of the floating contaminant within the aquifer. Where volatiles accumulate in the vadose zone, an explosion hazard may exist. Various mapping and detection techniques including soil-gas sampling and geophysical techniques can be utilized in planning the monitoring well locations to intercept the plume and reduce the risk of an explosion (Noel et al., 1983; Andres and Canace, 1984; Marrin and Thompson, 1984; Saunders and Germeroth, 1985; Lithland et al., 1985).

High density immiscible fluids are called dense non-aqueous phase liquids (DNAPLs). DNAPLs include most halogenated hydrocarbons and other aliphatic compounds because the density of most organic compounds is significantly greater than water. A density difference of one percent or greater has been shown to cause migration of contaminants in the subsurface (Mackay et al., 1985).

Figure 19 illustrates the movement of DNAPLs in the subsurface. Movement of DNAPLs in the unsaturated zone is primarily governed by capillary forces and density (Villaume, 1985). The contaminant sinks through the aquifer and pools at the bottom of the aquifer on top of the lower permeability boundary (Schwille, 1981). The pool of contaminant migrates in response to the topography of the lower permeability boundary independent of regional ground-water flow. Residual material is retained in the pore space of the unsaturated and saturated zones. This residual typically occurs as discrete fingers of globules. The formation and movement of the globules in the subsurface depends on the extant pore-size distribution and capillary forces (Schwille, 1981; Villaume, 1985). As much as five percent by volume of a compound may be retained in the aquifer after plume migration.

Both residual contaminant and the contaminant plume may continue to contribute dissolved constituents to the ground water for an extended period of time. Thus, small spills of persistent compounds have the ability to extensively contami-

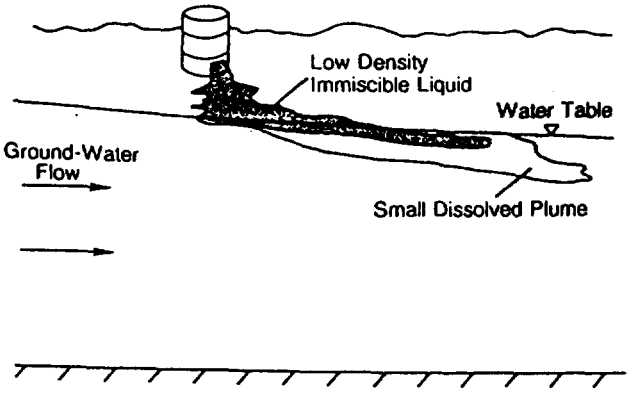

Figure 18. Migration of a low density, immiscible contaminant in the subsurface.

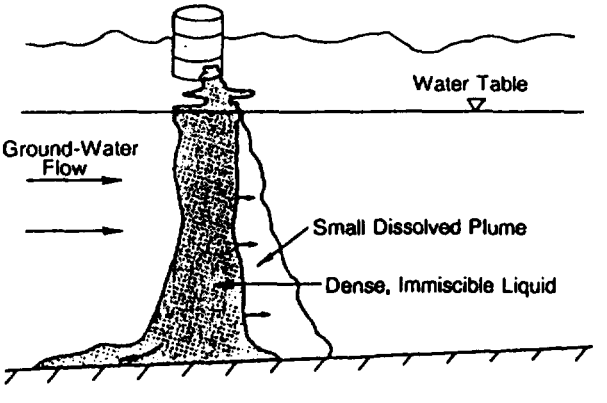

Figure 19. Migration of a dense, non-aqueous phase liquid (DNAPL) in the subsurface.

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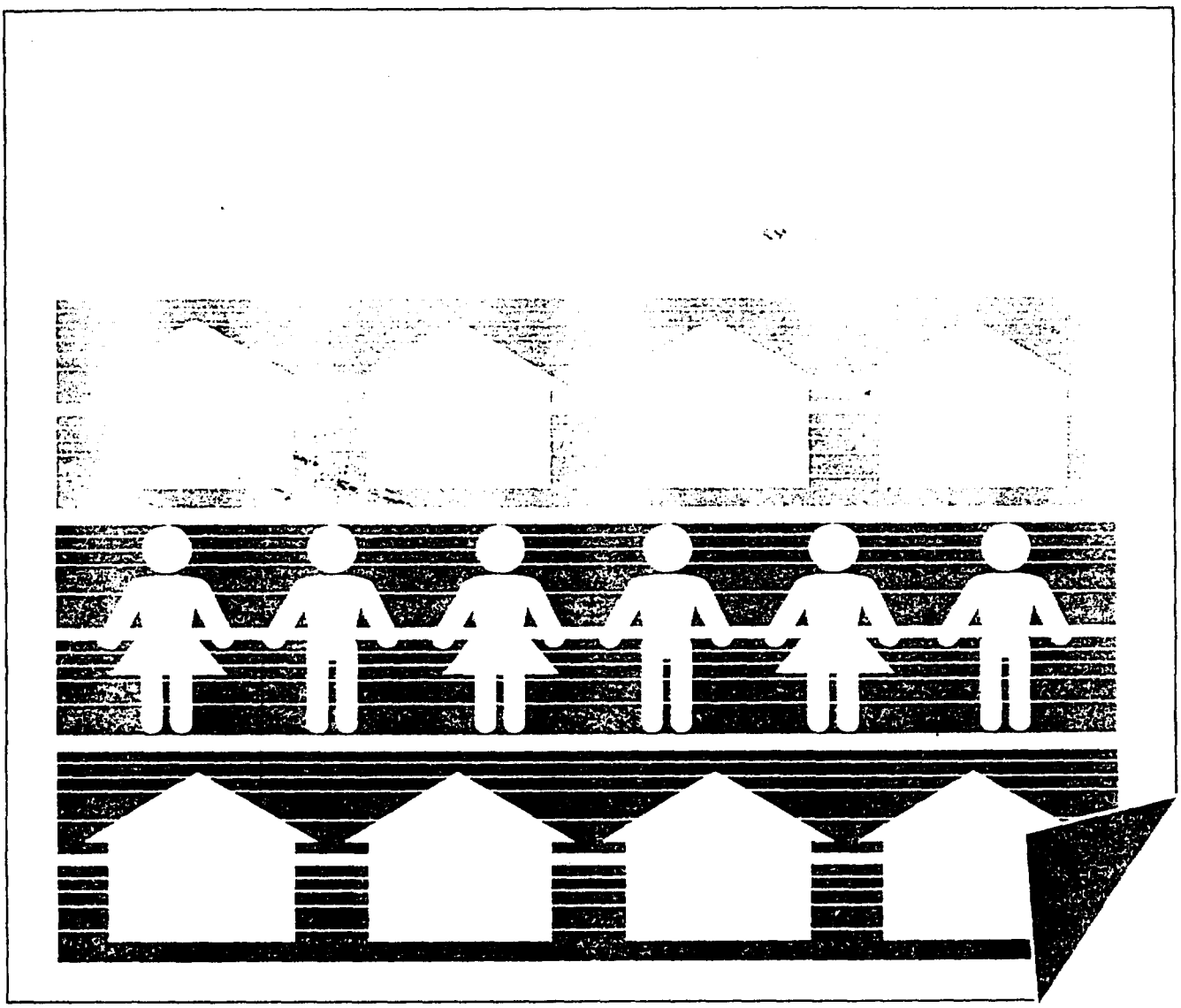

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Table 5. Household, Family, and Group Quarters Characteristics: 1990—Con.

[For definitions of terms and meanings of symbols, see text]

State County County Subdivision Place	Persons in households	All households	Family households			Nonfamily households				Persons per—		Persons in group quarters		
							Householder living alone							
								65 years and over						
			Total	Married-couple family	Female householder, no husband present	Total	Total	Total	Female	Household	Family	Total	Institutionalized persons	Other persons in group quarters
Brevard County—Con.														
West Brevard division	1 811	598	538	489	27	60	45	8	6	3.03	3.17	9	–	9
June Park CDP (pt.)	504	169	157	137	11	12	8	2	1	2.98	3.04	–	–	–
Melbourne city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Palm Bay city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
West Melbourne city (pt.)	4	1	1	1	–	–	–	–	–	4.00	4.00	–	–	–
Broward County	1 239 535	528 442	335 022	263 624	52 923	193 420	155 961	75 919	59 752	2.35	2.91	15 953	11 419	4 534
Conservation division	28	17	4	3	1	13	9	–	–	1.65	2.75	212	–	212
Davie division	99 861	37 545	27 896	23 053	3 557	9 649	7 211	2 407	1 813	2.66	3.07	565	126	439
Cooper City city	20 774	6 976	5 835	5 045	602	1 141	889	313	229	2.98	3.27	17	–	17
Davie town (pt.)	46 803	17 854	12 729	10 080	1 954	5 125	3 685	1 059	830	2.62	3.06	314	106	208
Pembroke Pines city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Pine Island Ridge CDP	5 244	2 611	1 650	1 401	201	961	832	348	273	2.01	2.49	–	–	–
Sunrise city (pt.)	2 025	702	576	503	52	126	73	7	5	2.88	3.14	–	–	–
Deerfield Beach division	99 151	44 584	27 383	22 601	3 467	17 201	14 192	8 271	6 583	2.22	2.80	590	513	77
Coconut Creek city (pt.)	5 642	2 420	1 599	1 330	189	821	584	192	138	2.33	2.77	–	–	–
Coral Springs city (pt.)	7 533	2 193	2 001	1 886	86	192	121	10	8	3.44	3.60	–	–	–
Deerfield Beach city	46 177	23 118	12 691	10 339	1 713	10 427	8 812	5 712	4 632	2.00	2.62	148	118	30
Hillsboro Beach town	1 748	1 001	600	556	31	401	365	250	197	1.75	2.17	–	–	–
Lighthouse Point city	10 378	4 967	3 118	2 740	279	1 849	1 589	974	804	2.09	2.61	–	–	–
Parkland city	3 558	1 044	975	914	44	69	53	6	2	3.41	3.50	–	–	–
Pompano Beach Highlands CDP	17 506	6 537	4 558	3 304	898	1 979	1 533	739	513	2.68	3.13	409	395	14
Fort Lauderdale division	268 035	118 945	65 698	46 374	14 294	53 247	41 709	16 292	12 538	2.25	2.95	6 339	4 623	1 716
Broadview-Pompano Park CDP (pt.)	566	368	169	138	24	199	186	126	90	1.54	2.08	–	–	–
Browardale CDP	6 212	1 721	1 460	832	508	261	206	57	39	3.61	3.91	45	30	15
Fort Lauderdale city (pt.)	144 355	66 440	34 127	23 794	7 515	32 313	25 369	9 086	6 813	2.17	2.91	5 022	3 661	1 361
Lauderdale-by-the-Sea town	2 990	1 775	814	697	85	961	851	483	366	1.68	2.29	–	–	–
Lauderdale Lakes city (pt.)	26 444	11 708	7 050	5 066	1 547	4 658	3 935	2 640	2 192	2.26	2.87	361	361	–
Lauderhill city (pt.)	569	292	129	67	43	163	126	11	11	1.95	2.66	–	–	–
Lazy Lake village	33	14	8	6	2	6	5	2	1	2.36	2.75	–	–	–
Melrose Park CDP	6 461	1 930	1 513	1 016	386	417	307	110	86	3.35	3.72	16	13	3
North Andrews Gardens CDP	9 002	3 443	2 396	1 838	389	1 047	731	307	257	2.61	3.06	–	–	–
North Lauderdale city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Oakland Park city	25 931	12 097	6 213	4 372	1 289	5 884	4 226	1 101	844	2.14	2.80	395	147	248
Plantation city (pt.)	17	4	3	2	–	1	1	–	–	4.25	5.33	27	27	–
Pompano Beach city (pt.)	4 869	2 719	1 535	1 395	96	1 184	934	360	285	1.79	2.21	–	–	–
Riverland CDP	5 376	2 069	1 513	1 211	198	556	368	135	96	2.60	2.95	–	–	–
Sea Ranch Lakes village	619	256	194	171	15	62	50	28	21	2.42	2.78	–	–	–
Tamarac city (pt.)	5 203	2 930	1 431	1 143	195	1 499	1 263	865	698	1.78	2.34	32	–	32
Washington Park CDP	6 854	2 217	1 578	716	734	639	506	143	99	3.09	3.68	76	56	20
Wilton Manors city	11 457	5 430	2 790	2 038	534	2 640	2 033	599	462	2.11	2.79	347	328	19
Hallandale division	42 487	21 634	11 614	9 083	1 864	10 020	8 949	6 129	4 715	1.96	2.63	536	140	396
Hallandale city (pt.)	30 588	17 057	8 462	6 802	1 230	8 595	7 783	5 532	4 303	1.79	2.44	284	140	144
Miami Gardens-Utopia-Carver CDP (pt.)	4 321	1 328	1 020	552	388	308	249	111	83	3.25	3.71	84	–	84
Pembroke Park town (pt.)	2 873	1 617	886	767	70	731	623	345	230	1.78	2.26	154	–	154
Hollywood division	147 366	64 811	39 041	29 914	6 690	25 770	21 452	11 004	8 462	2.27	2.90	1 902	1 103	799
Dania city	12 679	5 794	3 268	2 210	799	2 526	1 981	768	543	2.19	2.83	345	252	93
Davie town (pt.)	100	53	26	23	1	27	22	8	2	1.89	2.46	–	–	–
Fort Lauderdale city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Hallandale city (pt.)	124	78	25	20	4	53	45	36	30	1.59	2.48	–	–	–
Hollywood city	120 545	52 904	31 969	24 819	5 246	20 935	17 674	9 477	7 368	2.28	2.91	1 152	803	349
Pembroke Pines city (pt.)	129	102	20	19	–	82	82	75	60	1.26	2.35	–	–	–
Margate division	164 610	63 323	46 045	38 158	5 760	17 278	13 444	6 577	5 372	2.60	3.03	305	285	20
Broadview-Pompano Park CDP (pt.)	3 778	1 295	969	725	170	326	238	84	65	2.92	3.31	–	–	–
Coconut Creek city (pt.)	5 347	2 464	1 543	1 236	227	921	636	93	71	2.17	2.62	–	–	–
Coral Springs city (pt.)	71 855	24 821	19 133	15 706	2 589	5 688	4 348	1 660	1 405	2.89	3.31	55	35	20
Margate city	42 854	18 930	12 585	10 607	1 396	6 345	5 327	3 435	2 776	2.26	2.75	131	131	–
North Lauderdale city (pt.)	22 612	7 445	5 774	4 466	930	1 671	989	119	100	3.04	3.36	–	–	–
Tamarac city (pt.)	18 164	8 368	6 041	5 418	448	2 327	1 906	1 186	955	2.17	2.51	119	119	–
Miramar-Pembroke Pines division	110 307	42 933	31 223	25 311	4 550	11 710	9 384	4 354	3 472	2.57	3.01	1 442	1 276	166
Davie town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Miami Gardens-Utopia-Carver CDP (pt.)	3 043	958	774	525	183	184	135	56	44	3.18	3.47	–	–	–
Miramar city	40 663	14 395	11 077	8 561	1 914	3 318	2 544	918	701	2.82	3.20	–	–	–
Pembroke Park town (pt.)	1 808	699	443	251	162	256	185	16	10	2.59	3.17	98	–	98
Pembroke Pines city (pt.)	63 979	26 620	18 702	15 762	2 282	7 918	6 493	3 362	2 715	2.40	2.87	1 344	1 276	68
Plantation division	209 729	89 024	59 473	48 460	8 413	29 551	23 956	12 383	10 027	2.36	2.86	1 568	1 452	116
Broadview Park CDP	6 039	2 037	1 534	1 086	324	503	358	123	92	2.96	3.32	70	6	64
Broadview-Pompano Park CDP (pt.)	886	309	226	179	24	83	44	8	5	2.87	3.23	–	–	–
Davie town (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Lauderdale Lakes city (pt.)	536	254	129	46	72	125	106	30	22	2.11	2.95	–	–	–
Lauderhill city (pt.)	48 702	20 839	13 107	9 659	2 706	7 732	6 308	2 949	2 310	2.34	2.91	437	417	20
North Lauderdale city (pt.)	3 894	1 626	1 071	846	159	555	383	138	111	2.39	2.84	–	–	–
Plantation city (pt.)	66 201	26 485	18 681	15 675	2 294	7 804	6 075	2 265	1 877	2.50	2.97	447	447	–
Sunrise city (pt.)	61 893	25 612	17 647	14 667	2 278	7 965	6 533	3 939	3 229	2.42	2.91	489	457	32
Tamarac city (pt.)	21 179	11 608	6 948	6 176	554	4 660	4 033	2 830	2 291	1.82	2.25	125	125	–
Pompano Beach division	97 961	45 626	26 645	20 667	4 327	18 981	15 655	8 502	6 770	2.15	2.73	2 494	1 901	593
Coconut Creek city (pt.)	16 496	8 691	5 444	4 909	414	3 247	2 886	2 122	1 789	1.90	2.34	–	–	–
Collier Manor-Cresthaven CDP	7 322	3 091	1 865	1 426	291	1 226	966	566	452	2.37	2.97	–	–	–
Fort Lauderdale city (pt.)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Kendall Green CDP	3 815	1 717	1 036	831	134	681	555	374	303	2.22	2.73	–	–	–
Pompano Beach city (pt.)	65 048	29 438	16 911	12 434	3 274	12 527	10 211	4 973	3 863	2.21	2.84	2 494	1 901	593
Calhoun County	9 998	3 793	2 784	2 148	506	1 009	920	474	358	2.64	3.13	1 013	1 013	–
Altha division	1 876	694	516	413	78	178	162	83	55	2.70	3.20	13	13	–
Altha town	497	193	128	93	28	65	60	38	32	2.58	3.23	–	–	–
Blountstown division	5 798	2 205	1 592	1 167	353	613	560	299	235	2.63	3.15	1 000	1 000	–
Blountstown city	2 358	916	633	376	228	283	270	161	126	2.57	3.20	46	46	–
Calhoun West division	2 324	894	676	568	75	218	198	92	68	2.60	3.03	–	–	–
Charlotte County	108 214	48 433	35 325	31 392	2 914	13 108	11 143	7 263	5 492	2.23	2.59	2 761	2 542	219
Grove City-Rotonda division	22 637	10 414	7 796	7 128	489	2 618	2 208	1 440	1 046	2.17	2.47	111	110	1
Englewood CDP (pt.)	4 846	2 455	1 708	1 575	105	747	679	488	373	1.97	2.33	100	100	–
Grove City CDP	2 374	1 152	791	705	58	361	300	194	138	2.06	2.41	–	–	–
Manasota Key CDP	1 395	752	479	443	27	273	225	136	107	1.86	2.21	–	–	–
Rotonda CDP	3 576	1 676	1 267	1 183	60	409	353	258	190	2.13	2.41	–	–	–
Port Charlotte division	60 570	26 456	19 189	16 798	1 785	7 267	6 164	4 119	3 239	2.29	2.67	723	706	17
Charlotte Harbor CDP	2 921	1 549	860	724	90	689	599	418	359	1.89	2.42	406	395	11
Harbour Heights CDP	2 392	1 013	798	727	50	215	163	92	70	2.36	2.61	131	131	–
Port Charlotte CDP	41 355	18 182	12 994	11 245	1 324	5 188	4 493	3 159	2 467	2.27	2.68	180	180	–

Table 2. **Age: 1990**—Con.

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	All persons	Age												
		Under 5 years	16 years and over	18 years and over	18 to 20 years	21 to 24 years	25 to 44 years	45 to 54 years	55 to 59 years	60 to 64 years	65 years and over	75 years and over	85 years and over	Median age
PLACE AND COUNTY SUBDIVISION—Con.														
Florida Ridge CDP, Indian River County	12 218	807	9 700	9 420	352	446	3 388	896	516	781	3 041	1 058	168	38.8
Forest City CDP, Seminole County	10 638	604	8 567	8 186	444	582	3 663	1 205	500	407	1 385	668	234	34.5
Forest Island Park CDP, Lee County	5 988	184	5 485	5 427	86	150	1 228	528	353	683	2 399	727	70	60.8
Fort Lauderdale city, Broward County	149 377	9 084	124 103	121 321	5 025	7 794	51 934	15 864	6 695	7 447	26 562	12 904	3 351	37.3
Fort Meade city, Polk County	4 976	414	3 724	3 566	232	300	1 234	507	214	241	838	381	79	33.5
Fort Myers city, Lee County	45 206	3 833	34 865	33 683	2 047	3 104	13 948	3 804	1 718	1 794	7 268	3 686	1 062	32.1
Fort Myers Beach CDP, Lee County	9 284	216	8 678	8 601	145	239	1 811	1 017	680	1 045	3 664	1 273	192	60.4
Fort Myers Shores CDP, Lee County	5 460	363	4 086	3 929	206	233	1 710	556	245	248	731	274	50	33.5
Fort Pierce city, St. Lucie County	36 830	3 103	28 101	27 156	1 513	1 983	9 815	3 267	1 571	1 954	7 053	2 927	589	34.4
Fort Pierce North CDP, St. Lucie County	5 833	461	4 285	4 057	280	270	1 487	616	257	252	895	328	63	33.0
Fort Pierce South CDP, St. Lucie County	5 320	408	4 125	3 982	241	347	1 633	560	244	252	705	247	43	33.3
Fort Walton Beach city, Okaloosa County	21 471	1 441	16 952	16 377	911	1 430	6 727	2 471	1 345	1 093	2 400	708	141	33.3
Fort White town, Columbia County	268	24	186	172	7	12	68	22	8	18	37	11	2	29.7
Freeport city, Walton County	843	48	661	635	42	46	244	108	40	42	113	40	7	35.4
Frostproof city, Polk County	2 808	191	2 171	2 093	97	146	709	275	128	161	577	268	37	37.5
Fruit Cove CDP, St. Johns County	5 904	372	4 493	4 298	208	167	1 987	743	240	219	734	438	190	37.2
Fruitland Park city, Lake County	2 754	163	2 089	2 005	121	111	877	292	114	125	365	147	32	34.9
Fruitville CDP, Sarasota County	9 808	880	7 360	7 112	303	375	3 693	907	381	396	1 057	447	131	33.2
Fussels Corner CDP, Polk County	3 840	337	2 815	2 718	181	211	1 111	387	192	200	436	119	17	31.2
Gainesville city, Alachua County	84 770	4 997	69 923	68 172	12 315	10 795	25 938	6 138	2 463	2 544	7 979	3 412	813	26.7
Gandy CDP, Pinellas County	3 164	46	3 064	3 052	39	276	1 332	223	102	185	895	403	72	39.6
Gibsonia CDP, Polk County	5 168	283	4 134	3 987	236	231	1 475	610	266	282	887	316	57	38.0
Gibsonton CDP, Hillsborough County	7 706	713	5 799	5 609	354	490	2 415	839	341	343	827	284	50	31.4
Gifford CDP, Indian River County	6 278	505	4 676	4 466	290	364	1 700	592	283	268	969	502	209	31.9
Gladeview CDP, Dade County	15 637	1 738	10 460	9 864	722	935	4 023	1 316	716	661	1 491	568	111	26.7
Glencoe CDP, Volusia County	2 282	137	1 840	1 784	73	82	675	265	146	152	391	134	26	39.7
Glen Ridge town, Palm Beach County	207	6	178	175	5	16	58	24	11	18	43	15	2	41.9
Glen St. Mary town, Baker County	480	41	337	322	20	26	132	49	20	18	57	20	2	29.7
Glenvar Heights CDP, Dade County	14 823	758	12 860	12 606	518	1 263	5 775	1 602	652	723	2 073	826	172	35.0
Golden Beach town, Dade County	774	44	627	606	26	30	214	99	39	47	151	67	21	41.5
Golden Gate CDP, Collier County	14 148	1 407	10 276	9 966	571	959	5 410	1 121	396	419	1 090	328	45	28.9
Golden Glades CDP, Dade County	25 474	2 116	19 541	18 878	984	1 473	8 981	2 406	957	1 017	3 060	1 417	454	32.8
Golden Lakes CDP, Palm Beach County	3 867	107	3 603	3 582	76	132	624	178	76	184	2 312	1 131	90	68.9
Goldenrod CDP	12 362	782	9 863	9 531	617	1 152	4 427	1 245	539	506	1 045	344	69	31.1
Orange County	5 760	353	4 842	4 712	388	835	2 122	477	199	186	505	169	34	28.9
Seminole County	6 602	429	5 021	4 819	229	317	2 305	768	340	320	540	175	35	33.5
Golf village, Palm Beach County	234	2	224	221	1	7	22	17	11	20	143	55	7	68.3
Golfview town, Palm Beach County	153	5	135	129	7	8	37	30	5	13	29	8	3	45.2
Gonzalez CDP, Escambia County	7 669	584	5 675	5 446	318	347	2 623	957	340	323	538	166	35	32.9
Goulding CDP, Escambia County	4 159	241	3 398	3 251	190	202	1 052	400	204	191	1 012	547	171	38.4
Goulds CDP, Dade County	7 284	914	4 649	4 383	336	414	1 853	641	301	267	571	207	37	24.9
Graceville city, Jackson County	2 675	212	2 023	1 932	139	136	678	222	98	117	542	292	86	33.6
Grand Ridge town, Jackson County	536	31	418	401	26	37	149	62	16	31	80	41	5	35.0
Greater Northdale CDP, Hillsborough County	16 318	1 228	11 840	11 260	627	649	6 648	1 866	443	346	681	192	29	31.9
Greenacres City city, Palm Beach County	18 683	1 111	15 567	15 234	579	1 015	5 831	1 598	740	1 186	4 285	1 314	150	38.2
Green Cove Springs city, Clay County	4 497	337	3 436	3 296	196	216	1 301	405	205	238	735	337	94	34.0
Greensboro town, Gadsden County	586	43	435	414	19	44	149	70	28	22	82	28	5	31.4
Greenville town, Madison County	950	104	685	646	45	44	191	82	28	46	210	111	31	32.5
Greenwood town, Jackson County	474	28	369	357	9	11	138	55	18	26	100	48	10	39.6
Gretna city, Gadsden County	1 981	218	1 257	1 171	127	123	505	159	68	46	143	45	7	22.7
Grove City CDP, Charlotte County	2 374	71	2 146	2 119	59	62	433	216	149	253	947	404	55	60.3
Groveland city, Lake County	2 300	213	1 665	1 599	100	129	626	227	106	111	300	127	28	31.4
Gulf Breeze city, Santa Rosa County	5 530	286	4 456	4 310	205	186	1 552	814	388	370	795	271	64	40.6
Gulf Gate Estates CDP, Sarasota County	11 622	402	10 340	10 176	259	484	2 737	991	523	726	4 456	2 578	693	53.8
Gulfport city, Pinellas County	11 727	548	10 184	10 024	284	468	2 971	885	484	755	4 177	2 150	524	49.8
Gulf Stream town, Palm Beach County	690	27	609	594	12	14	136	77	44	55	256	121	26	56.1
Haines City city, Polk County	11 683	980	8 604	8 284	456	602	3 108	933	518	596	2 071	850	164	32.4
Hallandale city, Broward County	30 996	1 073	28 188	27 855	610	948	5 498	2 213	1 416	2 134	15 036	8 979	1 923	64.0
Hammocks CDP, Dade County	10 897	947	8 390	8 141	436	939	5 007	857	260	226	416	114	16	28.9
Hampton city, Bradford County	296	16	230	226	13	9	76	31	18	23	56	17	4	37.9
Hamptons at Boca Raton CDP, Palm Beach County	11 686	383	10 583	10 485	155	131	1 671	527	301	703	6 997	3 053	338	68.8
Harbor Bluffs CDP, Pinellas County	2 659	88	2 343	2 305	63	75	574	333	209	216	835	377	79	52.8
Harbour Heights CDP, Charlotte County	2 523	113	2 155	2 115	46	58	523	227	179	264	818	328	84	55.0
Harlem CDP, Hendry County	2 826	345	1 735	1 624	156	125	707	234	92	86	224	77	13	22.9
Hastings town, St. Johns County	595	58	432	416	30	34	151	53	22	31	95	43	14	30.9
Havana town, Gadsden County	1 654	118	1 273	1 236	78	90	446	166	72	82	302	143	36	35.8
Haverhill town, Palm Beach County	1 058	65	835	804	42	61	360	145	63	42	91	34	13	34.7

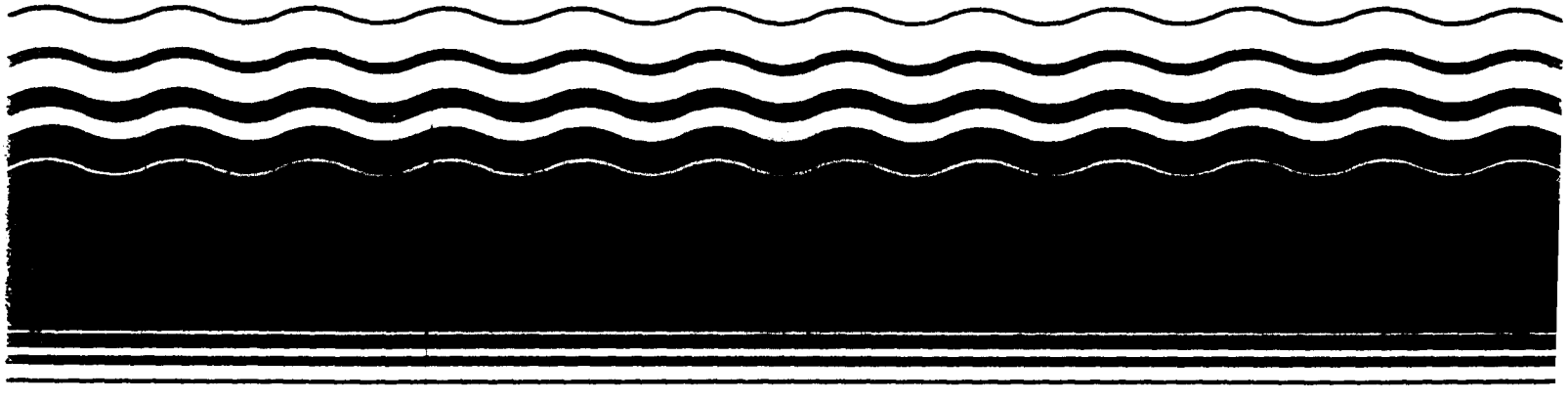
Reference 39

Office of Emergency and
Remedial Response
Washington, DC 20460

EPA/540/G-91/013
September 1991

EPA

Guidance for Performing Preliminary Assessments Under CERCLA



Reference 40

Federal Register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

Section 3.3.2.1 Level of contamination. Explains how to evaluate population based on concentrations of hazardous substances in samples. Text was added to assign Level II contamination to any drinking water wells where there is an observed release by direct observation.

Section 3.3.2.2 Level I concentrations. Explains how to evaluate populations exposed to Level I concentrations. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 10.

Section 3.3.2.3 Level II concentrations. Explains how to evaluate populations exposed to Level II concentrations. The scoring cap was eliminated, and the multiplier (i.e., weight) is now 1.

Section 3.3.2.4 Potential contamination. Explains how to assign values to populations potentially exposed to contamination from the site. The formula for calculating population values has been modified to reflect both the revised method for evaluating karst aquifers (see below) and the use of distance-weighted population values from Table 3–12, which has been added to assign distance-weighted values for populations in each distance category. The values are determined for each distance category and are then added across distance categories, and the sum is divided by 10 to derive the factor value for potentially contaminated population. The assigned values in Table 3–12 were determined by statistical simulation to yield the same population value, on average, as the use of the formulas in the proposed rule. The use of range values has been adopted as part of the simplification discussed in section III A. The rounding rules have also changed. The method for evaluating karst aquifers has been simplified and is explained in this section. Table 3–14 in the proposed rule, which included dilution weighting factors for the general case and for two special cases, has been removed, and the two special karst cases are no longer evaluated. (The generally applicable dilution factors for karst have not changed and are all incorporated into the distance-weighted population values in Table 3–12.) The scoring cap was eliminated, and the multiplier (i.e., weight) is now 0.1.

Section 3.3.2.5 Calculation of population factor value. Has been revised to reflect the changes in the evaluation of actually contaminated wells. The rounding rule has also been changed, and the scoring cap was eliminated.

Section 3.3.3 Resources. Describes how points are assigned to resource uses of ground water. Points may be assigned if there are no drinking water wells within the target distance limit, but the water is usable for drinking water. This scoring allows for consideration of potential future uses of the aquifers. (See section III I of this preamble for a discussion of the relative weighting of these factors.)

Section 3.3.4 Wellhead protection area. Explains how to assign values to this factor. The maximum value is assigned when a source or an observed release lies partially or fully within a wellhead protection area applicable to the aquifer being evaluated, and this value has been changed from 50 to 20 to adjust for scale changes. A new criterion for scoring this factor has been added. If a wellhead protection area applicable to the aquifer being evaluated is within the target distance limit and neither of the other conditions is met, a value of five is assigned. This change allows the HRS to place a value on the resource.

Section 3.3.5 Calculation of targets factor category value. Has been revised to reflect changes in the factor names. The rounding rule has been changed, and the scoring cap was eliminated.

Section 3.4 Ground water migration score for an aquifer. Text has been revised to reflect the new divisor for normalizing pathway scores.

Section 3.5 Calculation of ground water migration pathway score. Text has been simplified.

In addition to the above noted changes, the sorptive capacity factor has been eliminated and replaced by the depth to aquifer factor, as have the tables used to assign values to this factor (Tables 3–6 and 3–7 in the proposed rule). The ground water use factors have also been eliminated as have the tables used to assign their values (Tables 3–15 and 3–16 in the proposed rule). Figures 3–2, 3–3, and 3–4 and Tables 3–4, 3–8, 3–9, 3–13 of the proposed rule have been removed .

Section 4 Surface Water Migration Pathway

The surface water migration pathway evaluates threats resulting from releases or potential releases of hazardous substances to surface water bodies. One major change to this pathway is the addition of a new component for scoring ground water discharge to surface water; either this component or the overland flow/flood migration component or both may be scored. For each component, three threats are evaluated: drinking water threat, human food chain threat, and environmental threat. Other major changes specific to this pathway include elimination of the recreational use threat; simplification of overland flow potential to release factors; modifications to the human food chain threat including addition of a food chain individual; modifications to the treatment of bioaccumulation potential and addition of a similar factor, ecosystem bioaccumulation potential, to the evaluation of the environmental threat; modifications to the persistence factor; revisions to the dilution weights; additions of benchmarks, extension of benchmarks to evaluation of the nearest intake, and addition of levels of contamination to the human food chain targets; modifications to criteria for establishing actual food chain contamination; elimination of the surface water use factor; addition of a resources factor to the targets evaluation in the drinking water threat; and revisions to sensitive environments.

Section 4.0 Surface Water Migration Pathway. New structure of the pathway is explained. Descriptive text has been removed. Figure 4–1 has been revised to reflect revisions to the factors evaluated, and Table 4–1 has been revised to reflect the new factor category values throughout.

Section 4.0.1 Migration components. Explains how to score the two migration components.

Section 4.0.2 Surface water categories. A definition of coastal tidal waters has been added. Some surface water bodies that belong in this new category were listed in other categories in the proposed rule (e.g., bays and wetlands contiguous with oceans). Isolated perennial wetlands have been added to the definition of lakes; salt water harbors largely protected by seawalls have been removed from the definition of lakes. Ocean has been defined more precisely as areas seaward from the baseline of the Territorial Sea. Contiguous bays have been removed from, and wetlands contiguous to the Great Lakes have been added to ocean and ocean-like bodies. These definitional changes/clarifications more accurately reflect the different characteristics of the water bodies.

Section 4.1 Overland flow/flood migration component. As discussed in section III M of this preamble, the surface water migration pathway has been divided into two components. The overland flow/flood component is essentially the surface water migration pathway as proposed except that the recreational use threat has been eliminated.

Section 4.1.1 General considerations. Consists of several subsections.

Section 4.1.1.1 Definition of the hazardous substance migration path for overland flow/flood migration component. Text has been simplified.

Section 4.1.1.2 Target distance limit. Explains target distance limits for sites in general and adds an explanation of how to calculate the target distance limit for contaminated sediments with no identified source. For these latter sources only, when there is a clearly defined direction of flow, the target distance limit is measured beginning at the observed sediment contamination farthest upstream; when there is no clearly defined direction of flow, the target distance limit is measured from the center of the area of observed sediment contamination. Discusses the determination of whether surface water targets are subject to actual or potential contamination. Also, text was added to assign Level II to targets subject to actual contamination based on direct observation.

Section 4.1.1.3 Evaluation of the overland flow/flood migration component. Explains that for multiple watersheds, highest score assigned to a watershed is used instead of summing watershed scores as proposed.

Section 4.1.2 Drinking water threat. Descriptive text has been removed.

Section 4.1.2.1 Drinking water threat—likelihood of release. Text has been simplified to clarify when potential to release factors need to be evaluated.

Section 4.1.2.1.1 Observed release. Text has been revised to reflect the changed maximum value.

Section 4.1.2.1.2 Potential to release. Text has been revised to reflect the changed maximum value and has been simplified.

Section 4.1.2.1.2.1 Potential to release by overland flow. Explains when overland flow potential to release is not evaluated.

Section 4.1.2.1.2.1.1 Containment. Text has been revised to reflect changes in the numbering of the containment table. Only sources that meet the minimum size requirement (i.e., that have a source hazardous waste quantity value of 0.5 or higher) are used in assigning containment values. This requirement has been added to ensure that very small, uncontained sources do not unduly influence the score. For example, a site might have a large, but highly contained source and a very small, uncontained source; without a minimum size requirement, the potential to release could be assigned the maximum value based on the very small source, which could overestimate the potential hazard posed by the site. If no source meets the minimum size requirement, the source with the highest surface water containment factor value is used. Descriptive text has been removed. Table 4–2, Containment Factor Values for Surface Water Migration Pathway, has been simplified by combining repetitious items and has been moved from an attachment to the proposed rule into this section of the final rule.

Section 4.1.2.1.2.1.2 Runoff. Text on evaluating rainfall has been simplified by removing explanatory references. The runoff curve number has been simplified by substituting a soil group designation in its place. Table 4–4 (proposed rule Table 4–2) has been revised to list only the soil group designations. Based on analyses of runoff and actual drainage area sizes, Table 4–3 (proposed rule Table 4–3) has been revised by changing the divisions of drainage area size. Table 4–5 (proposed rule Table 4–4) has been revised to reflect the changes related to the use of soil group designations. Table 4–6 (proposed rule Table 4–5) has been revised so that the heading in the table reads Rainfall/Runoff Value; the values assigned have been adjusted on the basis of both the higher maximum value assigned to the factor category and the analyses described above. Explanatory text has been removed.

Section 4.1.2.1.2.1.3 Distance to surface water. Values assigned to distance to surface water factor values in Table 4–7 (proposed rule Table 4–6) have been revised to adjust for the higher maximum assigned to the factor category.

Section 4.1.2.1.2.1.4 Calculation of the factor value for potential to release by overland flow. Has not been changed except for assigned value.

Section 4.1.2.1.2.2 Potential to release by flood. Descriptive text has been removed.

Section 4.1.2.1.2.2.1 Containment (flood). Text in Table 4–8 (proposed rule Table 4–7) has been revised to incorporate new language on required documentation on containment. The requirement for certification by an engineer has been dropped. The new documentation requirements have been added to make the rule consistent with RCRA requirements.

Section 4.1.2.1.2.2.2 Flood frequency. Values assigned to this factor by Table 4–9 (proposed rule Table 4–8) have been revised to better reflect probabilities and to adjust for the higher maximum assigned to the factor category. Descriptive text has been removed.

Section 4.1.2.1.2.2.3 Calculation of the factor value for potential to release by flood. Has been revised to reflect a minimum size requirement for sources.

Section 4.1.2.1.2.3 Calculation of potential to release factor value. Text has been simplified, and the assigned value has been changed.

Section 4.1.2.1.3 Calculation of drinking water threat—likelihood of release factor category value. Text has been simplified. The maximum value has been changed, and the maximum for potential to release is no longer equal to the maximum for observed release.

Section 4.1.2.2 Drinking water threat—waste characteristics. Descriptive text has been removed.

Section 4.1.2.2.1 Toxicity/persistence. Editorial changes have been made.

Section 4.1.2.2.1.1 Toxicity. References § 2.4.1.1.

Section 4.1.2.2.1.2 Persistence. As discussed in section III F of this preamble, several changes have been made to this factor, including the deletion of free-radical oxidation as a decay process and the inclusion of consideration of K_{ow} to account for sorption to sediments. Table 4–10 (proposed rule Table 4–9) has been revised to change the values assigned from categorical numbers to linear scales. The divisions among the half-lives for rivers, oceans, coastal tidal waters, and Great Lakes have changed based on a study of travel time, and the text has been modified to clarify the procedure for determining whether to base the persistence factor on lakes or on rivers, oceans, coastal tidal waters, and Great Lakes. A factor value of 0 is no longer assigned for persistence, as had been the case under the proposed rule, where categorical place-holder values were used; because persistence is now multiplied by toxicity and hazardous waste quantity, assigning a 0 value would result in a pathway score of 0. This result could understate the risk posed by a site with a large volume of highly toxic hazardous substances with low persistence. Furthermore, given the uncertainties about half-life estimates and their applicability in site-specific situations, EPA determined that a 0 value should not be assigned to the persistence factor under any conditions. The text has been modified to clarify selection of an appropriate default value. Table 4–11—Persistence Values—Log K_{ow}, has been added. Descriptive text has been removed.

Section 4.1.2.2.1.3 Calculation of toxicity/persistence factor value. Table reference has been changed to reflect the change in numbering. Table 4–12 (proposed rule Table 4–10) has been changed to reflect the multiplicative relationship.

Section 4.2.3.3.2.4 Calculation of the population factor value. Explains how to calculate this factor value.

Section 4.2.3.3.3 Calculation of human food chain threat—targets factor category value. Explains how to calculate this factor category value.

Section 4.2.3.4 Calculation of human food chain threat score for a watershed. Explains how to calculate the score for a watershed.

Section 4.2.4 Environmental threat. Lists the factors evaluated.

Section 4.2.4.1 Environmental threat—likelihood of release. Explains how to calculate this factor category value.

Section 4.2.4.2 Environmental threat—waste characteristics. Explains how to calculate this factor category value.

Section 4.2.4.2.1 Ecosystem toxicity/mobility/persistence/bioaccumulation. Explains how to calculate these factor values.

Section 4.2.4.2.1.1 Ecosystem toxicity. Explains how to calculate this factor value.

Section 4.2.4.2.1.2 Mobility. Explains how to calculate this factor value.

Section 4.2.4.2.1.3 Persistence. Explains how to calculate this factor value.

Section 4.2.4.2.1.4 Ecosystem bioaccumulation potential. Parallels the ecosystem bioaccumulation evaluation in the overland flow/flood component, except expands the species considered as discussed in section III J.

Section 4.2.4.2.1.5 Calculation of ecosystem toxicity/mobility/persistence/bioaccumulation factor value. Explains how to calculate this factor value using Tables 3–9, 4–29, and 4–30, which were added.

Section 4.2.4.2.2 Hazardous waste quantity. Explains how to calculate this factor value.

Section 4.2.4.2.3 Calculation of environmental threat—waste characteristics factor category value. Explains how to calculate this factor category value.

Section 4.2.4.3 Environmental threat—targets. Explains how to calculate this factor category value.

Section 4.2.4.3.1 Sensitive environments. Explains how to calculate this factor value.

Section 4.2.4.3.1.1 Level I concentrations. Parallels factor sections in the overland flow/flood migration component.

Section 4.2.4.3.1.2 Level II concentrations. Parallels factor sections in the overland flow/flood migration component.

Section 4.2.4.3.1.3 Potential contamination. Parallels factor sections in the overland flow/flood migration component, except for addition of the dilution weight adjustment.

Section 4.2.4.3.1.4 Calculation of environmental threat—targets factor category value. Explains how to calculate the value for the factor category.

Section 4.2.4.4 Calculation of environmental threat score for a watershed. Explains how to calculate this threat score for a watershed.

Section 4.2.5 Calculation of ground water to surface water migration component score for a watershed. Explains how to calculate a watershed score for this component.

Section 4.2.6 Calculation of ground water to surface water migration component score. Explains how to calculate this score based on the scores for watersheds evaluated for this component.

Section 4.3 Calculation of surface water migration pathway score. Explains how to assign the pathway score.

In addition to the above noted changes, the recreational use threat has been eliminated. The drinking water use and other use factors have also been eliminated as have the tables (4–12 and 4–13 in the proposed rule) that related to scoring these factors. Figures 4–1, 4–2, and 4–3 as well as Tables 4–15, and 4–17 through 4–22 from the proposed rule have been eliminated.

Section 5 Soil Exposure Pathway

The soil exposure pathway evaluates threats resulting from contamination of surface material. The major changes specific to this pathway include revision of the name of the pathway; elimination of children under seven as a population that must be counted and evaluated separately; addition of hazardous waste quantity to the waste characteristics factor category; inclusion of workers in the evaluation of resident population targets; weighting of resident population based on benchmarks; inclusion of the nearest individual factor in both the resident and nearby targets factor category; inclusion of a resources factor in the resident population evaluation; and revisions to the sensitive environments factor.

Section 5.0 Soil Exposure Pathway. The name of the pathway has been changed from onsite exposure to soil exposure. Descriptive text has been removed. Figure 5–1 has been revised to reflect revisions to the factors evaluated. Table 5–1 has been revised to reflect the new factor category values throughout, which were made more consistent with the other pathways.

Section 5.0.1 General considerations. Has been revised to reflect the redefinition of source, discussed in section III N of this preamble. The methods for establishing areas of observed contamination and for determining the hazardous substances associated with an area of observed contamination have been clarified. The instructions have been revised to make clear that any part of a site that is covered by a permanent or otherwise maintained impermeable material such as asphalt is not considered in evaluating the pathway.

Section 5.1 Resident population threat. Has been revised to specify when the resident population threat should be evaluated. The requirements state that this threat is scored when there is an area of observed contamination within the property boundary and within 200 feet of a residence, school, day care center, or workplace, or within the boundaries of terrestrial sensitive environments and specified resources.

Section 5.1.1 Likelihood of exposure. Text has been simplified.

Section 5.1.2 Waste characteristics. Evaluation of waste characteristics has been changed to include hazardous waste quantity as well as toxicity. Hazardous waste quantity was added to the factor category in response to comments that the pathway did not consider the dose relationship; the combination of hazardous waste quantity and toxicity is a surrogate for that relationship and makes the pathway more consistent with the rest of the rule. The text has been revised to reflect the change.

Section 5.1.2.1 Toxicity. References the section explaining how to assign toxicity factor values.

Section 5.1.2.2 Hazardous waste quantity. This section is new and explains how to assign a value to this factor. Table 5–2, Hazardous Waste Quantity Evaluation Equations for Soil Exposure Pathway, is a revision of Table 2–14 from the proposed rule. This table differs from Table 2–5 of the final rule because generally only the top two feet of an area of observed contamination are considered in evaluating the pathway. Landfills, contaminated soils, waste piles, land treatment areas, dry surface impoundments, and buried/backfilled surface impoundments, which can be evaluated based on their volume in Table 2–5, are evaluated for this pathway using the area measure because the area measure now has a two-foot depth built into the equation. Surface impoundments containing

TABLE 3-12.—DISTANCE-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FACTOR FOR GROUND WATER MIGRATION PATHWAY *

Distance category (miles)	Number of people within the distance category												
	0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000
Other Than Karst [b]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385
Greater than 1 to 2	0	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842
Greater than 2 to 3	0	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219
Greater than 3 to 4	0	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596
Karst [c]:													
0 to ¼	0	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455
Greater than ¼ to ½	0	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122
Greater than ½ to 1	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 1 to 2	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 2 to 3	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227
Greater than 3 to 4	0	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227

* Round the number of people present within a distance category to nearest integer. Do not round the assigned distance-weighted population value to nearest integer.
[b] Use for all aquifers, except karst aquifers underlying any portion of the sources at the site.
[c] Use only for karst aquifers underlying any portion of the sources at the site.

–Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

• Use the "Other Than Karst" portion of Table 3-12 for the remainder of the population served by points of withdrawal subject to potential contamination.

–For this portion of the population, determine the number of people included within each "Other Than Karst" distance category in Table 3-12.

–Assign a distance-weighted population value for each distance category based on the number of people included within the distance category.

Calculate the value for the potential contamination factor (PC) as follows:

$$PC = \frac{1}{10} \sum_{i=1}^{n} (W_i + K_i)$$

where:

W_i = Distance-weighted population from "Other Than Karst" portion of Table 3-12 for distance category i.

K_i = Distance-weighted population from "Karst" portion of Table 3-12 for distance category i.

n = Number of distance categories.

If PC is less than 1, do not round it to the nearest integer; if PC is 1 or more, round to the nearest integer. Enter this value in Table 3-1.

3.3.2.5 *Calculation of population factor value.* Sum the factor values for Level I concentrations, Level II concentrations, and potential contamination. Do not round this sum to the nearest integer. Assign this sum as the population factor value for the aquifer. Enter this value in Table 3-1.

3.3.3 *Resources.* To evaluate the resources factor, select the highest value specified below that applies for the aquifer being evaluated. Assign this value as the resources factor value for the aquifer. Enter this value in Table 3-1.

Assign a resources value of 5 if water drawn from any target well for the aquifer being evaluated or overlying aquifers (as specified in section 3.0) is used for one or more of the following purposes:

• Irrigation (5-acre minimum) of commercial food crops or commercial forage crops.

• Watering of commercial livestock.

• Ingredient in commercial food preparation.

• Supply for commercial aquaculture.

• Supply for a major or designated water recreation area, excluding drinking water use.

Assign a resources value of 5 if no drinking water wells are within the target distance limit, but the water in the aquifer being evaluated or any overlying aquifers (as specified in section 3.0) is usable for drinking water purposes.

Assign a resources value of 0 if none of the above applies.

3.3.4 *Wellhead Protection Area.* Evaluate the Wellhead Protection Area factor based on Wellhead Protection Areas designated according to section 1428 of the Safe Drinking Water Act, as amended. Consider only those Wellhead Protection Areas applicable to the aquifer being evaluated or overlying aquifers (as specified in section 3.0). Select the highest value below that applies. Assign it as the value for the Wellhead Protection Area factor for the aquifer being evaluated. Enter this value in Table 3-1.

Assign a value of 20 if either of the following criteria applies for the aquifer being evaluated or overlying aquifers:

• A source with a ground water containment factor value greater than 0 lies, either partially or fully, within or above the designated Wellhead Protection Area.

• Observed ground water contamination attributable to the sources at the site lies, either partially or fully, within the designated Wellhead Protection Area.

If neither criterion applies, assign a value of 5, if, within the target distance limit, there is a designated Wellhead Protection Area applicable to the aquifer being evaluated or overlying aquifers.

Assign a value of 0 if none of the above applies.

3.3.5 *Calculation of targets factor category value.* Sum the factor values for nearest well, population, resources, and Wellhead Protection Area. Do not round this sum to the nearest integer. Use this sum as the targets factor category value for the aquifer. Enter this value in Table 3-1.

3.4 *Ground water migration score for an aquifer.* For the aquifer being evaluated, multiply the factor category values for likelihood of release, waste characteristics, and targets, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum value of 100, as the ground water migration pathway score for the aquifer. Enter this score in Table 3-1.

3.5 *Calculation of ground water migration pathway score.* Calculate a ground water migration score for each aquifer underlying the sources at the site, as appropriate. Assign the highest ground water migration score for an aquifer as the ground water migration pathway score (S_{gw}) for the site. Enter this score in Table 3-1.

4.0 *Surface Water Migration Pathway.*

4.0.1 *Migration components.* Evaluate the surface water migration pathway based on two migration components:

• Overland/flood migration to surface water (see section 4.1).

• Ground water to surface water migration (see section 4.2).

Evaluate each component based on the same three threats: drinking water threat, human food chain threat, and environmental threat.

Score one or both components, considering their relative importance. If only one component is scored, assign its score as the surface water migration pathway score. If

both components are scored, select the higher of the two scores and assign it as the surface water migration pathway score.

4.0.2 *Surface water categories.* For HRS purposes, classify surface water into four categories: rivers, lakes, oceans, and coastal tidal waters.

Rivers include:

• Perennially flowing waters from point of origin to the ocean or to coastal tidal waters, whichever comes first, and wetlands contiguous to these flowing waters.

• Aboveground portions of disappearing rivers.

• Man-made ditches only insofar as they perennially flow into other surface water.

• Intermittently flowing waters and contiguous intermittently flowing ditches only in arid or semiarid areas with less than 20 inches of mean annual precipitation.

Lakes include:

• Natural and man-made lakes (including impoundments) that lie along rivers, but excluding the Great Lakes.

• Isolated, but perennial, lakes, ponds, and wetlands.

• Static water channels or oxbow lakes contiguous to rivers.

• Small rivers, without diking, that merge into surrounding perennially inundated wetlands.

• Wetlands contiguous to water bodies defined here as lakes.

Ocean and ocean-like water bodies include:

• Ocean areas seaward from the baseline of the Territorial Sea. (This baseline represents the generalized coastline of the United States. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.)

• The Great Lakes.

• Wetlands contiguous to the Great Lakes.

Coastal tidal waters include:

• Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc. seaward from mouths of rivers and landward from the baseline of the Territorial Sea.

4.1 *Overland/flood migration component.* Use the overland/flood migration component to evaluate surface water threats that result from overland migration of hazardous substances from a source at the site to surface water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.1.1 *General considerations.*

4.1.1.1 *Definition of hazardous substance migration path for overland/flood migration component.* The hazardous substance migration path includes both the overland segment and the in-water segment that hazardous substances would take as they migrate away from sources at the site:

• Begin the overland segment at a source and proceed downgradient to the probable point of entry to surface water.

• Begin the in-water segment at this probable point of entry.

–For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.1.1.2).

–For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.

–If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

For sites that consist of contaminated sediments with no identified source, the hazardous substance migration path consists solely of the in-water segment specified in section 4.1.1.2.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the overland/flood migration component for each watershed separately as specified in section 4.1.1.3.

4.1.1.2 *Target distance limit.* The target distance limit defines the maximum distance over which targets are considered in evaluating the site. Determine a separate target distance limit for each watershed as follows:

• If there is no observed release to surface water in the watershed or if there is an observed release only by direct observation (see section 4.1.2.1.1), begin measuring the target distance limit for the watershed at the probable point of entry to surface water and extend it for 15 miles along the surface water from that point.

• If there is an observed release from the site to the surface water in the watershed that is based on sampling, begin measuring the target distance limit for the watershed at the probable point of entry; extend the target distance limit either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater.

In evaluating the site, include only surface water targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, partially or wholly, at or between the probable point of entry and the target distance limit applicable to the watershed:

• If flow within the hazardous substance migration path is reversed by tides, evaluate upstream targets only if there is documentation that the tidal run could carry substances from the site as far as those upstream targets.

• Determine whether targets within or contiguous to the hazardous substance migration path are subject to actual or potential contamination as follows:

–If a target is located, partially or wholly, either at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed or at a point that meets the criteria for an observed release by direct observation, evaluate that target as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and for wetlands in section 4.1.4.3.1.1. If the actual contamination is based on direct observation, assign Level II to the actual contamination. However, if the actual contamination is based on samples, determine whether the actual contamination is at Level I or Level II concentrations as specified in sections 4.1.2.3, 4.1.3.3, and 4.1.4.3.1.

–If a target is located, partially or wholly, within the target distance limit for the watershed, but not at or between the probable point of entry and any sampling point that meets the criteria for an observed release to the watershed, nor at a point that meets the criteria for an observed release by direct observation, evaluate it as subject to potential contamination.

For sites consisting solely of contaminated sediments with no identified source, determine the target distance limit as follows:

• If there is a clearly defined direction of flow for the surface water body (or bodies) containing the contaminated sediments, begin measuring the target distance limit at the point of observed sediment contamination that is farthest upstream (that is, at the location of the farthest available upstream sediment sample that meets the criteria for an observed release); extend the target distance limit either for 15 miles along the surface water or to the most distant downstream sample point that meets the criteria for an observed release to that watershed, whichever is greater.

• If there is no clearly defined direction of flow, begin measuring the target distance limit at the center of the area of observed sediment contamination. Extend the target distance limit as an arc either for 15 miles along the surface water or to the most distant sample point that meets the criteria for an observed release to that watershed, whichever is greater. Determine the area of observed sediment contamination based on available samples that meet the criteria for an observed release.

Note that the hazardous substance migration path for these contaminated sediment sites consists solely of the in-water segment defined by the target distance limit; there is no overland segment.

For these contaminated sediment sites, include only those targets (for example, intakes, fisheries, sensitive environments) that are within or contiguous to the hazardous substance migration path and located, wholly or partially, within the target distance limit for the site. Determine whether these targets are subject to actual or potential contamination as follows:

• If a target is located, partially or wholly, within the area of observed sediment contamination, evaluate it as subject to actual contamination, except as otherwise specified for fisheries in section 4.1.3.3 and wetlands in section 4.1.4.3.1.1.

–If a drinking water target is subject to actual contamination, evaluate it using Level II concentrations.

4.1.4.3.1.4 *Calculation of environmental threat-targets factor category value.* Sum the values for the Level I concentrations, Level II concentrations, and potential contamination factors for the watershed. Do not round this sum to the nearest integer. Assign this sum as the environmental threat-targets factor category value for the watershed. Enter this value in Table 4–1.

4.1.4.4 *Calculation of environmental threat score for a watershed.* Multiply the environmental threat factor category values for likelihood of release, waste characteristics, and targets for the watershed, and round the product to the nearest integer. Then divide by 82,500. Assign the resulting value, subject to a maximum of 60, as the environmental threat score for the watershed. Enter this score in Table 4–1.

4.1.5 *Calculation of overland/flood migration component score for a watershed.* Sum the scores for the three threats for the watershed (that is, drinking water, human food chain, and environmental threats). Assign the resulting score, subject to a maximum value of 100, as the surface water overland/flood migration component score for the watershed. Enter this score in Table 4–1.

4.1.6 *Calculation of overland/flood migration component score.* Select the highest surface water overland/flood migration component score from the watersheds evaluated. Assign this score as the surface water overland/flood migration component score for the site, subject to a maximum score of 100. Enter this score in Table 4–1.

4.2 *Ground water to surface water migration component.* Use the ground water to surface water migration component to evaluate surface water threats that result from migration of hazardous substances from a source at the site to surface water via ground water. Evaluate three types of threats for this component: drinking water threat, human food chain threat, and environmental threat.

4.2.1 *General considerations.*

4.2.1.1 *Eligible surface waters.* Calculate ground water to surface water migration component scores only for surface waters (see section 4.0.2) for which all the following conditions are met:

- A portion of the surface water is within 1 mile of one or more sources at the site having a containment factor value greater than 0 (see section 4.2.2.1.2).
- No aquifer discontinuity is established between the source and the portion of the surface water within 1 mile of the source (see section 3.0.1.2.2). However, if hazardous substances have migrated across an apparent discontinuity within this 1 mile distance, do not consider a discontinuity present in scoring the site.
- The top of the uppermost aquifer is at or above the bottom of the surface water.

Do not evaluate this component for sites consisting solely of contaminated sediments with no identified source.

4.2.1.2 *Definition of hazardous substance migration path for ground water to surface water migration component.* The hazardous substance migration path includes both the ground water segment and the surface water in-water segment that hazardous substances would take as they migrate away from sources at the site:

- Restrict the ground water segment to migration via the uppermost aquifer between a source and the surface water.
- Begin the surface water in-water segment at the probable point of entry from the uppermost aquifer to the surface water. Identify the probable point of entry as that point of the surface water that yields the shortest straight-line distance, within the aquifer boundary (see section 3.0.1.2), from the sources at the site with a containment factor value greater than 0 to the surface water.
  - –For rivers, continue the in-water segment in the direction of flow (including any tidal flows) for the distance established by the target distance limit (see section 4.2.1.4).
  - –For lakes, oceans, coastal tidal waters, or Great Lakes, do not consider flow direction. Instead apply the target distance limit as an arc.
  - –If the in-water segment includes both rivers and lakes (or oceans, coastal tidal waters, or Great Lakes), apply the target distance limit to their combined in-water segments.

Consider a site to be in two or more watersheds for this component if two or more hazardous substance migration paths from the sources at the site do not reach a common point within the target distance limit. If the site is in more than one watershed, define a separate hazardous substance migration path for each watershed. Evaluate the ground water to surface water migration component for each watershed separately as specified in section 4.2.1.5.

4.2.1.3 *Observed release of a specific hazardous substance to surface water in-water segment.* Section 4.2.2.1.1 specifies the criteria for assigning values to the observed release factor for the ground water to surface water migration component. With regard to an individual hazardous substance, consider an observed release of that hazardous substance to be established for the surface water in-water segment of the ground water to surface water migration component only when the hazardous substance meets the criteria both for an observed release both to ground water (see section 4.2.2.1.1) and for an observed release by chemical analysis to surface water (see section 4.1.2.1.1).

If the hazardous substance meets the section 4.1.2.1.1 criteria for an observed release by chemical analysis to surface water but does not also meet the criteria for an observed release to ground water, do not use any samples of that hazardous substance from the surface water in-water segment in evaluating the factors of this component (for example, do not use the hazardous substance in establishing targets subject to actual contamination or in determining the level of actual contamination for a target).

4.2.1.4 *Target distance limit.* Determine the target distance limit for each watershed as specified in section 4.1.1.2, except: do not extend the target distance limit to a sample location beyond 15 miles unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

Determine the targets eligible to be evaluated for each watershed and establish whether these targets are subject to actual or potential contamination as specified in section 4.1.1.2, except: do not establish actual contamination based on a sample location unless at least one hazardous substance in a sample from that location meets the criteria in section 4.2.1.3 for an observed release to the surface water in-water segment.

4.2.1.5 *Evaluation of ground water to surface water migration component.* Evaluate the drinking water threat, human food chain threat, and environmental threat for each watershed for this component based on three factor categories: likelihood of release, waste characteristics, and targets. Figure 4–2 indicates the factors included within each factor category for each type of threat.

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For the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2, subject to the restrictions specified in sections 4.2.1.3 and 4.2.1.4.

When the intake is subject to actual contamination evaluate it using Level I concentrations or Level II concentrations. Determine which level applies for the intake by comparing the exposure concentrations from a sample (or comparable samples) to health-based benchmarks as specified in section 4.1.2.3, except use only those samples from the surface water in-water segment and only those hazardous substances in such samples that meet the conditions in sections 4.2.1.3 and 4.2.1.4.

4.2.2.3.1 *Nearest intake.* Assign a value to the nearest intake factor as specified in section 4.1.2.3.1 with the following modification. For the intake being evaluated, multiply its dilution weight from Table 4–13 (section 4.1.2.3.1) by a value selected from Table 4–27. Use the resulting product, not the value from Table 4–13, as the dilution weight for the intake for the ground water to surface water component. Do not round this product to the nearest integer.

Select the value from Table 4–27 based on the angle Θ, the angle defined by the sources at the site and either the two points at the intersection of the surface water body and the 1-mile distance ring of any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle. (See Figure 4–3 for an example of how to determine Θ.) If the surface water body does not extend to the 1-mile ring at one or both ends, define Θ using the surface water endpoint(s) within the 1-mile ring or any two other points of the surface water body within the 1-mile distance ring, whichever results in the largest angle.

TABLE 4–27.—DILUTION WEIGHT ADJUSTMENTS

Angle Θ (degrees)	Assigned value *
0	0
Greater than 0 to 18	0.05
Greater than 18 to 54	0.1
Greater than 54 to 90	0.2
Greater than 90 to 126	0.3
Greater than 126 to 162	0.4
Greater than 162 to 198	0.5
Greater than 198 to 234	0.6
Greater than 234 to 270	0.7
Greater than 270 to 306	0.8
Greater than 306 to 342	0.9
Greater than 342 to 360	1.0

* Do not round to nearest integer.

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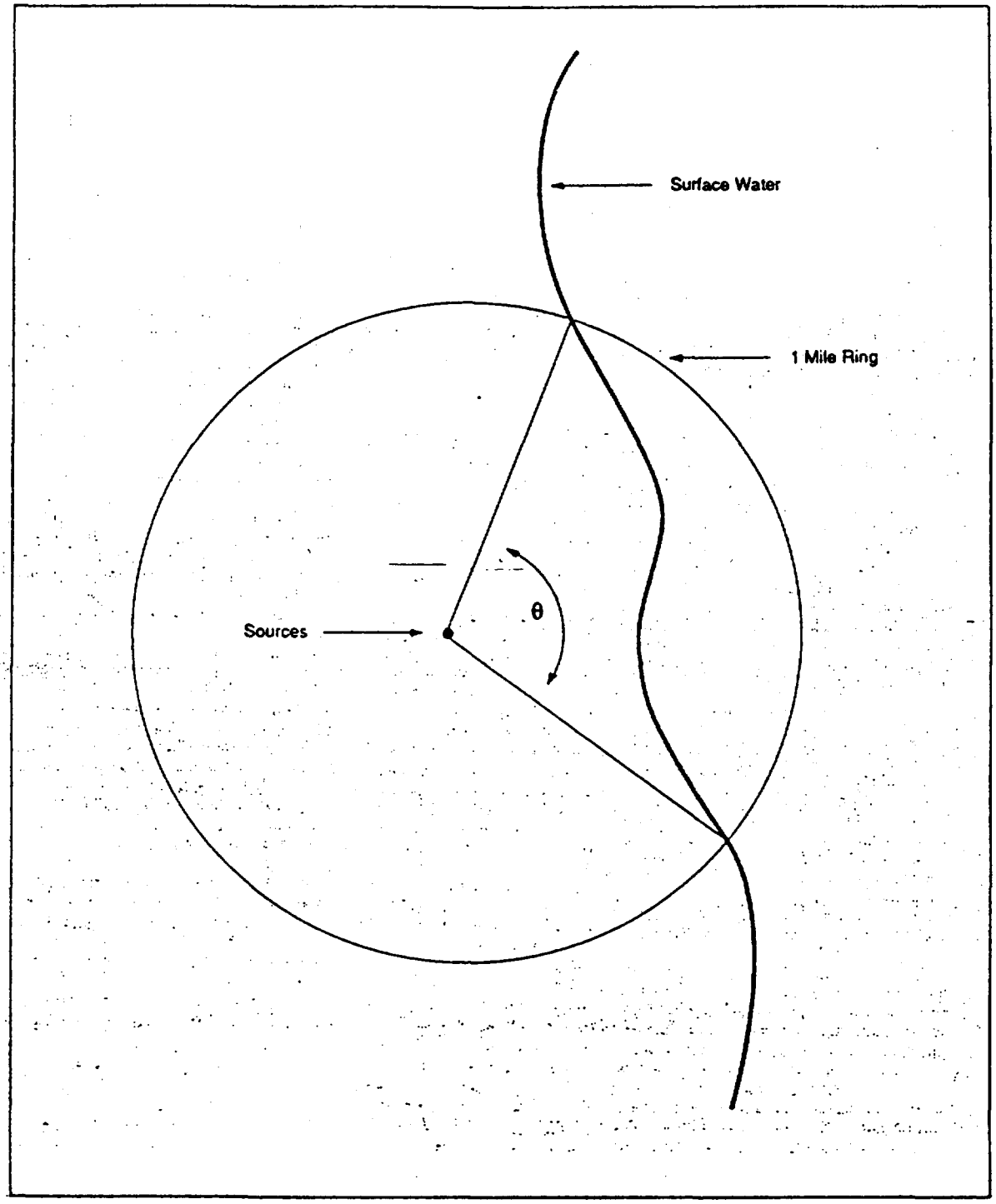

FIGURE 4-3
SAMPLE DETERMINATION OF GROUND WATER TO SURFACE WATER ANGLE

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Reference 41

Environmental Protection Agency | Solid Waste and Emergency Response

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October 1991

EPA

The Revised Hazard Ranking System: Evaluating Sites After Waste Removals

Office of Emergency and Remedial Response
Hazardous Site Evaluation Division, OS-230

Quick Reference Fact Sheet

The U.S. Environmental Protection Agency (EPA) has revised the Hazard Ranking System (HRS) in response to the Superfund Amendments and Reauthorization Act of 1986 (SARA). The HRS is the primary mechanism for placing sites on the National Priorities List (NPL). Under the original HRS promulgated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), a site was scored based on conditions that existed prior to any removal actions. Under the revised HRS, waste removals may be considered under certain circumstances. The term "waste removal", as used in this fact sheet, refers to the physical removal from the site of hazardous substances or wastes containing hazardous substances. The waste removal policy is designed to provide an incentive for rapid response actions by potentially responsible parties (PRPs), reducing risks to the public and the environment and allowing for more timely and cost-effective cleanups.

This fact sheet provides information for EPA Regional staff, States, and PRPs. It defines the concept of "qualifying removal," explains how to score sites where qualifying removals have been conducted, and discusses some of the management implications of the removal policy. In addition, this fact sheet provides examples of how to score sites where removals have occurred.

WHEN TO CONSIDER A REMOVAL

In the preamble to the HRS final rule (54 FR 51567, December 14, 1990), EPA established three requirements that must be met for the results of a removal to be considered in scoring a site for the NPL (Figure 1). This fact sheet pertains only to removal actions that meet all three requirements, that is, "qualifying removals." Procedures for evaluating sites where other types of response actions have occurred are being developed.

Removal of Waste

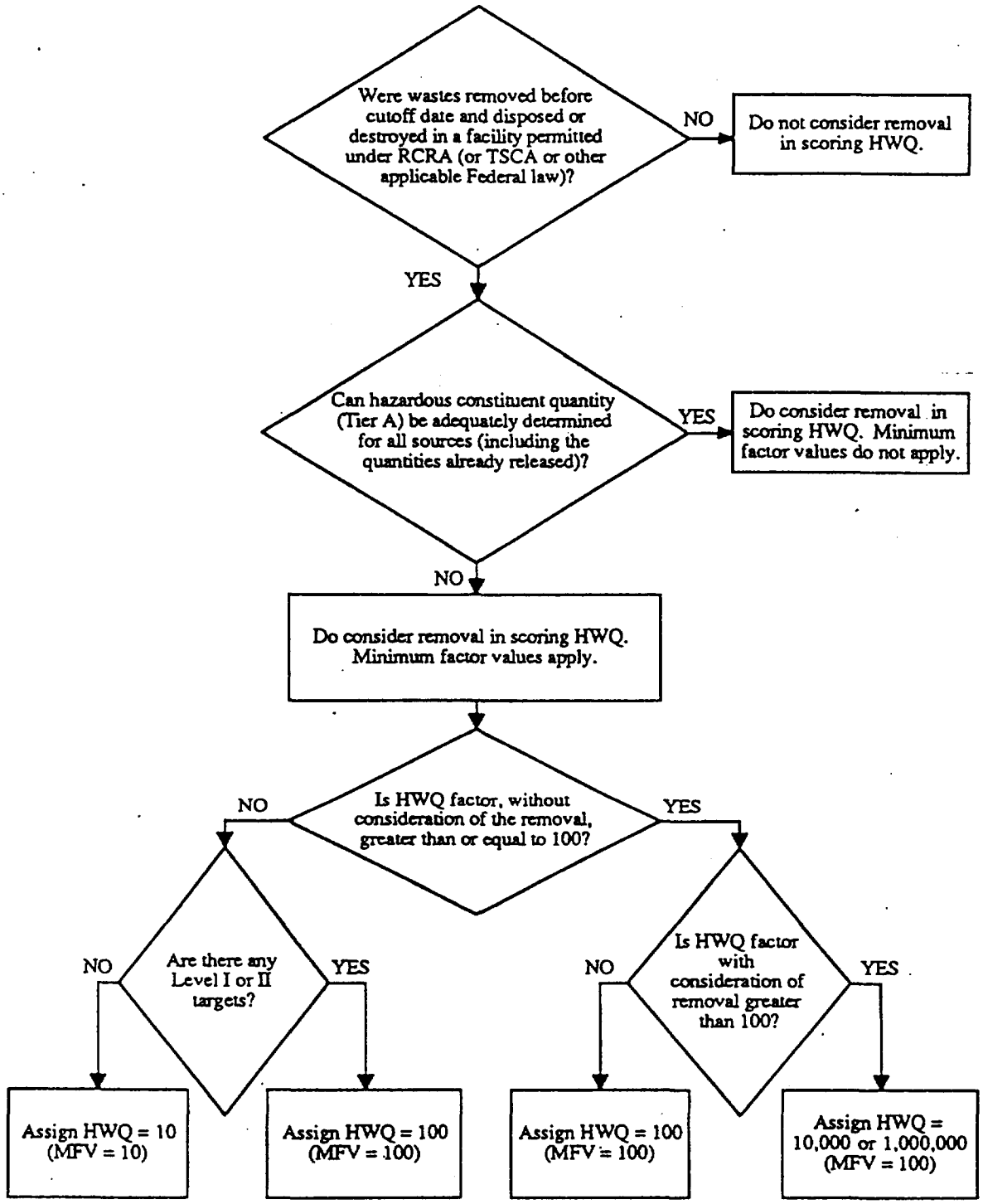
The first requirement is that all waste subject to the removal must be physically removed from the site. This requirement ensures that removals do not simply move the waste and its associated risks to another portion of the same site. A removal action (or removal) conducted by Superfund's emergency response program does not necessarily involve physical removal of wastes from the site.

FIGURE 1
Requirements for Considering Removal Actions

- The removal action must physically remove waste from the site.
- The removal action must have occurred prior to the cutoff date applicable to the site (see Figure 2).
- The removed waste must be disposed or destroyed at a facility permitted under RCRA or TSCA or by the NRC.

For example, Superfund removal actions, as defined in CERCLA section 101(23), may include stabilizing or containing waste on-site through engineering controls or limiting exposure potential

FIGURE 3
Determining Minimum Factor Values (MFV) for Hazardous Waste Quantity (HWQ) at Sites with Removals (Migration Pathways Only)



Note: Minimum HWQ factor values are pathway-specific.

-- If the HWQ factor value would be less than 100 without considering the removal, then the minimum HWQ factor value for that pathway is 10.

The minimum HWQ factor value of 10 (i.e., final bullet above) ensures that a site will not receive a higher score simply because a removal has been conducted. Under no circumstances will a party be penalized for conducting a qualifying removal.

HWQ for Soil Exposure Pathway

HWQ is evaluated differently for the soil exposure pathway than for the migration pathways. In the soil exposure pathway, HWQ is always based on conditions at the time of the SI. Only the first 2 feet of areas of observed contamination plus tanks, drums, and other container sources are included in evaluating HWQ. The HWQ factor is subject to a minimum value of 10 (if hazardous constituent quantity cannot be adequately determined), regardless of whether there has been a qualifying removal. Section 5.1.2.2 of the HRS rule provides further information on evaluating HWQ for the soil exposure pathway.

DETERMINING QUANTITY OF HAZARDOUS SUBSTANCES REMAINING

EPA's removal policy is meant to encourage the PRP conducting the removal to determine the quantity of CERCLA hazardous substances remaining in sources at the site and the full extent of the associated releases to the environment. If a release to the environment has occurred or is suspected, the PRP must determine with reasonable confidence the total quantity of all CERCLA hazardous substances in releases to all media to receive the maximum reduction in score (i.e., to avoid use of the minimum factor value). This requires determining HWQ for all sources completely using Tier A (Figure 4). As discussed previously, if the total mass of all CERCLA hazardous substances in all sources and in releases to the environment (or in areas of observed contamination for the soil exposure pathway) cannot be adequately determined for a pathway, the HWQ factor for that pathway is subject to minimum values.

At sites where surface soils or wastes have been removed, Regions are encouraged to collect a reasonable number of additional soil and/or

FIGURE 4
Adequately Determining Hazardous Constituent Quantity

Hazardous constituent quantity can be calculated for a source using the following equation:

$$HCQ = \sum_{i=1}^{n} C_i \times D_m \times V_s$$

where:

- HCQ = hazardous constituent quantity for source S (mass)
- C_i = average concentration of constituent i (mass/mass)
- n = total number of CERCLA hazardous substances
- D_m = density of source medium (mass/volume)
- V_s = volume of source S (volume)

To use this equation to adequately determine hazardous constituent quantity for a source:

- the equation must be applied to each medium;
- the volume of the source must be known with reasonable confidence;
- representative values for the average concentration of each hazardous substance deposited in the source must be known; and
- there must be no release from the source.

The key to using concentration data to estimate hazardous constituent quantity is determining a representative value for the average concentration of each hazardous substance in the source or portion of the source. This can be very difficult for sources where the distribution of hazardous substances shows high spatial or temporal variability. In addition, if a release from the source has occurred, then the total mass of all hazardous substances released to the environment must also be adequately determined.

Hazardous constituent quantity also can be adequately determined if complete data are available on the quantity of hazardous substances deposited (e.g., manifest data). The procedure described above does not apply to RCRA wastes or radionuclides.

subsurface samples to verify the PRP's evaluation of hazardous constituent quantity for the remaining waste. SIs are not intended to address the full extent of contamination at sites; therefore, EPA generally will rely on PRPs to quantify the extent of releases to all media, so that they can receive the maximum possible reduction in HWQ factor value. If subsequent Regional sampling reveals that HWQ is greater than that estimated by the PRP during the removal, the HWQ factor value is calculated based on these new data.

SCORING OTHER FACTORS

For the migration pathways, a number of factors other than HWQ can be affected by the removal of waste and, in some cases, are scored to reflect a qualifying removal (Figure 5).

Likelihood of Release Factors

The results of a qualifying removal may be taken into account in scoring several factors in the likelihood of release factor category for the source subject to the removal. These factors include:

- observed release (or observed contamination);
- containment; and
- source type.

An observed release to one of the migration pathways documented before or after a qualifying removal can be used to score likelihood of release. That is, a qualifying removal does not negate the fact that the source already has released to the environment. However, areas of observed contamination in the soil exposure pathway are intended to reflect continuing risks at the site. Therefore, soil exposure pathway factors should be documented by sampling that represents conditions at the time of the SI.

Changes in source containment should be considered only when:

- the change results from a qualifying removal;
- no observed release of a hazardous substance associated with that source is established for a given pathway; and
- the containment factor value for the affected source is equal to 0 for that pathway after the removal.

FIGURE 5
Scoring Other Factors

Changes in factors other than HWQ should be considered in scoring a migration pathway only if:

- The change in that factor was a direct result of a qualifying removal;
- No observed release of a hazardous substance associated with the source is established for that pathway; and
- The removal completely eliminated a source (and its associated releases) or resulted in a containment factor value of 0 for that source in that pathway.

If changes in containment result in a lower -- but non-zero -- containment factor value, then that source is assigned a containment factor that does not reflect the changes that resulted from the qualifying removal. Similarly, changes in source type that result in a non-zero source type factor value are not considered in scoring. Changes that result in a source type factor value of 0 are considered.

Substance-specific Factors

Some substance-specific HRS factors can be affected if a qualifying removal completely eliminates a hazardous substance from a pathway (i.e., all sources of that hazardous substance are completely removed or have containment factor values of 0 and there is no observed release or observed contamination of that substance). These factors include:

- toxicity;
- mobility;
- persistence;
- bioaccumulation potential; and
- gas migration potential.

None of these factors can be based on a hazardous substance that was completely eliminated from a pathway by a qualifying removal. Such a removal must include all sources of that hazardous substance, and no releases of that substance to the environment may have occurred. EPA generally

will be unable to obtain such information and will rely on PRPs to produce these data. If a portion of a source is eliminated in a qualifying removal, the remaining portion of that source is assumed to contain the same hazardous substances as the removed portion, unless the PRP can document otherwise (e.g., provide analytical results or manifest data that convincingly demonstrate a given hazardous substance is not present in the remaining portion of the source). For the soil exposure pathway, toxicity should be based only on hazardous substances meeting the criteria for observed contamination at the time of the SI.

Targets Factors

Site-specific target distance limits or distance rings in migration pathways may change if a qualifying removal eliminates a source or changes a source in such a way that it is not available to a pathway (i.e., containment factor value of 0).

For a migration pathway:

- If an observed release (or observed contamination) is associated with a source, include that source when measuring target distances, regardless of whether a qualifying removal has occurred or whether the containment factor value is 0.

- If a source is completely eliminated or the characteristics of the source are changed such that the source's containment factor value for a given pathway is 0, and no observed release of a hazardous substance associated with that source to that pathway has occurred, do not include that source in measuring target distances for that pathway.

- If the characteristics of a source are changed, but that source is still available to a given pathway (i.e., non-zero containment factor value), then include that source when measuring target distances for that pathway.

For the soil exposure pathway:

- If all or part of an area of observed contamination is removed, do not include the removed area when determining the target distance limits.

EPA generally will not be able to document the complete removal of a source within the normal SI field sampling. EPA will rely on PRPs to provide the additional information that is needed to document complete removal of a source.

MANAGEMENT IMPLICATIONS

Site managers should be aware of the changes in site scores that may occur under the waste removal policy and understand the need to document releases at removal sites. In addition, EPA's removal and site assessment programs must coordinate at sites where the removal program is considering taking action.

Changes in Site Scores

The waste removal policy is intended to provide an incentive for timely and thorough removals by potentially lowering the HRS score for sites where a qualifying removal is conducted. This score lowering may be major or minor, depending on the characteristics of the site and the extent of the removal action:

- Because the HWQ factor values are grouped in two-order-of-magnitude ranges (100, 10,000 and 1,000,000), large changes in the HWQ factor value may occur for two types of sites: (1) sites where very large quantities of waste have been removed and (2) sites where the HWQ factor prior to removal was slightly above the lower boundary of a HWQ range.

- Likelihood of release could be affected for migration pathways where no observed release has been detected and a source is completely eliminated from a pathway by a qualifying removal (or is changed such that the containment factor value now equals 0).

- Large changes in target factor values could occur if surface soil contamination is removed from areas occupied by resident individuals or if source elimination significantly changes the targets evaluated.

Documenting Releases

At sites where the PRP claims to have completely eliminated a source (including any associated releases), the PRP must confirm this claim through adequate sampling. A source will be

evaluated on the basis of SI sampling unless the PRP can produce additional information that documents complete removal. Furthermore, if Regions believe that hazardous constituent quantity for the remaining source and its releases is not adequately determined, the minimum HWQ factor values for removal sites apply. At sites where a PRP has calculated hazardous constituent quantity for a source, Regions are encouraged to conduct sampling, to the extent practicable, to verify this information.

QUESTIONS AND ANSWERS

Q. How are multiple removals at the same site treated?

A. The number of individual removals does not matter as long as each removal considered in scoring is a qualifying removal. All qualifying removals should be considered and all non-qualifying removals should not be considered when calculating the HRS score.

Q. Whose removals are considered?

A. The waste removal policy applies to all sites, regardless of the identity of the party conducting the removal. EPA, State, and PRP removals are subject to the same requirements under the HRS removal policy.

Q. Does the waste removal policy apply to Federal facility sites?

A. Yes. The only difference in applying the removal policy to Federal facilities is the difference in determining the cutoff date.

Q. Are SIs conducted by States under cooperative agreements considered EPA SIs for the purposes of the HRS removal policy?

A. Yes.

Q. If a qualifying removal eliminates the only drums in a group for which data concerning the contents are available, how should substance-specific factors be scored for this source?

A. In the absence of information to the contrary, Regions may assume that the remaining portion of a source contains the same hazardous substances as the removed portion. If a PRP can produce convincing evidence that the hazardous substances in the removed portion of a source are <u>not</u> present in the remaining portion, these substances should not be used to score any substance-specific factors for that source. Regions should not, however, assume that hazardous substances present in one source (e.g., a group of drums) are present in a different source (e.g., a landfill) without supporting information.

Q. Prior to the cutoff date for a site, the PRP removed all of the waste from a pile and transferred it to an on-site containment system that would be assigned a containment factor of 0 for all pathways. Should the pile still be considered a source in scoring the site?

A. Yes. The pile should be considered when scoring this site. This response action did not physically remove waste from the site; therefore, it is not a qualifying removal.

Q. A site had an SI three-years ago, but a number of additional samples were taken subsequently to support HRS scoring. Which investigation should be used to assign the cutoff date?

A. Because the overall sampling strategy is developed in the first SI, the cutoff date is based on the first SI.

Q. What if the cutoff date falls in the middle of a waste removal that was conducted over an extended period of time?

A. Those wastes that were removed prior to the cutoff date (in compliance with all three requirements) are <u>not</u> considered in scoring the site.

Q. Can a removal assessment conducted by the EPA removal program be used to determine the cutoff date?

A. No. SIs conducted under the aegis of Superfund's <u>site assessment program</u> are used to determine the cutoff date for qualifying removals.

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Reference 42

Agricultural Experiment
Stations and Soil Science
Department, and the Florida
Department of Agriculture
and Consumer Services

Soil Survey of Broward County Florida

Eastern Part

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Issued May 1984

Most of the acreage of this soil is in natural vegetation or improved pasture. The natural vegetation consists of scattered slash pine and sawpalmetto, pineland threeawn, paspalum, bluejoint panicum, blue maidencane, and bluestem.

This soil is poorly suited to cultivated crops or citrus. Good pasture of improved grasses or grass and clover can be produced under intensive management. Some water control and fertilization with trace elements are needed.

This soil is in capability subclass IVw.

Hb—Hallandale-Urban land complex. This complex consists mainly of Hallandale fine sand and Urban land. The areas of these components are so intermixed or so small that separation at the scale of mapping is impractical. Depth to the water table depends on the established drainage in the area.

About 20 to 45 percent of the complex is open land, such as lawns and vacant lots, and about 40 to 70 percent is Urban land. The rest is modified areas of Margate, Pompano, and Basinger soils and filled ponds.

The open land consists of nearly level, poorly drained Hallandale soil that has been modified in most places by spreading fill material on the surface of the original soil to an average thickness of about 12 inches. The original soil below the fill material is Hallandale fine sand. About 80 percent of the fill material consists of a mixture of sand, limestone, and shell fragments that range from sand size to about 3 inches in diameter. The remaining 20 percent is sand.

The Urban land consists of areas covered by sidewalks, streets, patios, driveways, buildings, and other construction related to urban use.

The Margate soils have also been modified by spreading fill material on the surface of the original soil to an average thickness of about 12 inches, and the Pompano and Basinger soils have been modified by spreading fill material on the surface of the original soil.

The determined use of the soils for the foreseeable future is urban related.

This complex is not assigned to a capability subclass.

Hm—Hallandale and Margate soils. These are nearly level, poorly drained soils that have been modified by grading, shaping, and covering with 8 to 20 inches of fill material. These alterations were made to provide a base for construction of homes, streets, and industrial buildings. Depth to the water table in these soils is variable and depends on the established drainage in the area.

Hallandale soil covered by fill material makes up about 45 percent of the total acreage, and Margate soil covered with fill makes up about 35 percent. The remaining 20 percent is mostly filled ponds, areas of Pompano soils, and areas of Basinger soils that have been modified by spreading fill on the surface of the original soil.

Included with these soils in mapping are small areas of Urban land.

The fill material on these soils consists of sand, shell fragments, and limestone fragments. About 80 percent of the fill is mixed shell and limestone fragments ranging from sand size to 3 inches in diameter. The average thickness of the fill on these soils is about 12 inches, but some areas that originally were the lower areas in the landscape are covered by as much as 5 feet of fill material.

Planned use of these soils is for urban development only.

These soils are not assigned to a capability subclass.

Immokalee Series

The Immokalee series consists of nearly level, poorly drained soils on broad, low ridges in the eastern part of the survey area. These soils formed in unconsolidated marine sediment. Under natural conditions they have a water table at a depth of 10 inches or less for 1 to 4 months in most years, and at a depth of 10 to 40 inches for most of the rest of the year. In some years these soils are covered with shallow water for a few days.

Typically, the surface layer is dark gray fine sand about 6 inches thick. The subsurface layer is 34 inches of fine sand. The upper 14 inches is light gray, and the lower 20 inches is white. The subsoil extends to a depth of 80 inches. The upper 22 inches is black fine sand that is coated with organic matter. The next 3 inches is dark reddish brown fine sand that has black mottles and is coated with organic matter. The lower 15 inches is dark brown fine sand.

Permeability is moderate to moderately rapid in the subsoil and rapid in all other layers. Available water capacity is medium to high in the subsoil and very low in all other layers. Content of organic matter and natural fertility are low.

Where adequate water control and good management practices are in use, Immokalee soils are suited to winter truck crops and improved pasture grasses.

Typical pedon of Immokalee fine sand, 350 feet west of railroad and 1.25 miles south of Hillsborough Boulevard, SE1/4NW1/4 sec. 11, T. 48 S., R. 42 E.:

A1—0 to 6 inches; dark gray (10YR 4/1), rubbed, fine sand; light gray (10YR 7/1), unrubbed and dry, sand grains mixed with some organic matter; single grained; loose; common fine and medium roots; strongly acid; clear smooth boundary.

A21—6 to 20 inches; light gray (10YR 7/1) fine sand; single grained; loose; few fine and medium roots; strongly acid; clear smooth boundary.

A22—20 to 40 inches; white (10YR 8/1) fine sand; few fine distinct very dark gray (10YR 3/1) streaks along

Figure 6.—Typical vegetation of slash pine, sawpalmetto, and native grasses in an area of Immokalee fine sand.

streets commonly are excavated below the level of original land surface and serve as drainageways. The excavated material is spread over adjacent areas.

Included with this complex in mapping are small areas of Basinger, Immokalee, Margate, and Pompano soils. These soils have been altered by having had fill material up to 20 inches thick spread over the surface of the original soil. Also included are Arents and Udorthents.

Present land use precludes the use of this map unit for crops, pasture, or commercial trees. Most of the Immokalee, limestone substratum, part of this unit is used for grasses and ornamentals. Adequate surface drainage, proper watering, and regular applications of fertilizer are needed for satisfactory plant growth.

This complex is not assigned to a capability subclass.

Iu—Immokalee-Urban land complex. This complex consists of Immokalee fine sand and Urban land. The areas of these components are so intermixed or so small that separation at the scale of mapping is impractical. Depth to the water table depends on the established drainage in the area.

About 20 to 45 percent of the complex is open land, such as lawns and vacant lots; and about 40 to 70 percent is Urban land, or areas covered by sidewalks, streets, patios, driveways, and buildings, where the natural soil cannot be observed.

Figure 7.—Eggplant in an area of Immokalee fine sand where water control measures and intensive management are in use.

The open land consists of nearly level, poorly drained Immokalee soils that have been modified in most places by spreading sandy material on the surface of the soil to an average thickness of about 12 inches, but ranging from about 6 to 20 inches. About 10 percent of the Immokalee soils have not been modified. The original soil below the fill material is Immokalee fine sand.

Included with this complex in mapping are small areas of Basinger, Pompano, Margate, and Hallandale soils. These soils have been modified by spreading fill material on the surface of the original soil.

About 80 percent of the fill material on the Immokalee soils is sand. The rest of the fill material on the Immokalee soils and most of the fill material on the other soils consist of a mixture of shell fragments and limestone fragments ranging from sand size to about 3 inches in diameter.

The determined use of these soils for the foreseeable future is urban related.

The complex is not assigned to a capability subclass.

Lauderhill Series

The Lauderhill series consists of nearly level, very poorly drained soils in broad flats in the Everglades. These soils formed in hydrophytic plant remains mixed with a small amount of mineral material. Under natural conditions these soils are covered with water most of the year. Even where drainage has been improved, water stands on the surface for 6 to 12 months each year.

Typically, the upper 9 inches is black sapric material, or muck. Below this, to a depth of about 27 inches, is dark reddish brown sapric material. Between depths of 27 and 31 inches is dark reddish brown sapric material that is about 77 percent mineral material, of which 15

limestone fragments and sand. Slope is commonly nearly level to gently sloping (0 to 5 percent) but ranges to steep (20 to 45 percent) on the short side slopes of highway interchanges. This soil is somewhat poorly drained to moderately well drained in most areas.

Where the mixed fill material is less than about 30 inches thick, most of the underlying natural soils can be identified. Of these, Hallandale and Margate soils are dominant and the others include Immokalee soils, Basinger soils, and other poorly drained and very poorly drained soils.

Included with Udorthents, shaped, in mapping are small areas of Urban land and Arents. Also included are small areas that have less than 20 inches of fill material and areas in which the fill material rests on layers of organic material ranging from thin to thick.

Depth to the water table depends somewhat on the established drainage in the area, but it is generally 20 to 50 inches most of each year. Permeability is variable but generally is rapid. The available water capacity is commonly low. Also, natural fertility and organic matter content are low. Under good management, which includes proper fertilization and irrigation, grasses and landscaping ornamentals can be grown satisfactorily.

The determined use of this soil for the foreseeable future is for recreation (fig. 10) and other urban purposes.

This soil is not assigned to a capability subclass.

Uo—Udorthents-Urban land complex. About 50 to 70 percent of this complex consists of Udorthents, which are in open areas; and about 30 to 50 percent consists of Urban land, or areas covered by concrete and buildings. The areas of these components are so intermixed or so small that to map them separately at the scale of mapping used is impractical.

The open areas of Udorthents are lawns, vacant lots, parks, and playgrounds. Urban land consists of streets, sidewalks, parking lots, and buildings or other construction where the soil is covered and cannot be readily observed.

Udorthents are nearly level, somewhat poorly drained or moderately well drained soils consisting of a mixture of sand, rock fragments, and shell more than 20 inches thick over natural soils. This mixed soil material has been placed over wet, sandy soils in low areas to make them suitable for building sites or other uses. The underlying natural soil can generally be identified in places where the fill material is less than about 30 inches thick.

Included with this complex in mapping are small areas of sandier Arents soils and scattered areas of Udorthents which are not presently being developed for urban uses. Also included are similar soils that have less than 20 inches of overburden material and scattered small areas in which the overburden material rests on organic soils.

Depth to the water table in the Udorthents depends on the established drainage in the area, but is commonly 20 to 50 inches most of each year. Permeability is variable but generally is rapid. The available water capacity is generally low. Also, natural fertility and organic matter content are low. Under good management, which includes proper watering and fertilization, commonly grown lawn grasses and ornamentals can be produced satisfactorily.

The determined use of this map unit for the foreseeable future is urban related.

This complex is not assigned to a capability subclass.

Urban land

Ur—Urban land. This map unit consists of areas that are more than 70 percent covered by airports, shopping centers, parking lots, large buildings, streets and sidewalks, and other structures, so that the natural soil is not readily observable (fig. 11).

Unoccupied areas of this land type, mostly lawns, parks, vacant lots, and playgrounds, consist of soils in the Hallandale, Margate, Immokalee, and Basinger series that have been altered by fill material spread on the surface to an average thickness of about 12 inches. These unoccupied areas are in tracts too small to be mapped separately. The fill is mostly sandy material, some of which contains limestone and shell fragments.

This map unit is not assigned to a capability subclass.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	G/cm³	In/hr	In/in	pH	Mmhos/cm					Pct
Hb*:												
Hallandale------	0-4	<3	1.35-1.45	6.0-20	0.05-0.11	5.1-6.5	<2	Low-------	0.10	2	2	2-5
	4-10	<3	1.50-1.60	6.0-20	0.03-0.08	6.1-6.5	<2	Low-------	0.10			
	10-14	<3	1.50-1.60	0.6-6.0	0.03-0.08	5.6-8.4	<2	Low-------	0.10			
	14-16	<5	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	<2	Low-------	0.10			
	16	---	---	---	---	---	---	----------	----			
Urban land.												
Hm*:												
Hallandale------	0-4	<3	1.35-1.45	6.0-20	0.05-0.11	5.1-6.5	<2	Low-------	0.10	2	2	2-5
	4-10	<3	1.50-1.60	6.0-20	0.03-0.08	6.1-6.5	<2	Low-------	0.10			
	10-14	<3	1.50-1.60	0.6-6.0	0.03-0.08	5.6-8.4	<2	Low-------	0.10			
	14-16	<5	1.50-1.60	6.0-20	0.05-0.10	6.6-8.4	<2	Low-------	0.10			
	16	---	---	---	---	---	---	----------	----			
Margate---------	0-8	1-4	1.25-1.45	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.10	3	2	1-4
	8-16	0-4	1.55-1.65	6.0-20	0.03-0.06	5.1-6.5	<2	Low-------	0.10			
	16-28	1-4	1.55-1.65	6.0-20	0.03-0.06	6.1-7.8	<2	Low-------	0.10			
	28-32	3-10	1.55-1.65	6.0-20	0.03-0.10	7.4-8.4	<2	Low-------	0.17			
	32	---	---	---	---	---	---	----------	----			
Ia----------	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low-------	0.10	5	2	1-2
Immokalee	6-40	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
	40-65	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low-------	0.15			
	65-80	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
Ir*:												
Immokalee-------	0-5	1-5	1.20-1.50	>6.0	0.05-0.10	5.1-7.8	<2	Low-------	0.10	5	2	1-2
	5-48	1-5	1.40-1.70	>6.0	0.02-0.05	5.1-7.8	<2	Low-------	0.10			
	48-58	2-7	1.30-1.60	0.6-6.0	0.10-0.25	5.1-7.8	<2	Low-------	0.15			
	58	---	---	---	---	---	---	----------	----			
Urban land.												
Iu*:												
Immokalee-------	0-6	1-5	1.20-1.50	6.0-20	0.05-0.10	3.6-6.0	<2	Low-------	0.10	5	2	1-2
	6-35	1-5	1.45-1.70	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
	35-54	2-7	1.30-1.60	0.6-2.0	0.10-0.25	3.6-6.0	<2	Low-------	0.15			
	54-72	1-5	1.40-1.60	6.0-20	0.02-0.05	3.6-6.0	<2	Low-------	0.10			
Urban land.												
La----------	0-31	---	0.15-0.35	6.0-20	0.20-0.30	5.6-7.8	<2	Low-------	----	---	2	>55
Lauderhill	31	---	---	---	---	---	---	----------	----			
Ma----------	0-8	1-4	1.25-1.45	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.10	3	2	1-4
Margate	8-16	0-4	1.55-1.65	6.0-20	0.03-0.06	5.1-6.5	<2	Low-------	0.10			
	16-28	1-4	1.55-1.65	6.0-20	0.03-0.06	6.1-7.8	<2	Low-------	0.10			
	28-32	3-10	1.55-1.65	6.0-20	0.03-0.10	7.4-8.4	<2	Low-------	0.17			
	32	---	---	---	---	---	---	----------	----			
Mu*:												
Margate---------	0-8	1-4	1.25-1.45	6.0-20	0.05-0.10	4.5-6.0	<2	Low-------	0.10	3	2	1-4
	8-16	0-4	1.55-1.65	6.0-20	0.03-0.06	5.1-6.5	<2	Low-------	0.10			
	16-28	1-4	1.55-1.65	6.0-20	0.03-0.06	6.1-7.8	<2	Low-------	0.10			
	28-32	3-10	1.55-1.65	6.0-20	0.03-0.10	7.4-8.4	<2	Low-------	0.17			
	32	---	---	---	---	---	---	----------	----			
Urban land.												
Ok----------	0-40	---	0.22-0.38	6.0-20	0.20-0.30	4.5-6.5	<2	Low-------	----	---	2	>60
Okeelanta	40-60	1-5	1.30-1.55	6.0-20	0.05-0.10	5.1-7.8	<2	Low-------	0.15			
Pa----------	0-26	<2	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Low-------	0.10	5	1	<.5
Paola	26-83	<3	1.45-1.60	>20	0.02-0.05	4.5-7.3	<2	Low-------	0.10			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	G/cm³	In/hr	In/in	pH	Mmhos/cm					Pct
Uo*:												
Udorthents------	0-30	1-5	1.35-1.45	6.0-20	0.02-0.05	7.4-8.4	<2	Low--------	0.10	5	8	---
	30-50	1-10	1.35-1.55	6.0-20	0.02-0.08	5.1-7.3	<2	Low--------	0.10			
	50	---	---	---	---	---	---	----------	----			
Urban land.												
Ur*.												
Urban land												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock depth	Initial subsidence	Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months			Uncoated steel	Concrete
					Ft			In	In		
Hm**:											
Hallandale	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	7-20	---	High	Low.
Margate	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	20-40	---	High	Moderate.
Ia Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	---	High	High.
Ir**:											
Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	40-72	---	High	Moderate.
Urban land.											
Iu**:											
Immokalee	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	---	High	High.
Urban land.											
La Lauderhill	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	20-40	4-8	High	Moderate.
Ma Margate	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	20-40	---	High	Moderate.
Mu**:											
Margate	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	20-40	---	High	Moderate.
Urban land.											
Ok Okeelanta	B/D	None	---	---	+1-0	Apparent	Jun-Jan	>60	16-20	High	Moderate.
Pa Paola	A	None	---	---	>6.0	---	---	>60	---	Low	High.
Pb**:											
Paola	A	None	---	---	>6.0	---	---	>60	---	Low	High.
Urban land.											
Pc Palm Beach	A	None	---	---	>6.0	---	---	>60	---	Low	Low.
Pe Pennsuco	D	None	---	---	0-1.0	Apparent	Jun-Nov	40-72	---	High	Low.
Pf Pennsuco	D	Frequent	Long	Jan-Dec	0-1.0	Apparent	Jan-Dec	40-72	---	High	Low.
Pm Plantation	B/D	None	---	---	+1-1.0	Apparent	Jun-Nov	20-40	4-8	High	Moderate.

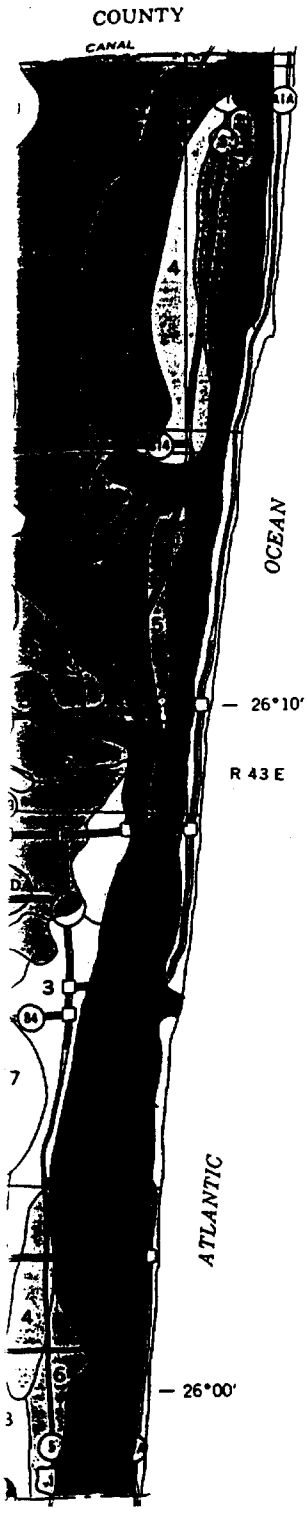
See footnotes at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock depth	Initial subsidence	Risk of corrosion	
		Frequency	Duration	Months	Depth*	Kind	Months			Uncoated steel	Concrete
					Ft			In	In		
Po Pomello	C	None	---	---	2.0-3.5	Apparent	Jul-Nov	>60	---	Low	High.
Pp Pompano	B/D	None	---	---	0-1.0	Apparent	Jun-Nov	>60	---	High	Moderate.
Ps Perrine	D	None	---	---	0-1.0	Apparent	Jun-Nov	20-40	---	High	Low.
Pu**: Palm Beach	A	None	---	---	>6.0	---	---	>60	---	Low	Low.
Urban land.											
Pv Perrine Variant	D	Frequent	Long	Jan-Dec	0-1.0	Apparent	Jan-Dec	>60	---	High	Low.
Sa Sanibel	B/D	None	---	---	+1-1.0	Apparent	Jun-Feb	>60	3-5	High	Low.
St St. Lucie	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Tc Terra Ceia	D	Frequent	Very long	Jan-Dec	0-1.0	Apparent	Jan-Dec	>60	16-20	High	High.
Ud** Udorthents	A	None	---	---	>6.0	---	---	>60	---	Low	Low.
Um**: Udorthents	B	None	---	---	2.0-4.0	Apparent	Jan-Dec	>60	---	Moderate	Low.
Urban land.											
Un** Udorthents	B	None	---	---	2.0-4.0	Apparent	Jan-Dec	40-72	---	High	Moderate.
Uo**: Udorthents	B	None	---	---	2.0-4.0	Apparent	Jan-Dec	40-72	---	High	Moderate.
Urban land.											
Ur**. Urban land											

* A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water is above the surface. The second numeral indicates the depth below the surface.
** See description of the map unit for composition and behavior characteristics of the map unit.



LEGEND

SOILS OF THE COASTAL RIDGES

Paola-Urban land-St. Lucie association: Excessively drained, nearly level, sandy soils that are more than 80 inches deep; large areas have been modified for urban use

2 — Palm Beach-Urban land-Beaches association: Excessively drained, nearly level to sloping, deep, sandy soils that have fine shell fragments throughout, and Beaches; most areas have been modified for urban use

SOILS OF THE LOW RIDGES, KNOLLS, AND FLATWOODS

3 — Dade-Urban land association: Well drained, nearly level, sandy soils that vary greatly in depth to soft limestone, generally between 20 and 40 inches; most areas have been modified for urban use

4 — Duette-Urban land-Pomello association: Moderately well drained, nearly level and gently sloping, sandy soils that have a dark subsoil generally more than 50 inches deep; most areas have been modified for urban use

5 — Immokalee-Urban land-Pompano association: Poorly drained, nearly level, sandy soils that are more than 80 inches deep; most have a dark, organic coated subsoil; some areas have been modified for urban use

6 — Immokalee-Urban land association: Poorly drained, nearly level, sandy soils that have a dark subsoil that is underlain by limestone at a depth of more than 40 inches; most areas have been modified for urban use

SOILS OF THE LOW FLATWOODS, SLOUGHS, AND MARSHES

7 — Hallandale-Margate association: Poorly drained, nearly level, sandy soils that are less than 60 inches deep to hard limestone

Lauderhill-Dania association: Very poorly drained, nearly level, organic soils that are less than 40 inches deep to hard limestone

SOILS OF THE COASTAL LOWLANDS AND TIDAL SWAMPS

Udorthents-Urban land-Pennsuco association: Soils that have been modified by spreading mixed limestone fragments, sand, and shell fill material over the natural surface, Urban land, and very poorly drained, loamy soils underlain by limestone; in swamps and lowlands

Arents-Urban land association: Soils that have been modified for urban use by spreading sandy fill material over the natural soil surface, and Urban land; in low coastal areas

Compiled 1982

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IN COOPERATION WITH
UNIVERSITY OF FLORIDA,
INSTITUTE OF FOOD AND AGRICULTURE SCIENCES,
AGRICULTURAL EXPERIMENT STATIONS,
SOIL SCIENCE DEPARTMENT,
AND FLORIDA DEPARTMENT OF AGRICULTURE
AND CONSUMER SERVICES

GENERAL SOIL MAP

BROWARD COUNTY
FLORIDA
EASTERN PART

1 0 1 2 3 4 Miles

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND

SYMBOL	NAME
Ae	Arents-Urban land complex
Ao	Arents, organic substratum-Urban land complex
Ba	Basinger fine sand
Bc	Boca fine sand
Be	Beaches
Ca	Canaveral-Urban land complex
Da	Dania muck
Dd	Ded fine sand
Df	Duette-Urban land complex
Du	Dade-Urban land complex
Ha	Hallandale fine sand
Hb	Hallandale-Urban land complex
Hm	Hallandale and Margate soils
Ia	Immokalee fine sand
Ir	Immokalee, limestone substratum-Urban land complex
Iu	Immokalee-Urban land complex
La	Lauderhill muck
Ma	Margate fine sand
Mu	Margate-Urban land complex
Ok	Okeelanta muck
Pa	Paola fine sand
Pb	Paola-Urban land complex
Pc	Palm Beach sand
Pe	Pennsuco silty clay loam
Pf	Pennsuco silty clay loam, tidal
Pm	Plantation muck
Po	Pomello fine sand
Pp	Pompano fine sand
Ps	Perrine silty clay loam
Pu	Palm Beach-Urban land complex
Pv	Perrine Variant silt loam
Sa	Sanibel muck
St	St. Lucie fine sand
Tc	Terra Ceia muck, tidal
Ud	Udorthents
Um	Udorthents, merly substratum-Urban land complex
Un	Udorthents, shaped
Uo	Udorthents-Urban land complex
Ur	Urban land

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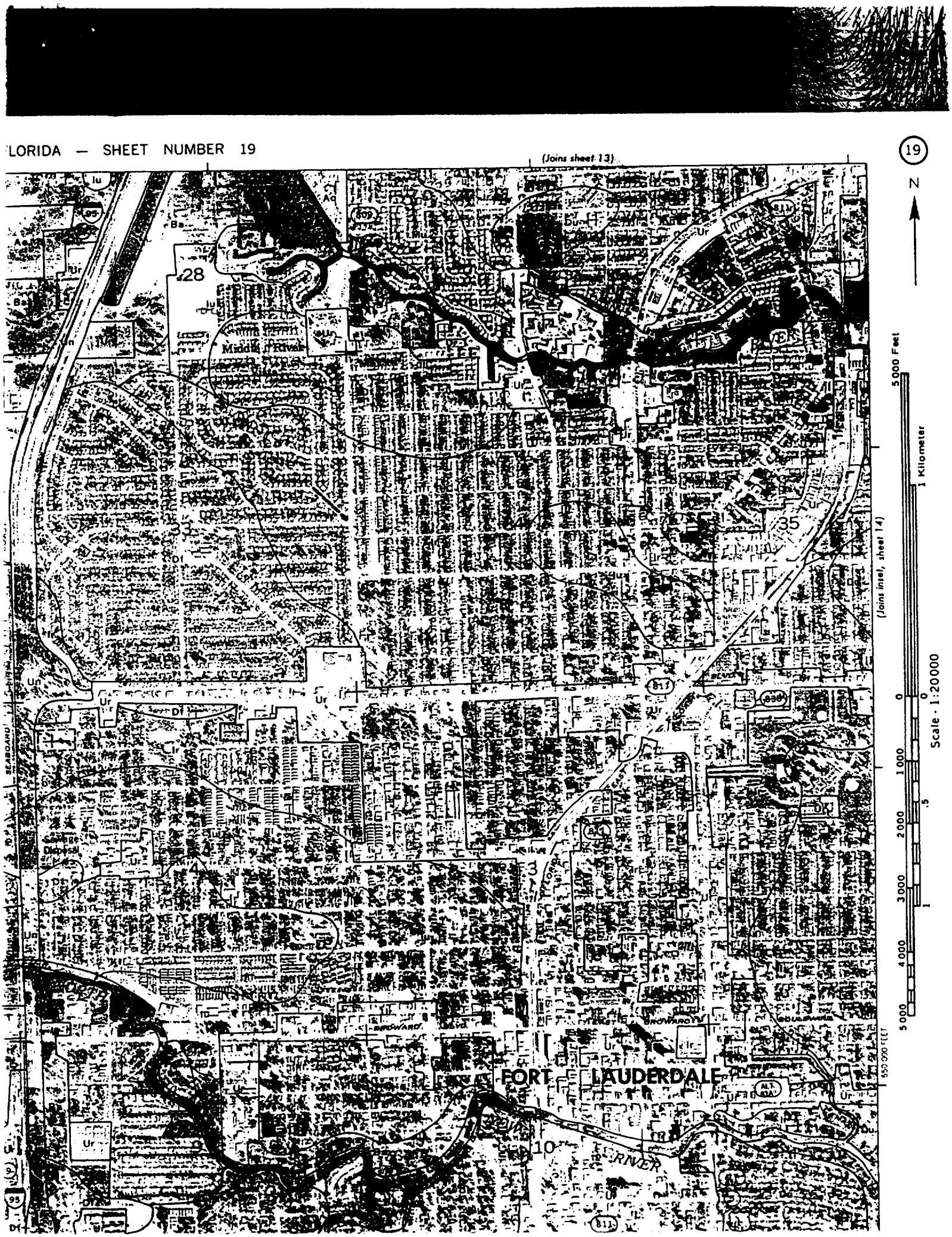
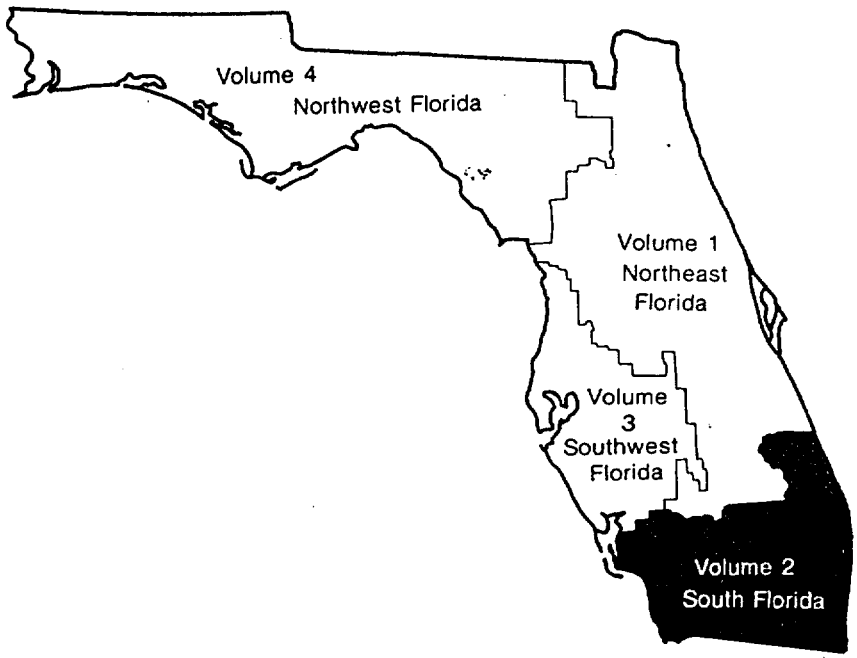

LORIDA — SHEET NUMBER 19
19
(Joins sheet 13)
N
Middle River
FORT LAUDERDALE
RIVER
(Joins inset, sheet 14)
5000 Feet
1 Kilometer
Scale - 1:20000

Reference 43

Water Resources Data Florida

Water Year 1990

Volume 2A. South Florida Surface Water

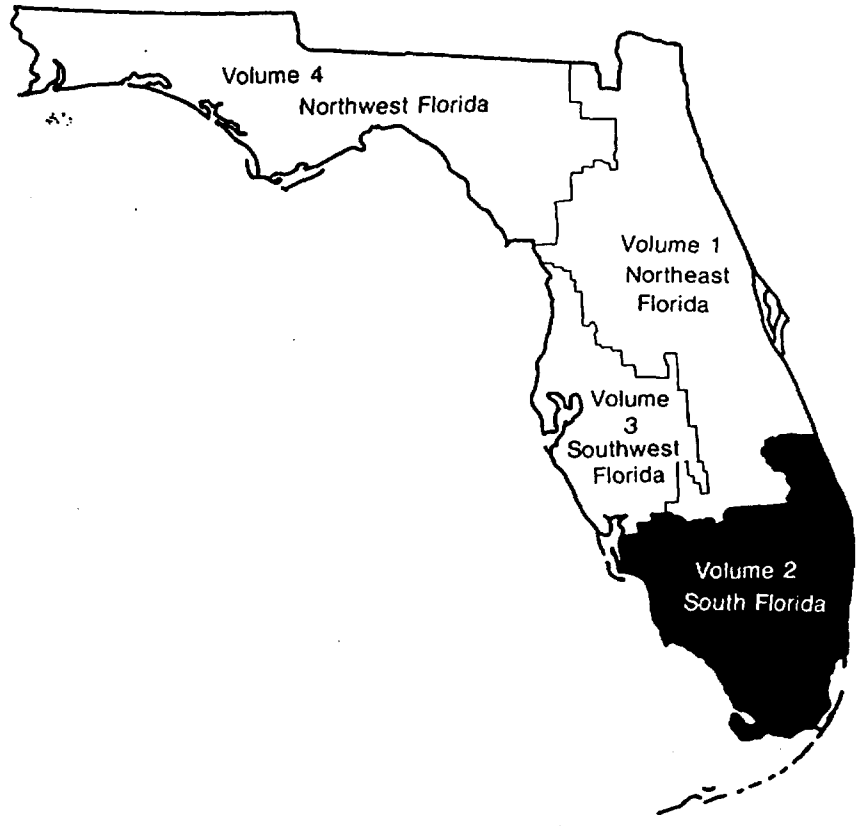


U.S. GEOLOGICAL SURVEY WATER-DATA R
Prepared in cooperation with the State of Florida
and with other agencies

Water Resources Data Florida Water Year 1990

Volume 2A. South Florida Surface Water

by W.J. Haire and C. Price



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT FL-90-2A
Prepared in cooperation with the State of Florida
and with other agencies

02285000 NORTH NEW RIVER CANAL NEAR FORT LAUDERDALE, FL

LOCATION.--Lat 26°05'39", long 80°13'48", in SW¼ sec.14, T.50 S., R.41 E., Broward County, Hydrologic Unit 03090202, on left bank 20 ft upstream from lock and salinity-control structure on State Highway 84, and 6 mi southwest of Fort Lauderdale.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--May to September 1913 (discharge measurements). November 1939 to current year. Records of gage heights prior to October 1961 are available in files of the Geological Survey.

GAGE.--Water-stage recorder and sharp crested weir. Datum of gage is National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). Prior to Apr. 13, 1940, nonrecording gage at same site and datum. Dec. 9, 1959, to Sept. 30, 1967, deflection vane recorder near left bank 20 ft upstream from lock and dam. Auxiliary water-stage recorder at downstream end of lock chamber. Aug. 1, 1947, to July 20, 1950, auxiliary gage at site 300 ft downstream.

REMARKS.--Estimated daily discharge Feb. 16 - Mar. 13. Records poor. Flow regulated at and above station by control structure for irrigation, drainage, and flood and fire control. Several small diversions above station for irrigation. Since February 1952, flow materially affected by control structure at 20-mile bend, 14 mi upstream. Discharge computed from relations between discharge, head, and submergence.

COOPERATION.--Stoplog record provided by South Florida Water Management District.

AVERAGE DISCHARGE.--50 years, 351 ft^3/s, 254,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 3,280 ft^3/s Nov. 19, 1947; maximum gage height, 10.83 ft Oct. 17, 1947; no flow May 5, 6, 13, 15-20, 24-26, 1966; minimum gage height, 0.08 ft Aug. 13, 1978, July 19, 1982.

EXTREMES OUTSIDE OF PERIOD OF RECORD.--Flood of Oct. 15, 1929, reached a stage of 7.66 ft, present site and datum, discharge, 5,400 ft^3/s from records by Everglades Drainage District.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 140 ft^3/s, June 9; maximum gage height, 5.44 ft July 22; minimum daily discharge, 3.0 ft^3/s (estimated leakage) for some days during the year; minimum gage height, 2.90 ft July 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.1	3.0	3.0	19
2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	26
3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	25
4	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.8	3.4	14
5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	11	3.4	3.0
6	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	7.7	3.1	3.0
7	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	38	3.1	3.0
8	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	122	48	3.0	3.0
9	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	140	29	3.0	8.4
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	91	3.0	3.0	11
11	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	27	9.6	3.0	3.0
12	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.2	14	3.0	3.0
13	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	13	3.0	3.0
14	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	40	3.2	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	27	3.0	3.0
16	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	14	3.1	3.0
17	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	19	3.0	3.0
18	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	24	3.0	3.0
19	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	5.4	5.9	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	14	9.8	3.0
21	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	49	5.1	3.8
22	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	92	3.0	3.0
23	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	119	3.0	3.0
24	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	14	18	3.0	3.0
25	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	21	7.1	3.0	3.0
26	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	6.0	52	3.0	3.0
27	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	31	3.0	3.0
28	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.3	3.0	18	3.0	4.9
29	3.0	3.0	3.0	3.0	---	3.0	3.0	4.7	3.0	13	3.2	42
30	3.0	3.0	3.0	3.0	---	3.0	3.0	3.0	3.0	9.4	3.0	17
31	3.0	---	3.0	3.0	---	3.0	---	3.0	---	3.0	3.0	---
TOTAL	93.0	90.0	93.0	93.0	84.0	93.0	90.0	95.0	491.3	742.0	106.3	231.1
MEAN	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.06	16.4	23.9	3.43	7.70
MAX	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.7	140	119	9.8	42
MIN	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
AC-FT	184	179	184	184	167	184	179	188	974	1470	211	458

WTR YR 1990 TOTAL 2301.7 MEAN 6.31 MAX 140 MIN 3.0 AC-FT 4570

EVERGLADES AND SOUTHEASTERN COASTAL AREA

02285001 NORTH NEW RIVER CANAL BELOW CONTROL NEAR FORT LAUDERDALE, FL

LOCATION.--Lat 26°05'39", long 80°13'50", in SW¼ sec.14, T.50 S., R.41 E., Broward County, Hydrologic Unit 03090202, on left bank downstream side of salinity-control structure on State Highway 84, and 6 mi southwest of Fort Lauderdale.

DRAINAGE.--Indeterminate.

PERIOD OF RECORD.--October 1943 to July 1947 (fragmentary), August 1974 to current year (gage heights). Record of gage heights prior to October 1962 are available in files of the Geological Survey.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). Aug. 1, 1947 to July 20, 1950, water-stage recorder at site 300 ft downstream at same datum.

REMARKS.--Estimated daily tidal low stage, Jan. 9-11, 20-23, Feb. 2-4, 17-20. Stage is basically tidal but is occasionally affected by operation of salinity-control structure during high flow. The stage record published is the maximum and minimum tide event for each calendar day.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 10.56 ft Oct. 19, 1947; minimum -1.33 ft Dec. 31, 1956.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 2.53 ft Oct. 30; minimum -0.68 ft estimated Feb. 17, 19.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
TIDAL HIGH (DAILY) VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.98	2.20	1.55	1.13	1.16	1.79	1.62	1.27	1.77	1.47	1.46	1.53
2	1.95	2.07	1.35	1.06	1.09	1.73	1.72	1.38	1.66	1.67	1.42	1.73
3	1.78	2.06	1.39	1.01	.94	1.62	1.77	1.35	1.61	1.51	1.50	2.07
4	1.75	1.94	1.59	1.10	.80	1.49	1.72	1.33	1.57	1.47	1.62	1.94
5	1.76	1.92	1.51	.99	.70	1.47	1.67	1.57	1.63	1.57	1.74	2.07
6	1.66	1.91	1.54	1.05	1.01	1.47	1.55	1.78	1.53	1.57	1.72	2.11
7	1.61	1.99	1.46	1.21	.97	1.57	1.63	1.81	1.46	1.54	1.78	2.24
8	1.70	2.20	1.49	1.26	1.17	1.89	1.87	1.87	1.99	1.49	1.78	2.13
9	1.87	2.22	1.26	1.15	1.25	1.72	1.90	1.70	1.95	1.49	1.69	2.06
10	1.95	2.07	1.21	1.21	1.35	1.73	1.80	1.98	1.73	1.48	1.84	1.89
11	1.86	2.03	1.42	1.20	1.36	1.69	1.64	1.96	1.62	1.44	1.89	1.75
12	2.11	1.96	1.57	1.24	1.31	1.56	1.63	1.70	1.69	1.54	1.94	1.80
13	2.25	1.84	1.52	1.36	1.23	1.59	1.61	1.62	1.57	1.49	1.89	1.81
14	2.35	1.97	1.46	1.32	1.08	1.62	1.59	1.33	1.44	1.41	1.88	1.91
15	2.22	1.90	1.38	1.32	1.08	1.66	1.50	1.26	1.64	1.45	1.76	1.90
16	2.14	1.85	1.29	1.22	.83	1.51	1.46	1.44	1.69	1.37	1.76	2.01
17	2.02	1.61	1.37	1.18	.47	1.34	1.36	1.47	1.57	1.57	1.81	1.96
18	1.86	1.40	1.12	1.05	.44	1.03	1.39	1.39	1.66	1.48	1.79	1.85
19	1.72	1.47	.99	.81	.45	1.07	1.41	1.48	1.80	1.70	1.89	2.00
20	1.23	1.40	.88	.88	.40	1.17	1.51	1.60	1.81	1.86	1.88	2.10
21	1.33	1.54	.93	.54	.60	1.29	1.57	1.54	1.63	1.87	1.82	2.11
22	1.44	1.49	.99	.39	.91	1.49	1.78	1.69	1.68	2.10	1.82	1.91
23	1.53	1.41	1.40	.69	1.08	1.40	2.01	1.84	1.82	2.08	1.96	1.88
24	1.63	1.28	1.29	1.09	1.10	1.67	2.01	1.91	1.95	1.99	1.97	1.66
25	1.82	1.38	1.67	1.32	1.29	1.68	1.98	1.89	2.06	1.79	1.88	1.65
26	1.89	1.50	1.80	1.22	1.64	1.67	1.96	1.89	2.07	1.71	1.61	1.74
27	1.98	1.37	1.68	1.27	1.72	1.81	1.96	1.92	1.82	1.66	1.54	1.79
28	2.11	1.23	1.44	1.35	1.75	1.76	1.79	1.90	1.87	1.67	1.61	1.66
29	2.34	1.19	1.44	1.43	---	1.78	1.74	2.26	1.62	1.76	1.56	1.82
30	2.53	1.30	1.46	1.37	---	1.65	1.54	2.10	1.49	1.68	1.40	1.81
31	2.33	---	1.40	1.23	---	1.52	---	1.98	---	1.49	1.52	---
TOTAL	58.70	51.70	42.85	34.65	29.18	48.44	50.69	52.21	51.40	50.37	53.73	56.89
MEAN	1.89	1.72	1.38	1.12	1.04	1.56	1.69	1.68	1.71	1.62	1.73	1.90
MAX	2.53	2.22	1.80	1.43	1.75	1.89	2.01	2.26	2.07	2.10	1.97	2.24
MIN	1.23	1.19	.88	.39	.40	1.03	1.36	1.26	1.44	1.37	1.40	1.53

CAL YR 1989 TOTAL 561.96 MEAN 1.54 MAX 2.53 MIN .83
WTR YR 1990 TOTAL 580.81 MEAN 1.59 MAX 2.53 MIN .39

DISCOVERY FORM

Part 1: Information necessary to add a site to CERCLIS

ACTION: A

EPA ID: FLD [redacted]10860

SITE NAME: G[redacted]ty SOURCE: R (R=EPA, T=STATE

STREET: 300 W. Broward Blvd. CONG DIST: __ (optional)

CITY: Ft. Lauderdale ZIP: _____ - ____

CNTY NAME: Broward CNTY CODE: ___ (optional)

LATITUDE: __ / __ / ____ LONGITUDE: ___ / __ / ____ (optional)

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

RPM NAME: Undine Johnson RPM PHONE: 404 - 347 - 5065 (EPA Project Office

SITE DESCRIPTION: (optional)

- The site was occupied by Gate City Sash & Window until they went OOB in 1972. The property is now owned by Sun Bank.

- Recently 4 underground storage tanks were noted on the property. Two were empty. The other 2 had pentachlorophenol and mineral spirits. (It was not clear if there was a mixture or separate tanks of each chemical.) There reportedly was more pentachlorophenol.

- Sun Bank told FDER and hired someone to do a cleanup. FDER saw the cleanup.

- The chemicals were removed from the 2 tanks and it totaled about 189 55 gal drums.

This information was given to Shane Hitchcock of EPA, Region IV Emergency on or about 6/16/89.

Part 2: Other site information (cont'd below)

DATE SITE FIRST REPORTED: 06 / 16 / 89 REPORTED BY: Ms. Toula of local newspaper 305-761-4264

~~REASON FOR LISTING~~:

Joe McG

Needs Discovery

Sun Bank - owns now
300 W. Broward Blvd.
Ft Lauderdale, Fla.
~~Gate C~~
Gate City Sash + Window

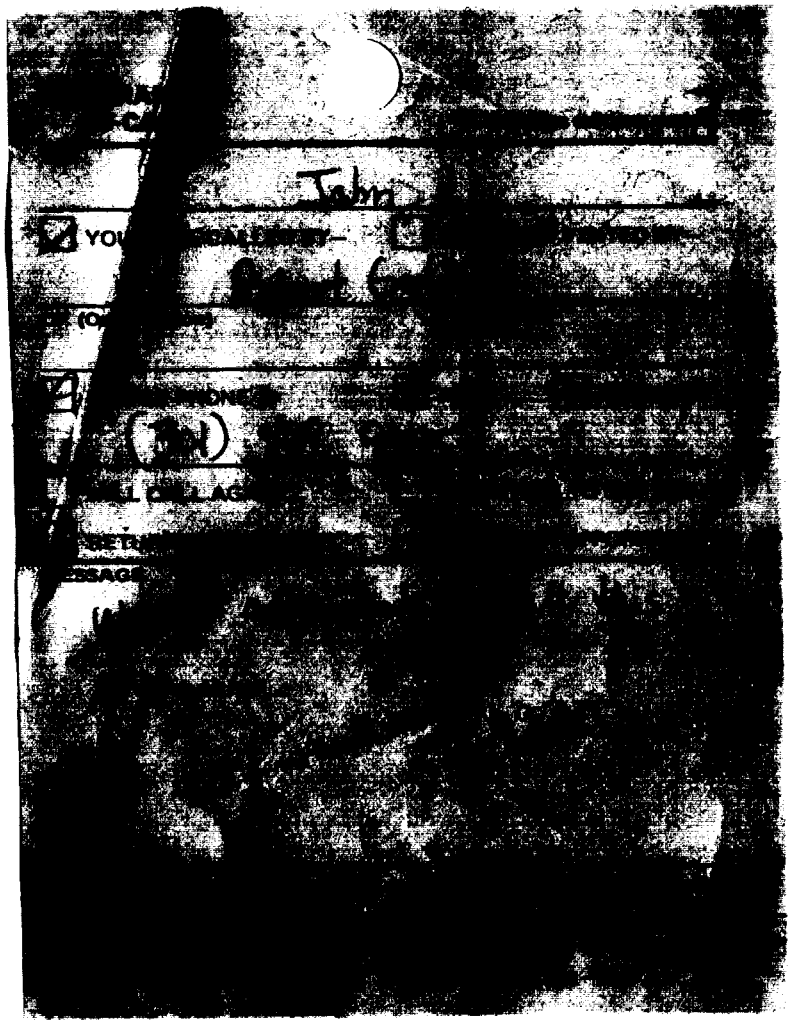
Went OOB 1972

Prelim. Tests - some
leaked into g.w.

4 underground
~~2~~ tanks (2 were empty)
189/55 gal drums
removed from other 2 tanks
Some mineral spirits
most have pentachlorophenol

Hazardous

FDER knows + has seen
cleanup

Sun Bank
~~had~~ told
FDER

Sun Bank hired someone to
do cleanup
I told Shane Hitchcock