SITE INSPECTION REPORT
CELIA'S LAUNDRY, INC.
SAN JUAN, PUERTO RICO

CERCLIS No.: PR00002196368

July1, 2004

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Prepared by:

PUERTO RICO ENVIRONMENTAL QUALITY BOARD
EMERGENCY RESPONSE AND SUPERFUND PROGRAM
SUPERFUND PA/SI DIVISION
SAN JUAN, PUERTO RICO 00917

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July 1, 2004

SUBMITED BY:

Miriam Ortiz Torres
Project Manager

Date: 09/28/04

Miguel A. Maldonado Negrón
Chief
Superfund PA/SI Division

Date: Sept. 28, 2004

SITE SUMMARY

Celia's Laundry, Inc. (CLI) is located on the first floor of a two (2) stories building that is on the north side of Eleanor Roosevelt Street and is surrounded by other commercial facilities. There is a residential apartment on the second floor. There are three (3) concrete buildings on the eastern, western, and northern sides of the property and there are no daycare centers or schools within 200 feet from the site. The site is rectangular in shape and consists of a concrete-covered parking area to the south, one concrete-covered area to the west of and besides the CLI building, another small concrete-covered area to the north and besides the CLI building, and a large area with exposed soil also to the north of the CLI building. This large area of exposed soil is in the backyard of the property and has small areas covered with vegetation or gravel. **Figs.1 and 2; Refs. 1, 2 and 3.**

Inside the CLI building there is a reception area, two large halls where the regular machine wash, drying, and ironing of clothing is performed, and a dry-cleaning area. The dry-cleaning area is in a room on the northern side of the building that opens into the property backyard. This room is covered by a metal roof and consists of a concrete platform with a primary containment system (i.e. ditch). The primary containment system is below the dry-cleaning machine it consists of a ditch covered by a metal screen, and was designed to collect any tetrachloroethylene accidentally released from the machine. **Refs. 2 and 3.**

All the solvent collected inside the ditch is then pumped back into a 55-gallon metal drum that is constantly connected to the dry-cleaning machine for reuse. Both the dry-cleaning machine and the 55-gallon drum are kept above the primary containment system. No secondary containment system exists at the site that will prevent any tetrachloroethylene accidentally released from this primary containment system from reaching the area of exposed soil in the backyard. The fact that there is a concrete ramp next to the primary containment system, which reaches the exposed soil in the backyard, may increase risk of any chemical from reaching the ground surface. **Refs. 4-6.**

CLI have been engaged in the dry-cleaning, machine washing, drying, and ironing of clothing since 1978. Tailoring is also performed at the site. According to Mrs. Celia Aristy, Manager of CLI, Mrs. Noemí López, who also lives on the second floor, owns the property. Currently there are 10 employees working on site. CLI has an updated PREQB air emissions permit (PFE-65-0101-0019-I-

II-0) to operate a dry-cleaning machine, a boiler, and two electric dryers. The rinse water from the washing machines is discarded directly into the Puerto Rico Aqueduct and Sewers Authority (PRASA) sewer system. **Refs. 7 and 8.**

The dry-cleaning process at CLI is performed using tetrachloroethylene (UN 1897). During an Off/On Site Reconnaissance performed on November 29, 2001, five (5) corroded 55-gallon metal drums were observed on the backyard (northern side) of the property. Two of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system. To the north and besides these two drums, there was another corroded drum, also labeled as containing tetrachloroethylene. This drum was partially buried directly into the ground, laying on its side and located over the exposed soil area on the backyard (Figure 2). At the moment of the Site Inspection activities performed on March 17, 2004 personnel from the Superfund PA/SI Division observed that the drums were removed from the areas described above. **Refs. 3 and 6.** In the area of exposed soil on the backyard, the remaining two (2) corroded 55-gallon metal drums that were observed next to and to the north of the three (3) drums containing tetrachloroethylene during the Off/On Site Reconnaissance performed on November 29, 2001 were also removed. These drums were also partially buried directly into the ground and laying on their side (Figure 2). According to Mrs. Aristy, these drums were previously used to store kerosene. One of these drums was over the gravel area while the other was over the exposed soil (Figure 2). **Refs. 3 and 9.**

Within a 4-mile radius from the site there are twenty-seven (27) PRASA drinking water wells. Two (2) of these wells are within a 2-mile radius, are downgradient (Pozo Truman and Pozo Miguel Such), and were closed in 1987 due to contamination with volatile organic compounds (VOC's), including tetrachloroethylene, among others. There are also two other PRASA drinking water wells that are downgradient and within ½ - mile distance from the site (Pozo Extension Roosevelt and Pozo Parque Roosevelt), but are not operational. **Refs. 6, 10, and 11.** The fact that tetrachloroethylene is being used at the site for the dry-cleaning process since 1978, that there were four (4) 55-gallon metal drums labeled as containing either tetrachloroethylene or kerosene laying on their side and directly over the ground at the site, and that there are two wells located downgradient

from the site closed due to contamination with VOC's (including tetrachloroethylene), CLI represents a threat to other drinking water wells in the area. **Refs. 6 and 22.**

The CLI site is located over the San Juan region. The area consists of a very gently sloping coastal plain in the northern part and a low to moderate hilly section on the south. The coast is marked mostly by sand beaches, but at the western end of the area eoliniate crops out in the sea cliffs of San Juan and the adjoining low hills as well as in the chain of small rocks that rise offshore. Behind the coast there are several enclosed to nearly enclosed lagoons, including the Bahía de San Juan. In the southern part of the coastal area, several hills and steep-sided rocky ridges of Miocene limestone rise abruptly from the featureless plain. To the south the uplands, which are underlain by rocks of Late Cretaceous to late Paleocene or early Eocene age, the ground rises progressively and develops a rugged aspect only at the southern edge of the map area. The upland is underlain by a sequence of much-deformed rocks that consist of volcanic, tuffaceous, sedimentary rocks, and the Aymamón formation. The soils are mainly clay, silt, and sand, mainly red or mottled red and light-gray, which includes Mucarabones Sand and San Sebatian Formation in the area east of Río Piedras. The thickness of this formation is variable but probably greater than 100 m in certain places. The regional groundwater in the upper and lower aquifers within the Bayamón-Loíza region flows northward from surficial exposures of the formations of Tertiary age, where the recharge occurs, to eventually discharge into swamps and lagoons along the coast. Ground water also moves locally towards the mainstream systems of the Río Bayamón, Río Piedras, and Río Grande de Loíza. The Bayamón-Loíza region includes the San Juan metropolitan area, which is comprised of the capital city of San Juan. The population of the region was approximately 434,374 in 2000. Estimated total ground water withdrawals of 0.94 Mgal/d were a small fraction of the total public water supply in the Bayamón-Loíza region in 1987. Public water supply wells located throughout the San Juan metropolitan area were in stand-by status most of the time, and were activated only during emergency situations. **Fig. 1; Refs. 12-14, and 46.**

The population within a 4-mile radius from the site relies on public (PRASA) wells for their domestic use. Currently there are twelve (12) public water wells within a 4-mile radius from the site that are either abandoned or on a standby status. The Hiram Bithorn and Las Américas wells are in a standby status but will open in case of an emergency or drought and can serve a population of

approximately 1,581,248 persons. Other wells have been kept closed since 1987 (Trina Padilla, Escorial, Los Caobos, Puerto Nuevo , Los Pollitos, Manuel A. Pérez II, Pozo Los Caobos, and University Gardens) due to VOC contamination, sodium, and chlorides, among others. During that same year also, VOC was detected in other two (2) PRASA wells (Truman, Miguel Such) located within the target distance limit. Refer to question 8 for more information on these wells. There is a Wellhead Protection Area within a ¼ mile radius from CLI. **Refs. 11, 15 and 16.**

There are no public or private surface water intakes downstream and within 15 miles distance from the site. The site is bordered to the north by Caño Martín Peña, which flows into the Laguna San José, the Río Puerto Nuevo, and the Bahía de San Juan. Caño Martín Peña is at approximately 1.02 miles from CLI and converges into the La Laguna San José at approximately 1.61 miles downstream. The Bahía de San Juan is approximately 2.76 miles from the site. There are three (3) wetlands (Laguna La Torrecilla, Torrecilla Baja, and Laguna de Piñones) within 2 - 3 miles radius. Within the Torrecilla-Piñones wetlands there are a Critical Wildlife Coastal Area, a wetland, and a State Natural Reserve, a fishery (marine sport shore fishing area I). There are four (4) Critical Wildlife Areas within a 4-miles radius from CLI, these are: the Piñones State Forest, which is also a Critical Wildlife Area, the Caño Martín Peña State Natural Reserve, the San José Lagoon, and the San Juan Bay. In the sensitive environments mentioned above and within a 4-mile radius from the site, there have been sightings or are the habitat of twenty four (24) animals and sixteen (16) plants that are listed as Threatened or Endangered Species. **Refs. 17 and 18.**

Personnel from the PREQB Superfund PA/SI Division performed an On-site reconnaissance at the CLI site on November 29, 2001. During that visual inspection five corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). Two of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system. To the north and besides these two drums, there was another corroded drum, also labeled as containing tetrachloroethylene. This drum was partially buried directly into the ground, laying on its side and located over the exposed soil area on the backyard (Figure 2). In the area of exposed soil on the backyard, two additional corroded metal 55-gallon drums were observed next to and to the north of the three drums containing tetrachloroethylene. These drums were also partially buried directly into the ground and laying on their side (Figure 2). According to

Mrs. Aristy, these drums were previously used to store kerosene. One of these drums was over the gravel area while the other was over the exposed soil (Figure 2). Due to the conditions of the site, to the operational history, to the fact that the drums mentioned before were buried in the soil, personnel from the PREQB Superfund PA/SI Division performed sampling activities at CLI as part of a Screening Site Inspection. During the sampling activities, nine (9) soil surface samples were collected on site and within 0-1/4 mile distance from the site at a depth of approximately 0-3 feet. In addition, three (3) groundwater samples were collected from two (2) potable water drinking water wells within 2 miles radius from the site. (Table 2). The inorganics **lead (260 ppm[1]), mercury (.68 ppm)**, and **zinc (5,550 ppm)** were detected in the soil samples collected on site at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's). Regarding the groundwater samples, since there were no background samples collected, the results were compared only with the CRQL's. The inorganics **calcium (39,000 ppm), copper (60 ppm), iron (4,700 ppm), magnesium (8,000 ppm), manganese (190 ppm),** and **sodium (100,000 ppm)** were detected higher than the CRQL's. **Refs. 3, 6, 19, and 20.**

1 ppm = parts per million

SITE ASSESSMENT REPORT: SITE INSPECTION PRIORITIZATION

PART I: SITE INFORMATION

1. Site Name/Alias: Celia's Laundry, Inc.

2. Site Address:

Street: 247 Eleanor Roosevelt Street
City: San Juan State: PR
County: Hato Rey Zip Code: 00919
County Code: Cong. Dist.:

3. CERCLIS ID NO.: PR00002196368

4. Block No.: N/A Lot Nos.: N/A

5. Site Coordinates*:

Latitude: 18.4200° N Longitude: 66.0630°W
USGS Quad(s): San Juan, PR

** Determined using the Garmin's GPS III Plus Personal Navigator.*

6. Approximate size of site: 1,100 ft^2

7. Owner: Mrs. Noemí López Telephone No.: 787-765-4325
Address: Eleanor Roosevelt Street
Street: 247
City: San Juan State: P.R.
County: Zip Code: 00919

8. Operator: Celia's Laundry, Inc. Telephone No.: 787-765-4325
Address:
Street: 247 Eleanor Roosevelt
City: San Juan State: PR
County: Hato Rey Zip Code: 00919

9. Type of Ownership:

☒ Private ☐ Federal ☐ State ☐ County ☐ Municipal ☐ Unknown ☐ Other

10. Owner/Operator Notification on File:

☐ RCRA 3001 - Date: ☐ CERCLA 103c - Date:
☒ None ☐ Unknown

11. Permit Information:

Permit	Permit No.	Date Issued	Expiration Date	Comments
Safety Kleen Transporter	**PRD 090399718**	10/18/2000	UNKNOWN	
Air Emission Operation Permit	**PFE-65-0101-0119-1-II-0**	10/14/2004	UNKNOWN	

12. Site Status:

☒ Active ☐ Inactive ☐ Unknown

13. Years of Operation:

from (beginning year): 1978 to (ending year): PRESENT

14. Identify the types of waste sources (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Sources

Waste Unit No.	Waste Source Type	Facility Name for Unit
1	Contaminated Soil	Contaminated Soil

(b) Other Areas of Concern

No other areas of concern have been identified. **Ref. 3, 19 and 21.**

15. Describe the regulatory history of the site, including the scope and objectives of any previous response actions, investigations and litigation by State, Local and Federal agencies (indicate type, affiliation, date of investigations).

■ Currently Celia's Laundry, Inc. (CLI) operates at the site. On November 29, 2001 personnel of the PREQB Superfund PA/SI Division performed an Off/On Site Reconnaissance to the Celia's Laundry facility. Mrs. Celia Aristy, owner of the site, informed us that the dry cleaning process was performed using tetrachloroethylene pumped from a 55-gallon metal drum connected to and located besides the dry cleaning machine. During the Off/On Site Reconnaissance five (5) corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). Three (3) of these drums were labeled as containing

tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system and next to an area covered with gravel. Both the concrete platform and the area covered with gravel were next to an area with exposed soil where two (2) other corroded 55-gallon metal drums were observed. These drums, previously used to store kerosene, were partially buried in the ground. During the same inspection it was observed that these partially buried drums were laying on their side. **Refs. 3 and 22.**

■ On May 17-18, 2004, the PREQB Superfund PA/SI Division performed a sampling event as part of the Screening Site Inspection process at CLI. During the sampling activities nine (9) soil samples were collected on and off site and three (3) groundwater samples were collected from two (2) public drinking water wells located within a 2-mile radius from the site. The inorganics **magnesium (7,900 ppb[2]), calcium (39,000 ppb), aluminum (200 ppb), cooper (31 ppb), iron (4,700 ppb), manganese (170 ppb), and sodium (66,000 ppb)** were detected in one (1) of the downgradient wells sampled (PRASA Hiram Bithorn) higher than the Contract Required Quantitation Limits (CRQL's) (Table 2). The inorganics **lead (260 ppm)**, **mercury (0.68 ppm)**, and **zinc (5,550 ppm)** were detected in the soil samples collected on site at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's). **Refs. 4, 19, and.48.**

(a) Is the site or any waste source subject to Petroleum Exclusion? Identify petroleum products and by products that justify this decision.

Available analytical data cannot confirm or deny the existence of petroleum products.

(b) Has normal farming application of pesticides registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) occurred at the site? Have pesticides been produced or stored at the site? Have there been any leaks or spills of pesticides on site?

Information that either denied or confirmed this information was not available during this investigation. **Ref. 3.**

(c) Is the site or any waste source subject to RCRA Subtitle C (briefly explain)?

Neither the site nor any waste source inside CLI is subject to RCRA Subtitle C regulations.

2 ppb = parts per billion

(d) Is the site or any waste source maintained under the authority of the Nuclear Regulatory Commission (NRC)?

Neither the site nor any waste source is maintained under the authority of the NRC.

16. Do any conditions exist on site, which would warrant immediate or emergency action?

Currently there are no conditions that would warrant immediate or emergency action.

17. Information available from:

Contact: MIGUEL A. MALDONADO Agency: **PREQB** Telephone No.: **(787) 764-8824**

Prepared by: MIRIAM ORTIZ TORRES Agency: **PREQB** Date: **September 2004**

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following items.

WASTE UNIT: 1 - CONTAMINATED SOIL

Source Type:

- ☐ Landfill
- ☐ Surface Impoundment
- ☐ Drums
- ☐ Tanks/Containers
- ☒ Contaminated Soil
- ☐ Pile
- ☐ Land Treatment
- ☐ Other

Description:

1. Describe the types of containers, impoundments, or other storage systems (i.e., concrete - lined surface impoundments) and any labels that may be present.

   - Celia's Laundry, Inc. (CLI) is an active facility that has been operating in the same location since 1978. CLI is a two (2) stories concrete building bordered by the parking area on the southern side and three (3) other concrete buildings on the eastern, western, and northern sides. The property consists of approximately 1,100 ft^2 and is surrounded by a cyclone fence. During an Off/On-Site Reconnaissance performed by PREQB Superfund PA/SI Division personnel on November 29, 2001, corroded 55-gallon metal drums were observed on the backyard of the property (northern side). Three (3) of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system next to an area covered with gravel. Both the concrete platform and the area covered with gravel were next to an area with exposed soil where two (2) other corroded 55-gallon metal drums were observed. These drums, previously used to store kerosene, were partially buried in the ground. During the same inspection it was observed that the drum over the gravel area and one of the drums partially buried were laying on their side. **Fig. 2; Refs. 1, 3, 6,and 9.**

2. Describe the physical condition of the containers or storage systems (i.e., rusted and/or bulging drums).

   - During an Off/On-Site Reconnaissance performed by PREQB Superfund PA/SI Division personnel on November 29, 2001, five (5) corroded 55-gallon metal drums were observed on the backyard of the property (northern side). During the same inspection it was

observed that the drum over the gravel area and one of the drums partially buried were laying on their side. **Refs. 1, 3, 5, 6, and 9.**

3. Describe any secondary containment that may be present (e.g., drums on concrete pad in building or aboveground tank surrounded by berm.

There were three drums labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system and over an area covered with gravel next to the platform. Both the concrete platform and the area covered with gravel were next to an area with exposed soil where two other two other corroded metal 55-gallon drums were observed. These drums, previously used to store kerosene, were partially buried in the ground. During the same inspection it was observed that the drum over the gravel area and one of the drums partially buried were bent over their side. **Figs. 2, Ref. 1, 4-6, 9, and. 22.**

Hazardous Waste Quantity:

During an Off/On-Site Reconnaissance and Site Inspection performed by PREQB Superfund PA/SI Division personnel on November 29, 2001, five (5) corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). These drums, previously used to store kerosene, were partially buried in the ground and laying on their side. **Fig. 2; Ref. 3.** The total amount of contaminated soil present at the CLI site is unknown. The total superficial area of the CLI property is approximately 1,100 square feet (ft^2); however, only an area of approximately 400 square ft^2 is from where seven (7) samples were collected by personnel from the PREQB Superfund PA/SI Division on May 17-18, 2004. This superficial area will be considered as a source under the HRS. As the results will show later in this report, the following inorganics were detected in all the soil samples collected on site: The inorganics **lead (260 ppm)**, **mercury (0.68 ppm)**, and **zinc (5,550 ppm)** were detected in the soil samples collected on site at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's). **Refs. 19, 21, and 48.**

Hazardous Substances/Physical State:

The physical state of the hazardous substances on the CLI site is liquid.

PART III: SAMPLING RESULTS

EXISTING ANALYTICAL DATA

SITE INSPECTION PRIORITIZATION SAMPLING RESULTS

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Puerto Rico Environmental Quality Board (PREQB) conducted a Site Inspection (SI) at the Celia's Laundry, Inc., (CLI) facility located on 247 Eleanor Roosevelt Street, San Juan, Puerto Rico.

The goals of this investigation were to collect information concerning the current conditions at CLI, assess the threat posed to human health and the environment, determine the need for additional investigation under CERCLA/SARA or other authority, and support the site evaluation using the Hazard Ranking System (HRS) for its proposal in the National Priorities List (NPL). The investigation included reviewing of available previous information, sampling of environmental media to test Preliminary Assessment hypotheses, evaluating and documenting Hazard Ranking System (HRS) factors, and collecting additional non-sampling information. Samples were collected as part of this investigation on May 17-18, 2004.

Nine (9) soil samples were collected from a depth of 0 to 3 feet. Of these soil samples, a duplicated was collected on site and two (2) background samples were collected off site. Three (3) groundwater samples were collected also from two (2) PRASA drinking water wells located within a 2-mile radius from the site. Two (2) Matrix Spike/ Matrix Spike Duplicates (MS/MSD) were collected, one (1) from one of these aqueous samples and another from one of the soil samples collected, as per Section 5.2.6 of the Revision 8 of the PREQB Superfund PA/SI Division Quality Assurance Project Plan (QAPP) for Screening Site Inspections (SSI) (November 7, 2003). Field trip blanks (FB), field rinsate blanks (FRB), analyte-free water blank (AFB), and trip blank (TB) were collected as per Section 5.2 of the Revision 8 of this QAPP as well.

The organic soil samples were sent to Ceimic Corporation (CEIMIC), the inorganic (aqueous and soil) samples were sent to USEPA Region 2 (DESA), and the organic aqueous samples were sent to A4 Scientific (A4) under case number 32903, for Target Compound List (TCL) volatile, base

neutral acid (BNA), pesticides, PCB analysis, and for Target Analyte List (TAL) total metals analysis. For the location and description of all the samples collected refer to Table 1 and Figures 3-5. **Refs. 21, 23, 24, 25, and 26.**

High Concentration/Drum Samples:

No high concentration or drum samples were collected.

Soil Samples:

Seven (7) surface soil samples were collected at the CLI site (CLI-SS-01, CLI-SS-02, CLI-SS-03, CLI-SS-04D, CLI-SS-05, CLI-SS-06, and CLI-SS-07) to determine type of contaminant and possible migration. These samples were collected from a superficial area of approximately 500 square feet (ft^2). Two (2) other soil samples were collected off site, (CLI-SS-08 and CLI-SS-09) for background purposes only. For the location and description of all the samples collected refer to Table 1 and Figures 3-4.

No volatiles, semi volatiles or pesticides were detected on the soil samples collected. The inorganics **lead (260 ppm)**, **mercury (0.68 ppm)**, and **zinc (5,550 ppm)** were detected in all the soil samples collected on site (CLI-SS-01, CLI-SS-02, CLI-SS-03, CLI-SS-04D, CLI-SS-06, and CLI-SS-07) at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's).

Substances	SS-01	SS-02	SS-03	SS-04	SS-05	SS-06	SS-07	SS-08	SS-09	*CRQL's*
								BKG	BKG	*(mg/Kg)*
Lead	**160**	230	**260**	**260**	210	170	140	14	**35**	*2*
Mercury	**0.68**	**0.36**	**0.32**	**0.33**	**0.56**	**0.51**	0.36	.08	**0.19**	*0.1*
Zinc	1,200	500	**5,550**	530	1,400	880	810	**76**	67	*12*

[ ] -Highest Concentration

Refs. 19, 21, 48, and 49.

TABLE 1: SAMPLE DESCRIPTION - CASE No. 32903:

PREQB Sample Number	CLP Organic Traffic Report No.	CLP Inorganic Traffic Report No.	Collection Date/Time	Sample Type	Sample Location
CLI-SS-01	BQQ 91	MBPH 90	5/17/2004; 0850 hours	Soil	Grab sample collected on site from an area of exposed soil located adjacent and to the north of a concrete platform on the west side of the site, to determine type and concentration of contaminants. Depth 0-12".
CLI-SS-02	BQQ 92	MBPH 91	5/17/2004; 0936 hours	Soil	Grab sample collected on site from an area of exposed soil to the northeast of an outdoors area covered with concrete where 55-gallon metal drums containing tetrachloroethylene were previously observed. Depth 0-12".
CLI-SS-03	BQQ 93	MBPH 92	5/17/2004; 0905 hours	Soil	Grab sample collected on site from an area of exposed soil on the northwestern corner of CLI's backyard, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI-SS-04*D	BQQ 94	MBPH 93	5/17/2004; 0911 hours	Soil	Duplicate of sample CLI-SS-03.
CLI-SS-05	BQQ 95	MBPH 94	5/17/2004; 1122 hours	Soil	Grab sample collected on site from an area of exposed soil on the northeastern corner of the CLI's backyard, to determine type, concentration and possible migration of contaminants. Depth 0-12".
CLI-SS-06	BQQ 96	MBPH 95	5/17/2004; 1106 hours	Soil	Grab sample collected from an area of exposed soil located halfway between the Celia's building and the northern border of the property, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI-SS-07	BQQ 97	MBPH 96	5/17/2004; 0948 hours	Soil	Grab sample collected from an area of exposed soil located in the southeast corner of CLI's backyard, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI-SS-08	BQQ 98	MBPH 97	5/17/2004; 0720 hours	Soil	Grab background sample collected offsite from a location to the south and within 0- ¼ -mile distance from the site, and the Matrix Spike/Matrix Spike Duplicate for quality control purposes. This location is presumed to be out of the influence of site activities and contamination. Depth 0-12".
CLI-SS-09	BQQ 99	MBPH 98	5/17/2004; 0756 hours	Soil	Grab background sample collected offsite from a location to the northeast and within 0- ¼ -mile distance from the site. This location is presumed to be out of the influence of site activities and contamination. Depth 0-12".

*** Duplicate - Indicates that a sample was designated for duplicate analysis.**

TABLE 1: SAMPLE DESCRIPTION - CASE No. 32903 (CONT.):

PREQB Sample Number	CLP Organic Traffic Report No.	CLP Inorganic Traffic Report No.	Collection Date/Time	Sample Type	Sample Location
CLI-GW-01	BQR 00	MBPH 99	5/18/2004; 1055 hours	Groundwater	Groundwater sample collected from the downgradient PRASA drinking water well Hiram Bithorn, (stand-by well) to determine type, concentration, and possible migration of contaminants from the site to the groundwater. This well is located to the southwest of and at approximately 2-mile radius from the site.
CLI-GW-02*	BQR 01	MBPJ 00	5/18/2004; 1058 hours	Groundwater	Duplicate of sample CLI-GW-01.
CLI-GW-03**	BQR 02	MBPJ 01	5/18/2004; 0935 hours	Groundwater	Groundwater sample collected from a downgradient PRASA drinking water well Las Américas, (stand-by well) to determine possible migration of contaminants from the site to the groundwater and the Matrix Spike/Matrix Spike Duplicate or MS/MSD. This well is located to the southwest of and within 2-mile radius from the site.
CLI -FB-01	BQR 03	------	5/18/2004; 0734 hours	Aqueous	Field Trip Blanks for quality control purposes, when volatile organics in aqueous matrix were collected.
CLI -FRB-01	BQR 05	MBPJ 02	5/17/2004; 0922 hours	Aqueous	Field Rinsate Blank for quality control purposes.
CLI -TB-01	BQR 04	------	5/17/2004; 0836 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI -TB-02	BQR 06	------	5/17/2004; 0748 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI -TB-03	BQR 08	------	5/17/2004; 0758 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI-AFB-01	BQR 07	MBPJ 03	5/17/2004; 0710 hours	Aqueous	Analyte Free Blank for quality control purposes.

* **Duplicate - Indicates that a sample was designated for duplicate analysis.**

** **MS/MSD - Indicates that additional sample volume that was collected and shipped to the laboratory for Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analysis.**

TABLE II
TARGET COMPOUND INORGANIC SOIL AND ORGANIC AQUEOUS SAMPLES

Substances	SS-01 MBPH 90	SS-02 MBPH 91	SS-03 MBPH 92	SS-04 MBPH 93	SS-05 MBPH 94	SS-06 MBPH 95	SS-07 MBPH 96	SS-08 MBPH 97 Background	SS-09 MBPH 98 Background	CRDL'S (mg/kg)
Lead	160	230	260	260	210	170	140	41	35	2
Mercury	.68	.36	.32	.33	.56	.51	.36	.08	.19	.1
Zinc	1,200	500	5,550	530	1,400	880	810	76	67	12
AQUEOUR SAMPLES										
Substances	GW-01 MBPH 99	GW-02 MBPJ 00 Dupl.of GW-01	GW-03 MBPJ 01							CRDL'S (µg/L)
Aluminum	ND	400	ND							200
Calcium	39,000	38,000	36,000							5,000
Copper	31	60	ND							25
Iron	4,700	2,200	1,500							100
Magnesium	7,900	8,000	6,400							5,000
Manganese	170	190	87							15
Sodium	66,000	65,000	100,000							5,000
Pesticides Organics Analysis										
Substances	GW-01 BQR00	GW-02 BQR01 Dupl.of GW-01	GW-03 BQR02							CRQL'S (µg/L)
Aldrin	ND	.086	ND							0.01
Dieldrin	ND	ND	0.21							0.02
4,4'-DDE	ND	0.21	ND							0.02
Endrin	ND	0.24	0.24							0.02
4,4'-DDT	ND	0.21	ND							0.02

☐ - Highest Concentration
ND-Non Detected

Groundwater samples:

Three (3) groundwater samples were collected from two (2) PRASA drinking water wells located within a 2- mile radius from the site. For the location and description of these samples refer to Table 1 and Figures 3-4. Of these three (3) groundwater samples, CLI-GW-01 and CLI-GW-03 were collected from two downgradient PRASA drinking water wells, Las Américas and Hiram Bithorn, respectively. Both wells are located to the southwest of an approximately 2-mile radius distance from the site. CLI-GW-02 was the duplicate sample from CLI-GW-01. All the samples were collected to determine migration of contaminants from the site to the groundwater.
The inorganics **magnesium (7,900 ppb), calcium (39,000 ppb), copper (31 ppb), iron (4,700 ppb), manganese (170 ppb), and sodium (66,000 ppb)** were found in sample CLI-GW-01 and in sample CLI-GW-03 the inorganics **magnesium (6,400 ppb), calcium (36,000 ppb), iron (1,500 ppb), manganese (87 ppb), and sodium (100,000 ppb)** were found at concentrations higher than the Contract Required Quantitation Limits (CRQL's) **Refs. 19, 21, 25, and 48.**

PART IV: HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.**

   Two (2) drinking water wells were sampled by the PREQB Superfund PA/SI Division personnel during the sampling activities performed at CLI on May 17-18, 2004. The inorganics **magnesium (7,900 ppb), calcium (39,000 ppb), copper (31 ppb), iron (4,700 ppb), manganese (170 ppb), and sodium (66,000 ppb)** were found in sample CLI-GW-01 (taken from the PRASA Hiram Bithorn well) and in sample CLI-GW-03 (taken from the PRASA Las Américas well) the inorganics **magnesium (6,400 ppb), calcium (36,000 ppb), iron (1,500 ppb), manganese (87 ppb), and sodium (100,000 ppb)** were found at concentrations higher than the Contract Required Quantitation Limits (CRQL's) (Table 2). The inorganics **lead (260 ppm)**, **mercury (0.68 ppm)**, and **zinc (5,550 ppm)** were also detected in the soil samples collected on site at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's).

The pesticides **Aldrin (.086ppb), Dieldrin (0.21ppb), 4,4'-DDE (0.21ppb), Endrin (0.24ppb), and 4,4'-DDT (0.21ppb)** were detected higher than the Contract Required Quantitation Limits (CRQL's) (Table 2); however, these contaminants were not found in the soil samples collected at the site, therefore, they will not be considered for the contaminant attribution to the site.

During an Off/On-Site Reconnaissance and Site Inspection performed by the PREQB Superfund PA/SI Division personnel on November 29, 2001, corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). Three (3) of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system and next to an area covered with gravel. Both the concrete platform and the area covered with gravel were next to an area with exposed soil where two other two other corroded 55-gallon metal drums were observed. These drums, previously used to store kerosene, were partially buried in the ground and laying sideways. During our file search no information on whether or not hazardous substances containing magnesium were stored or generated on site was found. **Refs. 3, 6 and 9.**

2. Describe the aquifer of concern; include information such as depth, thickness, geologic composition, areas of karst terrain, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.

The site is located over the San Juan region. The area consists of a very gently sloping coastal plain in the northern part and a low to moderate hilly section on the south. Mostly sand beaches mark the coast, but at the western end of the area eoliniate crops out in the sea cliffs of San Juan and the adjoining low hills as well as in the chain of small rocks that rise offshore. Several enclosed to nearly enclosed lagoons occur behind the coast, including the Bahía de San Juan. In the southern part of the coastal area, several hills and steep-sided rocky ridges of Miocene limestone rise abruptly from the featureless plain. To the south the uplands, which are underlain by rocks of Late Cretaceous to late Paleocene or early Eocene age, rise progressively and develop a rugged aspect only at the southern edge of the map area. The upland is underlain by a sequence of much-deformed rocks that consist of volcanic, tuffaceous, sedimentary rocks, and Aymamón formation. The soils in the area are

a combination of clay, silt, and sand, but are mostly red or mottled red and light-gray clay. Includes Mucarabones Sand and San Sebatian Formation in the area east of the Río Piedras. This formation has a variable thickness but probably greater than 100 m in certain places. **References 2,10, and 14**. The regional ground-water flow in the upper and lower aquifers within the Bayamón-Loíza region is northward from surficial exposures of the formations of Tertiary age, where the recharge occurs, to eventually discharge into swamps and lagoons along the coast. Ground water also moves locally towards the mainstream systems of the Río Bayamón, Río Piedras, and Río Grande de Loíza. The Bayamón-Loíza region includes the San Juan metropolitan area. The population of the region was about 434,374 in 2000. Estimated total ground water withdrawals of 0.94 Mgal/d were a small fraction of the total public water supply in the Bayamón-Loíza region in 1987.

Geologic Unit	Thickness* (meters)
Volcanic rocks	0-90
San Sebastian	0-100
Marly Limestone	0-100
Cibao Formation	0-100
Aymamón Formation	0-100

*** Approximate value.**

The major industries in the San Juan region obtain water supply from a combination of surface water from Río Piedras and the Río de Bayamón, and groundwater from several high-yield wells for both industrial and drinking water purposes. Public water supply in this geographical area is provided mostly by groundwater obtained from both the water-table and the artesian (confined) aquifers. The population within a 4-mile radius from the site relies on PRASA drinking water wells.

3. What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?

The depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern is estimated to be approximately 0-150 feet. This measurement is based upon the depth of the suspected contaminated surface soil (0 feet) down to the depth of the water-table aquifer (approximately 0-150 feet). **Ref. 16.**

4. **What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the top of the aquifer of concern?**

The soil in the San Juan Metropolitan area is classified as Ba (Bajura clay), this is a nearly level, poorly drained soil on river flood plains. Slopes are smooth and are 500 to 2000 feet long. The areas range from 20 to 1000 acres. Typically the surface layer is dark brown, firm clay about 5 inches thick. The subsoil, about 7 inches thick, is dark gray, and dark brown. The substratum, from a depth of 12 inches to 31 inches, is gray and yellowish brown, very dark gray, and dark brown, firm clay mottled with greenish gray. From 31 inches to 60 inches, the substratum is greenish gray, firm clay mottled with brownish yellow and bluish gray.

Permeability is slow and available water capacity is high. This soil is difficult to work due to stickiness and plasticity of the clay and wetness. It is fertile and has a deep root zone. When properly drained and managed, it is suited for crops. **Ref. 27.**

5. **What is the net precipitation at the site (inches)?**

The net precipitation at the site ranges from 50 to 52 inches. **Ref. 28.**

6. **What is the distance to and depth of the nearest well that is currently used for drinking purposes?**

The nearest well used for drinking water purposes is the PRASA Hiram Bithorn well that is within a 2-mile distance, downgradient, and to the southwest of the CLI site. The depth of this well is 250 feet. **Fig. 4; Refs. 16 and 29.**

7. **If a release to groundwater is observed or suspected, determine the number of people that obtain drinking water from wells that are documented or suspected to be actually contaminated by hazardous substance(s) attributed to an observed release from the site.**

On May 17-18, 2004, the PREQB Superfund PA/SI Division performed a sampling event as part of the Screening Site Inspection process at CLI. During the sampling activities, nine (9) soil samples were collected on and off site and three (3) groundwater samples were collected from two (2) public drinking water wells located within a 2-mile radius from the site. The inorganics **calcium (39,000 ppm), copper (60 ppm), iron (4,700 ppb), magnesium (8,000**

ppb), manganese (190 ppb), and **sodium (66,000 ppb)** were detected in one of the downgradient wells (PRASA, standby well, Hiram Bithorn). The inorganics **calcium (36,000 ppb), iron (1,500 ppb), magnesium (6,400 ppb), manganese (87 ppb),** and **sodium (100,000 ppm)** were detected in the other downgradient well (PRASA, standby well, Las Américas). These results are higher than the Contract Required Quantitation Limits (CRQL's) for groundwater. No background water samples were collected since no other wells were located upgradient from the site.

The analytical results from the tap water sample collected from the PRASA Hiram Bithorn and Las Américas drinking water well revealed the presence of **magnesium** and **calcium** were also detected in all the soil samples collected on site. Although other substances were detected on the soil samples collected on site (**lead**, **mercury**, and **zinc**, they were not detected in any of the downgradient drinking water wells sampled (PRASA Hiram Bithorn and Las Américas). These inorganics found in the soil samples will be considered because they are higher than three times the background results. The population served by these PRASA wells is of 1,581,248 persons.

Refs. 16, 19, 21, and 29.

8. Identify the population served by wells located within 4 miles of the site that draw from the aquifer of concern.

All the wells within a 4-mile radius from the site are closed, only two (2) wells (Hiram Bithorn and Las Américas) are in stand-by status and can be used in case of an emergency.

Distance	Population
0- ¼ mi	0
¼ -½ mi	0
½ - 1 mi	790,624
1-2 mi	790,624
2-3 mi	0
3-4 mi	0
Total	1,581,248

** According to PRASA this water distribution system is blended.*

State whether groundwater is blended with surface water, groundwater, or both before distribution.

Most of the population from the San Juan Metropolitan area is served with water from the

Carraízo dam, located upgradient and outside the 4-mile radius from the site. **Refs. 29 and 30.** All the wells within a 4-mile radius from the site are closed, only two (2) wells (Hiram Bithorn and Las Américas) are in stand-by status and can be used in case of an emergency.

Is a designated wellhead protection area within 4 miles of the site?

Yes, there are seventeen (17) designated Wellhead Protection Areas (WHPA) in the San Juan Metropolitan area, and within a 4-mile radius from the CLI site. This area is also part of the North Coast Ground Water Province, the most productive aquifer in Puerto Rico. **Refs. 15, 30, and 31.**

Does a waste source overlie a designated or proposed wellhead protection area? If a release to groundwater is observed or suspected, does a designated or proposed wellhead protection area lie within the contaminant boundary of the release?

No; however, there is a WHPA within a ¼ -mile radius from CLI. **Refs. 15 and 31.**

9. Identify one of the following resource uses of groundwater within 4 miles of the site (i.e., commercial livestock watering, ingredient in commercial food preparation, supply for commercial aquaculture, supply for major, or designated water recreation area, excluding drinking water use, irrigation (5-acre minimum) of commercial food or commercial forage crops, unusable).

There are no other resource uses of groundwater within a 4- mile radius of the site.

SURFACE WATER ROUTE

10. Describe the likelihood of a release of contaminant(s) to surface water as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.

Surface water and sediment samples were not collected.

Figs. 3 and 4; Refs. 21 and 29.

11. Identify the nearest down slope surface water. If possible, include a description of possible surface drainage patterns from the site.

Caño de Martín Peña is a stream located at a distance of approximately 1-mile radius from the site.

The property where CLI is located is almost completely flat. The area consists of a very gently sloping coastal plain in the northern part and a low to moderate hilly section on the south. Any runoff from the site will drain into the storm water sewer located on the street and, eventually, into the surface water. The underground pattern of the storm water sewer system in San Juan is unknown.

Refs. 12 and 27

12. What is the distance in feet to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.

Caño de Martín Peña is a stream located at a distance of approximately 1-mile radius from the site.

13. Identify all surface water body types within 15 downstream miles.

The following surface water bodies types are within 15 downstream miles from CLI.

Name	Water Body Type	Flow (cfs)	Saline/Fresh/Brackish
Laguna San José	Lagoon	N/A	Brackish
San Juan Bay	Estuary	N/A	Saline
Condado Lagoon	Lagoon	N/A	Saline
Piñones Lagoon	Lagoon	N/A	Brackish
Caño de San Antonio	Stream	N/A	Brackish
Atlantic Ocean	Ocean	N/A	Saline
Caño de Martín Peña	Canal	N/A	Brackish

Ref. 34

14. Determine the 2 yr, 24 hr rainfall (inches) for the site.

The 2 yr, 24 hr rainfall for the CLI site is 52.34 inches. **Refs. 28 and 35**

15. Determine size of the drainage area (acres) for sources at the site.

Drainage area for the sources at the CLI site is approximately 9,856 acres.

Ref.37.

16. Describe the predominant soil group in the drainage area.

The soil in the San Juan Metropolitan area is classified as Ba (Bajura clay), this is a nearly level, poorly drained soil on river flood plains. The soils in the area are a combination of clay, silt, and sand, but are mostly red or mottled red and light gray clay. Slopes are smooth and are 500 to 2000 feet long. The areas range from 20 to 1000 acres. Typically the surface layer is dark brown firm clay about 5 inches thick. The subsoil, about 7 inches thick, is dark gray and dark brown firm clay mottled with greenish gray. From 31 inches to 60 inches, the substratum is greenish gray, firm clay mottled with brownish yellow and bluish gray.

Permeability is slow and available water capacity is high. This soil is difficult to work due to stickiness and plasticity of the clay and wetness. It is fertile and has a deep root zone. When properly drained and managed, it is suited to crops.

This soil is limited for most urban uses because of drainage, flood hazard, and high shrink-swell potential. **Ref. 27**

17. Determine the type of floodplain that the site is located within.

The National Flood Insurance Program (NFIP) of the Federal Emergency Management Agency (FEMA) classified the Bajura clay terrain at the site as a 500 year flood plain with average depths of less than 2.6 square kilometers and areas protected by levees from 100-year flood plains. **Ref. 27. and 38**

18. Identify drinking water intakes in surface waters within 15 miles downstream of the point of surface water entry. For each intake identify: the name of the surface water body in which the intake is located, the distance in miles from the point of surface water entry, population served, and stream flow at the intake location.

There are no surface water intakes within 15 miles downstream from the site.

Refs. 1 and 36.

19. Identify fisheries that exist within 15 miles downstream of the point of surface water entry. For each fishery specify the following information:

The following fisheries exist within 15 miles downstream from the site.

Fishery Name	Water Body Type	Flow (cfs)	Saline/Fresh/Brackish
Marine Sport Fishing Area I	Moderate-Depth Ocean Zone	N/A	Saline
San Juan Bay	Estuary	N/A	Saline
San José Lagoon	Lagoon	N/A	Brackish
Piñones Lagoon	Lagoon	N/A	Brackish

Ref. 18, 34 and 39.

20. Identify surface water sensitive environments that exist within 15 miles of the point of surface water entry.

Environment	Water Body Type	Flow (cfs)	Wetland Frontage
Caño Martín Peña (Critical Federal Endangered Species Habitat)	Canal	N/A	0.1 – 1 mile
San Juan Bay (Critical Coastal Wildlife Area)	Estuary	N/A	1 – 3 miles

San José Lagoon	Lagoon	N/A	1 – 2 miles
Torrecilla Lagoon	Lagoon	N/A	1 – 4 miles
Condado Lagoon	Lagoon	N/A	1 – 4 miles
Piñones Lagoon	Lagoon	N/A	1 – 4 miles

Refs. 18, 39, 40, 41, and. 47.

21. If a release to surface water is observed or suspected, identify any intakes, fisheries, and sensitive environments from question Nos. 18-20 that are or may be actually contaminated by hazardous substance(s) attributed to an observed release of from the site.

Intake: none

No release to surface water is suspected.

Refs. 17, 18, 22, 36, 42, and 46

22. Identify whether the surface water is used for any of the following purposes, such as: irrigation (5 acre minimum) of commercial food or commercial forage crops, watering of commercial livestock, commercial food preparation, recreation, potential drinking water supply.

The San Juan Bay, San José Lagoon, and the Condado Lagoon are typically used for recreational boating and fishing. **Refs. 18, 22, 43, and, 44**

SOIL EXPOSURE PATHWAY

23. Determine the number of people that occupy residences or attend school or day care on or within 200 feet of observed contamination.

There is a two stories building inside the property. The first floor is where CLI is located and in the second floor is the owner's residence. Approximately 5 people live or occupy the residence inside the site. No other residences or daycare centers are within 200 feet of the site. **Ref. 3.**

24. Determine the number of people that regularly work on or within 200 feet of observed contamination.

There are 10 full time employees working at the site. **Refs. 3 and. 22**

25. Identify terrestrial sensitive environments on or within 200 feet of observed contamination.

There are no terrestrial sensitive environments known to be located on or within 200 feet of the site. **Refs. 3 and 22**

26. Identify whether there are any of the following resource uses, such as commercial agriculture, silviculture, livestock production or grazing within an area of observed or suspected soil contamination.

None of the preceding resources uses are conducted on the site or the surrounding properties. **Refs. 3 and 22.**

AIR PATHWAY

27. Describe the likelihood of release of hazardous substances to air as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.

There has been no documented release of hazardous substances to the air that can be attributed to this site. There are no analytical data available to document a release to air. During the sampling event by the personnel from the PREQB Superfund PA/SI Division performed air monitoring using a TVA 1000B for health and safety purposes. **Refs. 3, 8, 22 and 23.**

28. Determine populations that reside within 4 miles of the site.

Distance	Population
On site	**15**
>0 - ¼ mi	**20,867**
>¼ - ½ mi	**16,461**
>½ - 1 mi	**58,647**
>1 - 2 mi	**94,067**
>2 - 3 mi	**44,235**
>3 - 4 mi	**88,603**
Total	**322,895**

Refs. 45 and 46.

Identify sensitive environments, including wetlands and associated wetlands acreage, within 4 miles of the site.

Distance	Wetlands Acreage	Sensitive Environments
>2 - 3 mi	-----	**San José Lagoon**
	0.1 – 1 mile	**Natural Reserve (San Juan Bay)**
>3 - 4 mi	-----	**Condado Lagoon**
	0.1 – 1 mile	**Critical Habitat for Federal Endangered Species (Tiburones)**
	0.1 – 1 mile	**Critical Wildlife Area (Torrecilla Alta)**
	0.1 – 1 mile	**Fishery (San Juan Bay)**
	0.1 – 1 mile	**Critical Wildlife Area (Torrecilla Alta)**
	-----	**Constitution Bridge Mudflats**
	-----	**Critical Wildlife Area (Piñones Forest)**

Refs. 32,33, 39, 40 and 47.

30. If a release to air is observed or suspected, determine the number of people that reside or are suspected to reside within the area of air contamination from the release.

Release to air is not suspected. Refer to question No. 27.

31. If a release to air is observed or suspected, identify any sensitive environments, listed in question No. 29 that are or may be located within the area of air contamination from the release.

Release to air is not suspected. Refer to question No. 27

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48. Miriam Ortiz Torres, Environmental Science Specialist, PREQB Superfund PA/SI Division. PROJECT NOTE. RE: Tables summarizing the analytical results of all the samples collected on CLI by the PREQB Superfund PA/SI Division on May 17-18, 2004. **July 23, 2004.**
49. Ceimic Corporation (CEIMIC); Data from the Soil Organic Analyses of SI samples. Received on **September 02, 2004.**

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SITE SUMMARY AND RECOMMENDATION

Celia's Laundry, Inc. (CLI) is located on the first floor of a two (2) stories building that is on the north side of Eleanor Roosevelt Street and is surrounded by other commercial facilities. The second floor is used as a private residence by the owner. There are three (3) concrete buildings on the eastern, western, and northern sides of the property and there are no daycare centers or schools within 200 feet from the site. The site is rectangular in shape and consists of a concrete-covered parking area to the south, one concrete-covered area to the west of and besides the CLI building, another small concrete-covered area to the north and besides the CLI building, and a large area with exposed soil also to the north of the CLI building. This large area of exposed soil is in the backyard of the property and has small areas covered with vegetation or gravel.

Inside the CLI building there is a reception area, two large halls where the regular machine wash, drying, and ironing of clothing is performed, and a dry-cleaning area. The dry-cleaning area is in a room on the northern side of the building that opens into the property backyard. This room is covered by a metal roof and consists of a concrete platform with a primary containment system (i.e. ditch). The primary containment system is below the dry-cleaning machine it consists of a ditch covered by a metal screen, and was designed to collect any tetrachloroethylene accidentally released from the machine.

All the solvent collected inside the ditch is then pumped back into a 55-gallon metal drum that is constantly connected to the dry-cleaning machine for reuse. Both the dry-cleaning machine and the 55-gallon drum are kept above the primary containment system. No secondary containment system exists at the site that will prevent any tetrachloroethylene accidentally released from this primary containment system from reaching the area of exposed soil in the backyard. The fact that there is a concrete ramp next to the primary containment system, which reaches the exposed soil in the backyard, may increase risk of any chemical from reaching the ground surface.

CLI have been engaged in the dry-cleaning, machine washing, drying, and ironing of clothing since 1978. Tailoring is also performed at the site. According to Mrs. Celia Aristy, Manager of CLI, Mrs. Noemí López, who also lives on the second floor, owns the property. Currently there are 10

employees working on site. CLI has an updated PREQB air emissions permit (PFE-65-0101-0019-I-II-0) to operate a dry-cleaning machine, a boiler, and two electric dryers. The rinse water from the washing machines is discarded directly into the Puerto Rico Aqueduct and Sewers Authority (PRASA) sewer system.

The dry-cleaning process at CLI is performed using tetrachloroethylene (UN 1897). During an Off/On Site Reconnaissance performed on November 29, 2001, five (5) corroded 55-gallon metal drums were observed on the backyard (northern side) of the property. Two (2) of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system. To the north and besides these two drums, there was another corroded drum, also labeled as containing tetrachloroethylene. This drum was partially buried directly into the ground, laying on its side and located over the exposed soil area on the backyard (Figure 2). At the moment of the Site Inspection activities performed on March 17, 2004 personnel from the Superfund PA/SI Division observed that the drums were removed from the areas described above. In the area of exposed soil on the backyard, the remaining two (2) corroded 55-gallon metal drums that were observed next to and to the north of the three (3) drums containing tetrachloroethylene during the Off/On Site Reconnaissance performed on November 29, 2001 were also removed. These drums were also partially buried directly into the ground and laying on their side (Figure 2). According to Mrs. Aristy, these drums were previously used to store kerosene. One of these drums was over the gravel area while the other was over the exposed soil (Figure 2).
Within a 4-mile radius from the site there are twenty-seven (27) PRASA drinking water wells. Two (2) of these wells are within a 2-mile radius, are downgradient (Pozo Truman and Pozo Miguel Such), and were closed in 1987 due to contamination with volatile organic compounds (VOC's), including tetrachloroethylene, among others. There are also two other PRASA drinking water wells that are downgradient and within ½ - mile distance from the site (Pozo Extension Roosevelt and Pozo Parque Roosevelt), but are not operational.

The fact that tetrachloroethylene is being used at the site for the dry-cleaning process since 1978, that there were four (4) 55-gallon metal drums labeled as containing either tetrachloroethylene or kerosene laying on their side and directly over the ground at the site, and that there are two wells located downgradient from the site closed due to contamination with VOC's (including tetrachloroethylene), CLI could represent a threat to other drinking water wells in the area.

The CLI site is located over the San Juan region. The area consists of a very gently sloping coastal plain in the northern part and a low to moderate hilly section on the south. The coast is marked mostly by sand beaches, but at the western end of the area eoliniate crops out in the sea cliffs of San Juan and the adjoining low hills as well as in the chain of small rocks that rise offshore. Behind the coast there are several enclosed to nearly enclosed lagoons, including the Bahía de San Juan. In the southern part of the coastal area, several hills and steep-sided rocky ridges of Miocene limestone rise abruptly from the featureless plain. To the south the uplands, which are underlain by rocks of Late Cretaceous to late Paleocene or early Eocene age, the ground rises progressively and develops a rugged aspect only at the southern edge of the map area. The upland is underlain by a sequence of much-deformed rocks that consist of volcanic, tuffaceous, sedimentary rocks, and the Aymamón formation. The soils are mainly clay, silt, and sand, mainly red or mottled red and light-gray, which includes Mucarabones Sand and San Sebatian Formation in the area east of Río Piedras. The thickness of this formation is variable but probably greater than 100 m in certain places. The regional groundwater in the upper and lower aquifers within the Bayamón-Loíza region flows northward from surficial exposures of the formations of Tertiary age, where the recharge occurs, to eventually discharge into swamps and lagoons along the coast. Ground water also moves locally towards the mainstream systems of the Río Bayamón, Río Piedras, and Río Grande de Loíza. The Bayamón-Loíza region includes the San Juan metropolitan area, which is comprised of the capital city of San Juan. The population of the region was approximately 434,374 in 2000. Estimated total ground water withdrawals of 0.94 Mgal/d were a small fraction of the total public water supply in the Bayamón-Loíza region in 1987. Public water supply wells located throughout the San Juan metropolitan area were in stand-by status most of the time, and were activated only during emergency situations.

The population within a 4-mile radius from the site relies on public (PRASA) wells for their domestic use. Currently there are twelve (12) public water wells within a 4-mile radius from the site that are either abandoned or on a standby status. The Hiram Bithorn and Las Américas wells are in a standby status but will open in case of an emergency or drought and can serve a population of approximately 1,581,248 persons. Other wells have been kept closed since 1987 (Trina Padilla, Escorial, Los Caobos, Puerto Nuevo , Los Pollitos, Manuel A. Pérez II, Pozo Los Caobos, and University Gardens) due to VOC contamination, sodium, and chlorides, among others. During that

same year also, VOC was detected in other two (2) PRASA wells (Truman, Miguel Such) located within the target distance limit. Refer to question 8 for more information on these wells. There is a Wellhead Protection Area within a ¼ mile radius from CLI.

There are no public or private surface water intakes downstream and within 15 miles distance from the site. The site is bordered to the north by Caño Martín Peña, which flows into the Laguna San José, the Río Puerto Nuevo, and the Bahía de San Juan. Caño Martín Peña is at approximately 1.02 miles from CLI and converges into the La Laguna San José at approximately 1.61 miles downstream. The Bahía de San Juan is approximately 2.76 miles from the site. There are three (3) wetlands (Laguna La Torrecilla, Torrecilla Baja, and Laguna de Piñones) within 2 - 3 miles radius. Within the Torrecilla-Piñones wetlands there are a Critical Wildlife Coastal Area, a wetland, and a State Natural Reserve, a fishery (marine sport shore fishing area I). There are four (4) Critical Wildlife Areas within a 4-miles radius from CLI, these are: the Piñones State Forest, which is also a Critical Wildlife Area, the Caño Martín Peña State Natural Reserve, the San José Lagoon, and the San Juan Bay. In the sensitive environments mentioned above and within a 4-mile radius from the site, there have been sightings or are the habitat of twenty four (24) animals and sixteen (16) plants that are listed as Threatened or Endangered Species.

Personnel from the PREQB Superfund PA/SI Division performed an On-site reconnaissance at the CLI site on November 29, 2001. During that visual inspection five corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). Two of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system. To the north and besides these two drums, there was another corroded drum, also labeled as containing tetrachloroethylene. This drum was partially buried directly into the ground, laying on its side and located over the exposed soil area on the backyard (Figure 2). In the area of exposed soil on the backyard, two additional corroded metal 55-gallon drums were observed next to and to the north of the three drums containing tetrachloroethylene. These drums were also partially buried directly into the ground and laying on their side (Figure 2). According to Mrs. Aristy, these drums were previously used to store kerosene. One of these drums was over the gravel area while the other was over the exposed soil (Figure 2). Due to the conditions of the site, to the operational history, to the fact that the drums mentioned before were buried in the soil, personnel from the PREQB Superfund PA/SI Division performed sampling activities at CLI as part of a

Screening Site Inspection. During the sampling activities, nine (9) soil surface samples were collected on site and within 0-1/4 mile distance from the site at a depth of approximately 0-3 feet. In addition, three (3) groundwater samples were collected from two (2) potable water drinking water wells within 2 miles radius from the site. (Table 2). The inorganics **lead (260 ppm)**, **mercury (.68 ppm)**, and **zinc (5,550 ppm)** were detected in the soil samples collected on site at concentrations higher than three times the background samples and higher than the Contract Required Quantitation Limits (CRQL's). Regarding the groundwater samples, since there were no background samples collected, the results were compared only with the CRQL's. The inorganics **calcium (39,000 ppm), copper (60 ppm), iron (4,700 ppm), magnesium (8,000 ppm), manganese (190 ppm),** and **sodium (100,000 ppm)** were detected higher than the CRQL's.

The evaluation resulted in an overall site score of 50. Based on an evaluation of the above conditions and after reviewing all available information regarding the site, it is recommended for Further Action under the Superfund Program.

FIGURE 1

CELIA'S LAUNDRY, INC. (CLI)

247 ELEANOR ROOSEVELT STREET

SAN JUAN, PUERTO RICO

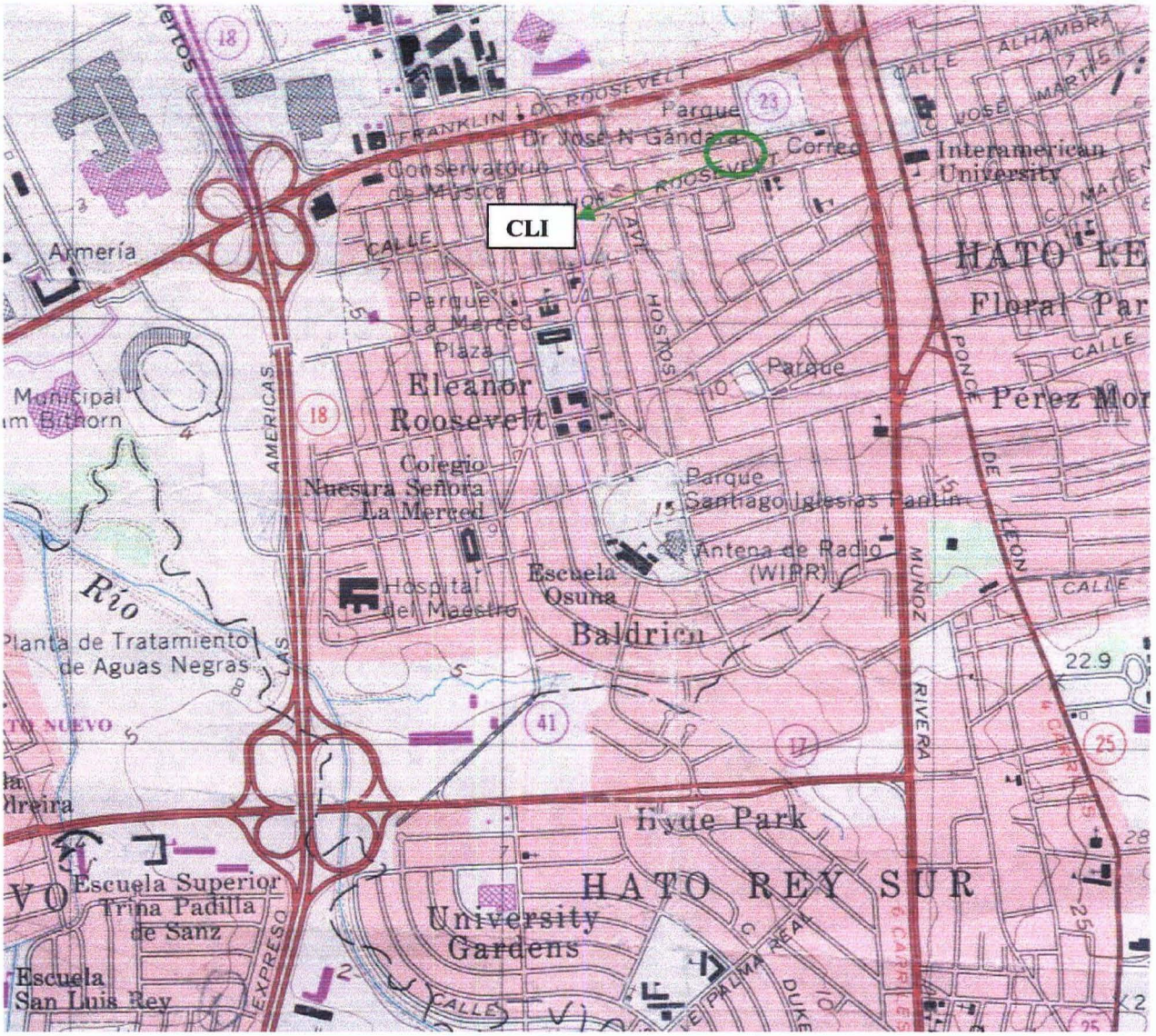
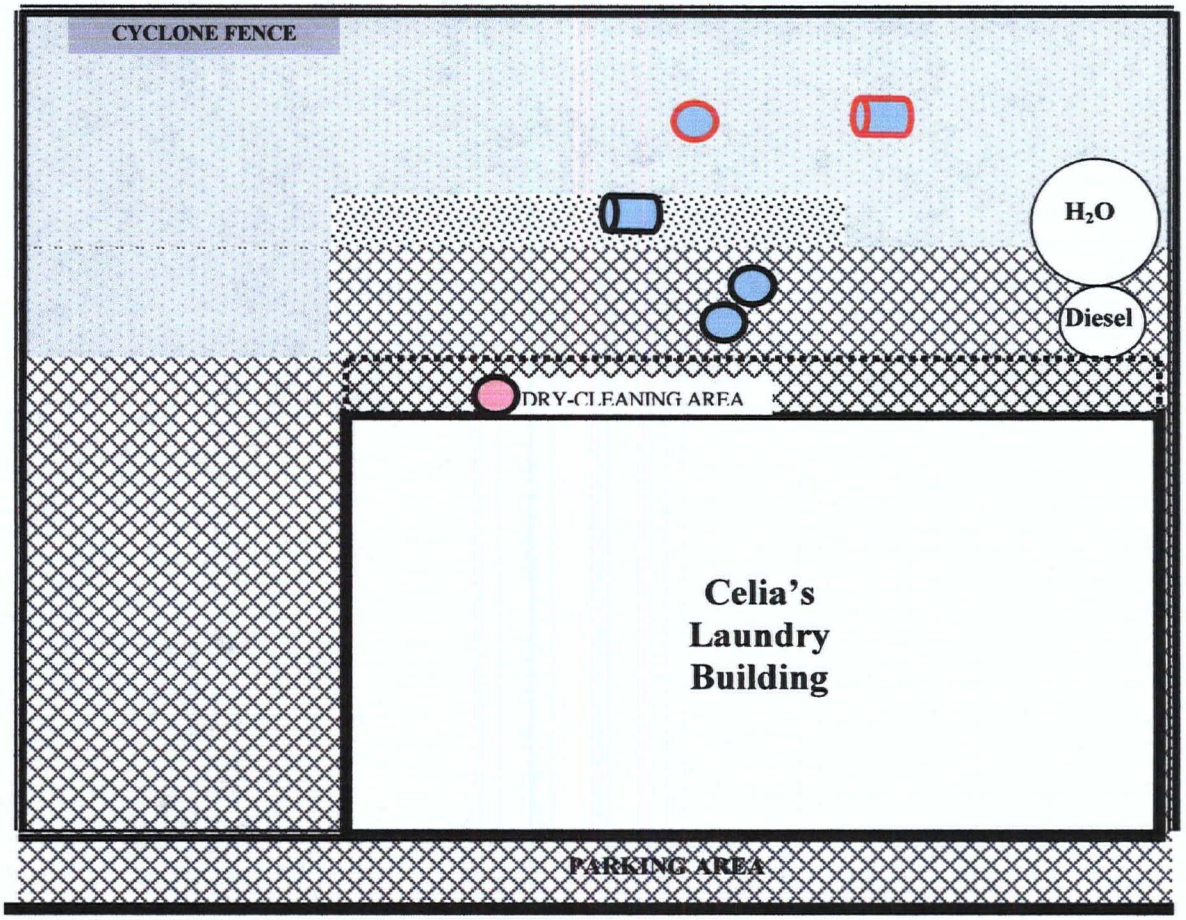


FIGURE 1: SITE LOCATION MAP

NOT TO SCALE

FIGURE 2

SITE SKETCH
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO



KEY:

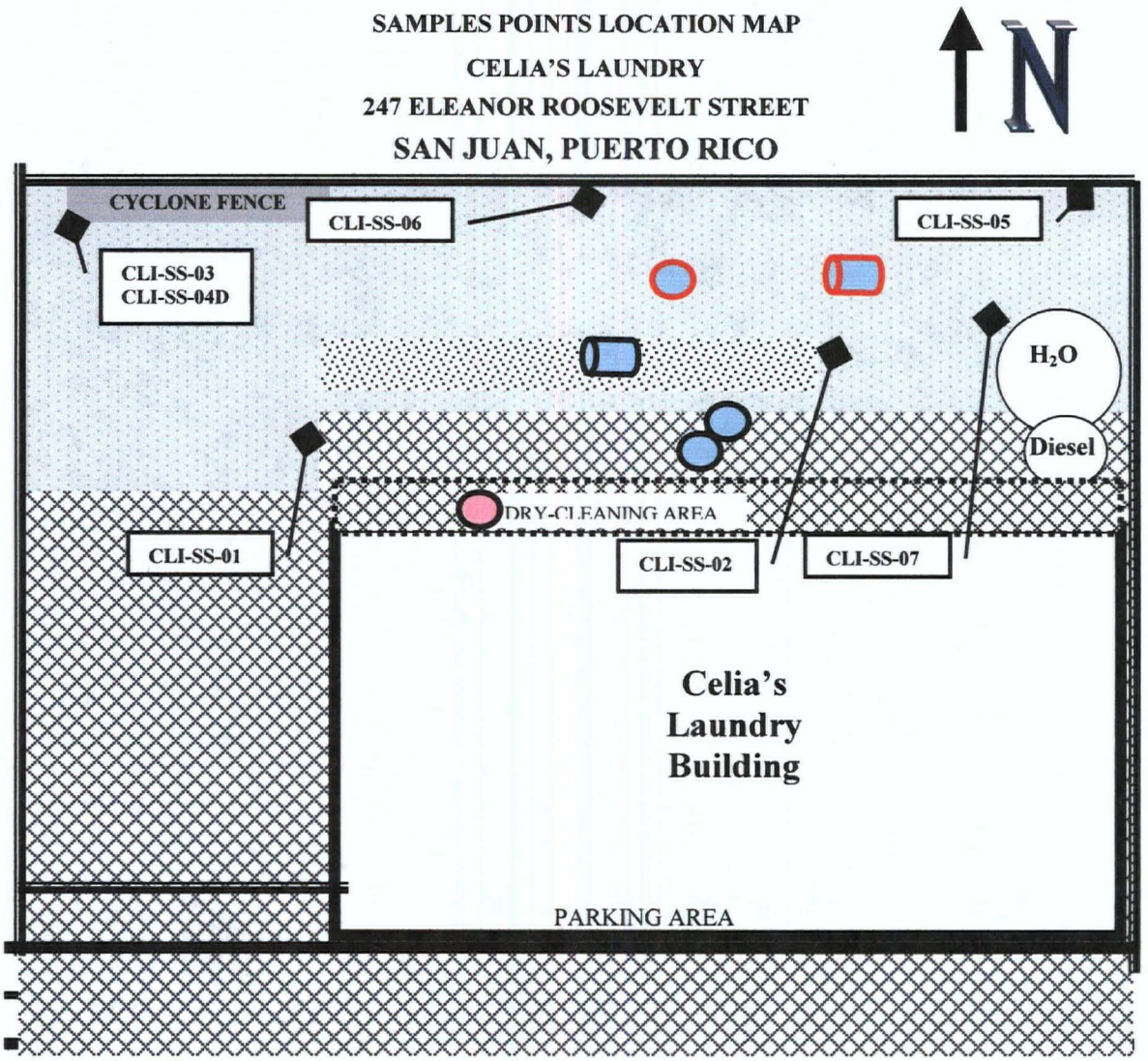
- AREAS COVERED WITH GRAVEL
- AREAS WITH EXPOSED SOIL (WITH LITTLE VEGETATION)
- CONCRETE COVERED AREAS
- BENT OVER DRUM
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR TETRACHLOROETHYLENE)
- 55-GALLON METAL DRUMS CONTAINING TETRACHLOROETHYLENE)
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR KEROSENE), PARTIALLY BURIED

(NOT TO SCALE)

FIGURE 2

FIGURE 3

SAMPLES POINTS LOCATION MAP
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO

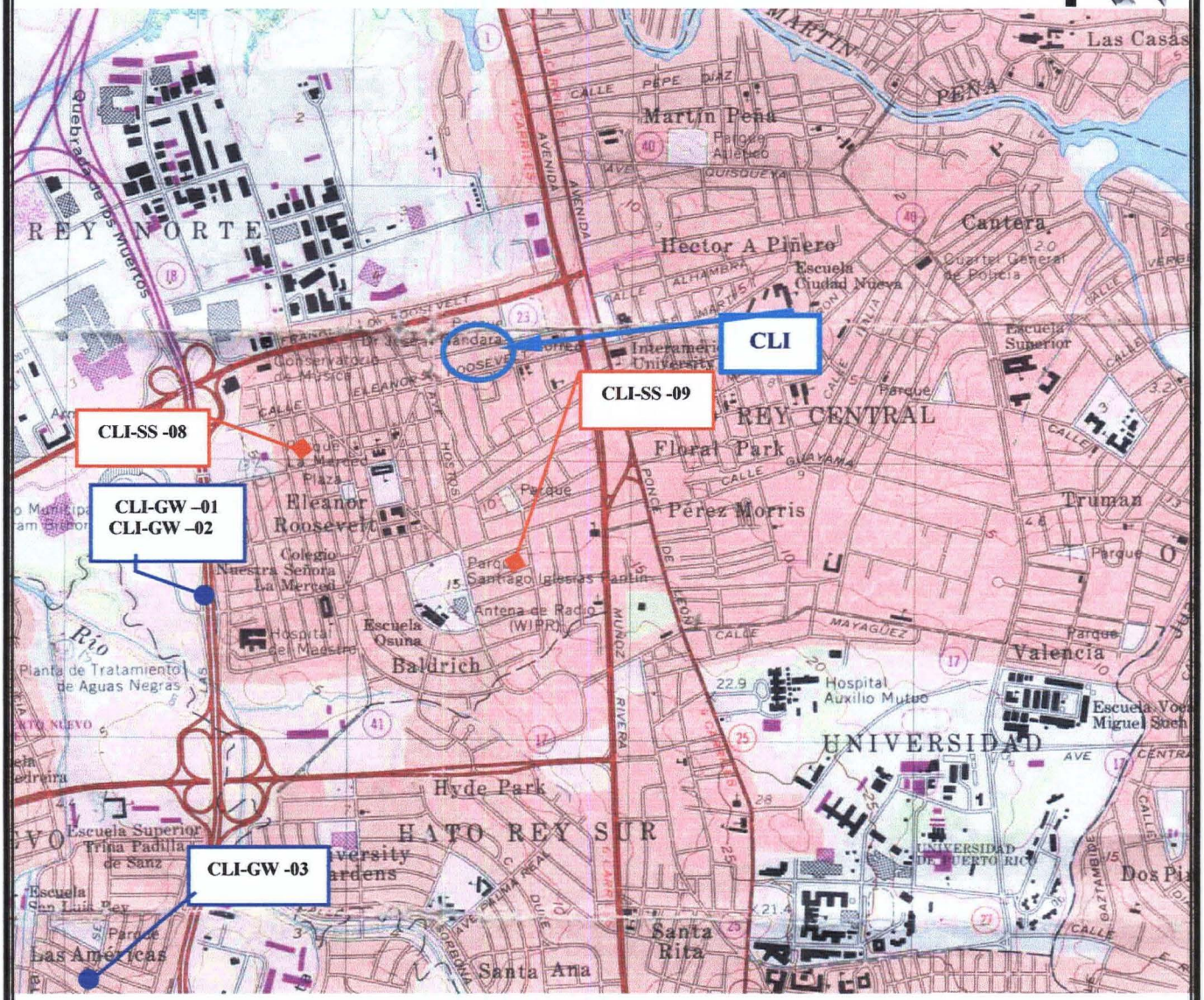


(NOT TO SCALE)

FIGURE 3: SITE SKETCH

FIGURE 4

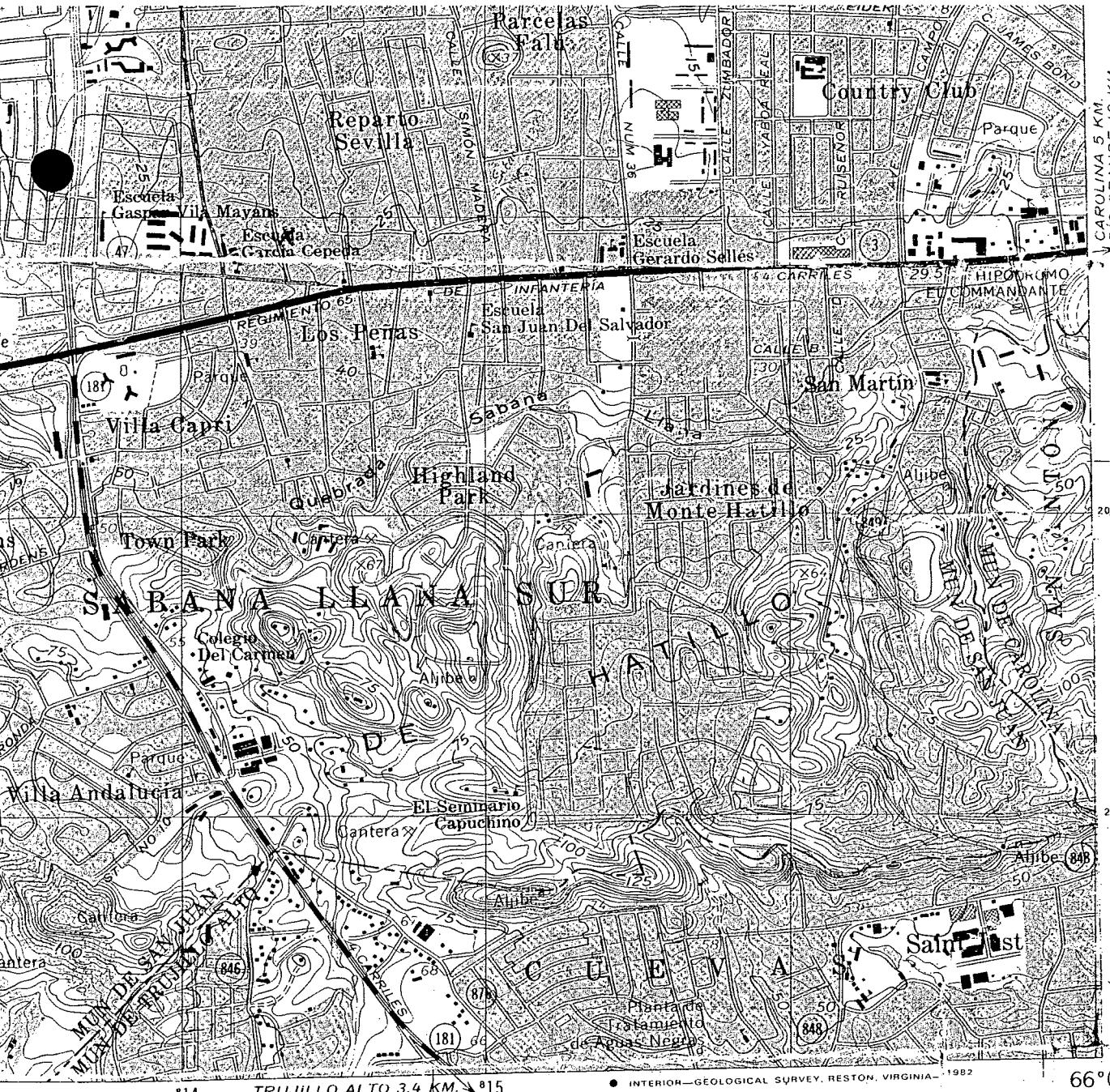
SAMPLE POINTS LOCATION MAP (CONT'N.)
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO



NOT TO SCALE

FIGURE 4

REFERENCE: 1



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1982

ROAD CLASSIFICATION

Primary highway, all weather, hard surface

Secondary highway, all weather, hard surface

Light-duty road, all weather, improved surface

Unimproved road, fair or dry weather

Insular Route

PUERTO RICO

DRANGLE LOCATION

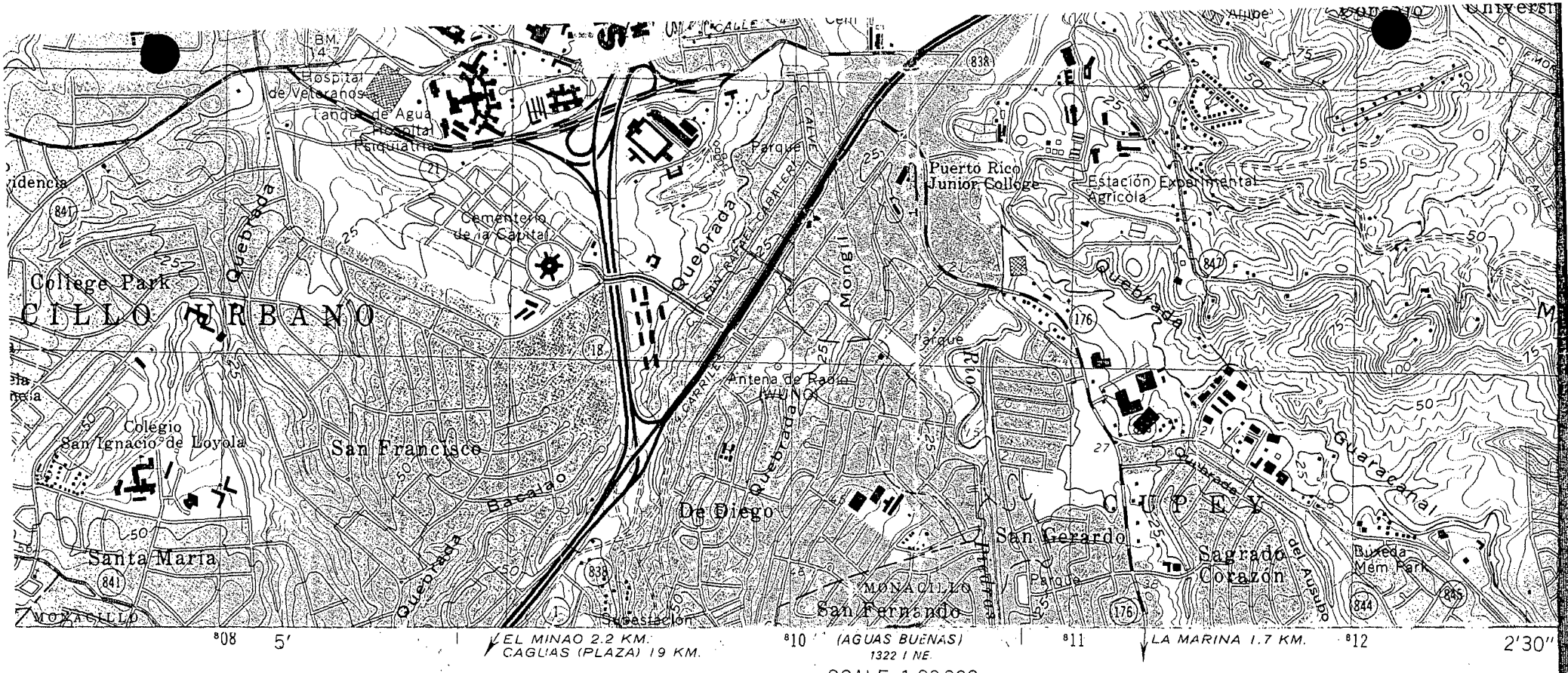
SAN JUAN, P. R.

N1822.5—W6600/7.5

1969

PHOTOREVISED 1982

DMA 1323 II SE—SERIES E835



ND 1982 MAGNETIC NORTH
ON AT CENTER OF SHEET

ıd woodland compiled from aerial
l other sources. This information not
1982

ɔn of urban areas

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA, 22092
AND DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS, SAN JUAN, P. R. 00910

A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

REFERENCE: 2

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC MAP OF THE SAN JUAN QUADRANGLE, PUERTO RICO

By M. H. Pease, Jr., and W. H. Monroe

Prepared in cooperation with
THE COMMONWEALTH OF PUERTO RICO
DEPARTMENT OF NATURAL RESOURCES

MISCELLANEOUS INVESTIGATIONS SERIES
Published by the U.S. Geological Survey, 1977
G

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PEASE, JR., MONROE—GEOLOGIC MAP—SAN JUAN, PUERTO RICO 1:20 000 M

GEOLOGIC MAP SYMBOLS

COMMONLY USED ON MAPS OF THE UNITED STATES GEOLOGICAL SURVEY

(Special symbols are shown in explanation)

Contact – Dashed where approximately located; short dashed where inferred; dotted where concealed

Contact – Showing dip; well exposed at triangle

Fault – Dashed where approximately located; short dashed where inferred; dotted where concealed

Fault, showing dip – Ball and bar on downthrown side

Normal fault – Hachured on downthrown side

Fault – Showing relative horizontal movement

Thrust fault – Sawteeth on upper plate

Anticline – Showing direction of plunge; dashed where approximately located; dotted where concealed

Asymmetric anticline – Short arrow indicates steeper limb

Overturned anticline – Showing direction of dip of limbs

Syncline – Showing direction of plunge; dashed where approximately located; dotted where concealed

Asymmetric syncline – Short arrow indicates steeper limb

Overturned syncline – Showing direction of dip of limbs

Monocline – Showing direction of plunge of axis

Minor anticline – Showing plunge of axis

Minor syncline – Showing plunge of axis

Strike and dip of beds – Ball indicates top of beds known from sedimentary structures

70 Inclined ⊕ Horizontal

Vertical 40 Overturned

Strike and dip of foliation

20 Inclined Vertical Horizontal

Strike and dip of cleavage

15 Inclined Vertical Horizontal

Bearing and plunge of lineation

15 Inclined Vertical Horizontal

Strike and dip of joints

40 Inclined Vertical Horizontal

Note: planar symbols (strike and dip of beds, foliation or schistosity, and cleavage) may be combined with linear symbols to record data observed at same locality by superimposed symbols at point of observation. Coexisting planar symbols are shown intersecting at point of observation.

Shafts

Vertical Inclined

Adit, tunnel, or slope

Accessible Inaccessible

x Prospect

Quarry

Active Abandoned

Gravel pit

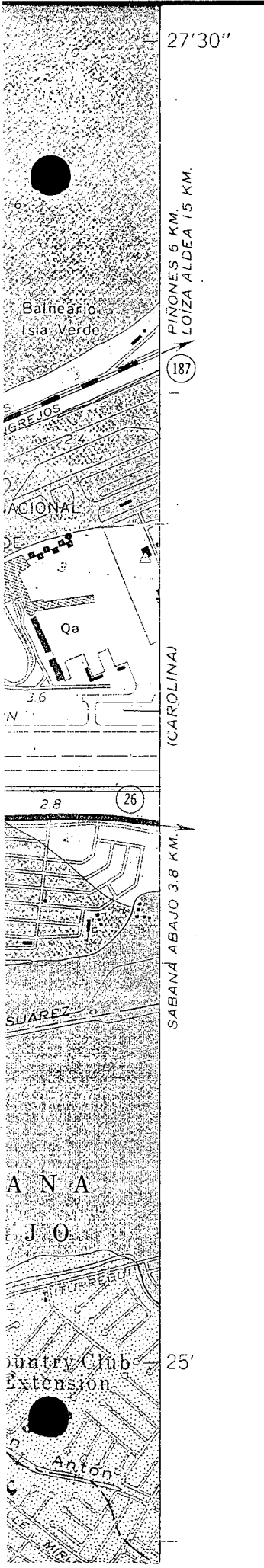
Active Abandoned

Oil well

Drilling Shut-in Dry hole abandoned

Gas Show of gas

Oil Show of oil



generally underlain by peat formed in mangrove swamps. Most areas now covered by artificial fill (map unit af) are underlain by swamp deposits. Generally less than 10 m thick

Qa ALLUVIUM (HOLOCENE)—Sand, clay, and sandy clay. Thickness variable; more than 20 m penetrated in test well in valley of Río Piedras near Nemesio Canales; radiocarbon date on wood at depth of 15 m at Plaza Las Americas, 500 m east of Nemesio Canales, is about 8,600 years BP

Qss SILICA SAND (HOLOCENE)—Quartz sand, very pure, derived from ferruginous sand by leaching. The deposits grade downward into older alluvial deposits (map unit QTt). Thickness ranges from 1–4 m. Silica sand and underlying parent material called Santurce Sand by Kaye (1959)

Qe EOLIANITE (HOLOCENE AND PLEISTOCENE)—Calcareous sandstone, well-cemented, crossbedded, composed of fine to coarse grains of shell fragments and quartz. Maximum thickness about 30 m

Qf ALLUVIAL FAN DEPOSITS (PLEISTOCENE)—Clay, silty and sandy, mainly red or mottled red and light-gray; lithologically indistinguishable from material of older alluvial deposits mapped west of the Río Piedras

QTt OLDER ALLUVIAL DEPOSITS (PLEISTOCENE AND PLIOCENE)—Clay, silty and sandy, mainly red or mottled red and light-gray. Includes Mucarabones Sand and San Sebastían Formation in area east of the Río Piedras. Thickness variable but probably greater than 100 m in places

Tay AYMAMÓN LIMESTONE (MIOCENE)—Limestone, fossiliferous, white to very pale orange, massive to thick-bedded, very pure. Most of this limestone within map area was used as fill in constructing the Aeropuerto de Isla Grande. Maximum exposed thickness about 10 m

Ta AGUADA LIMESTONE (MIOCENE)—Alternating beds of very pale orange to pink fine calcarenite and grayish-orange to very pale orange clayey and chalky limestone, locally contains scattered grains of quartz; locally fossiliferous. Maximum exposed thickness in Montes de Caneja about 80 m

Tc CIBAO FORMATION (MIOCENE AND OLIGOCENE)—Chalk, soft pale-gray limestone, and very pale orange sandy clay. Internal molds of mollusks abundant in outcrops at foot of southern slopes of Montes de Caneja and on north slope of hill north of Highway 3,300 m west of east edge of quadrangle. Exposed thickness about 20 m

Tm MUCARABONES SAND (MIDDLE OLIGOCENE)—Quartz sand, coarse, crossbedded, containing lenses of subangular to subrounded gravel and lenses of greenish-gray clay grading upward into grayish-orange to yellow crossbedded fine to medium sand. Upper part of map unit grades eastward into mottled red and light-gray silty, sandy clay indistinguishable from older alluvial deposits (QTt). Maximum thickness about 90 m

Ts SAN SEBASTIÁN FORMATION (MIDDLE OLIGOCENE)—Sandy clay containing pebbles and cobbles of silicified volcanic rock, grades upward into thin-bedded fine sand and red and gray mottled clay. Grades eastward into mottled red and light-gray silty and sandy clay and gravel indistinguishable from older alluvial deposits (unit QTt). Maximum thickness about 40 m

Tr RÍO PIEDRAS SILTSTONE (EOCENE AND PALEOCENE)—Thin-bedded and laminated siltstone containing thin layers of claystone and calcareous sandstone. Commonly contains fragments of volcanic glass altered to celadonite (?). Locally, conglomerate near base contains fragments of Guaracanal Andesite (Tg). In southwest corner includes beds of very thick bedded olive-gray volcanic pebble conglomerate and coarse-grained volcanic sandstone and siltstone. Maximum exposed thickness in quadrangle about 800 m

Tg GUARACANAL ANDESITE (PALEOCENE)—Poorly stratified tuffaceous wacke and pebble to cobble conglomerate. Characteristically purplish-gray and contains fresh crystals of black hornblende. Maximum exposed thickness in quadrangle about 170 m

Km MONACILLO FORMATION (UPPER CRETACEOUS)—Reddish-gray poorly indurated volcanic conglomerate and dusky-reddish-brown mudstone interstratified with yellowish-gray thin-bedded siltstone and sandstone. Apparent maximum exposed thickness 1000 m in this quadrangle, possibly is repeated by faulting

Kmt Trujillo Alto Limestone Member—Dark-gray calcarenite containing

EL MINAO 2.2 KM.
CAGUAS (PLAZA) 19 KM.

(AGUAS BUENAS)

LA MARINA 1.7 KM.

2'30"

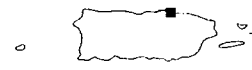
SCALE 1:20000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

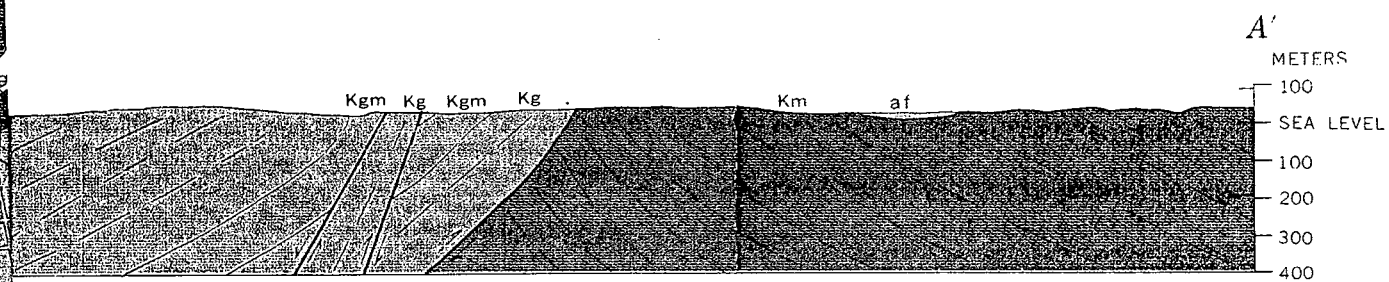
1 KILOMETER

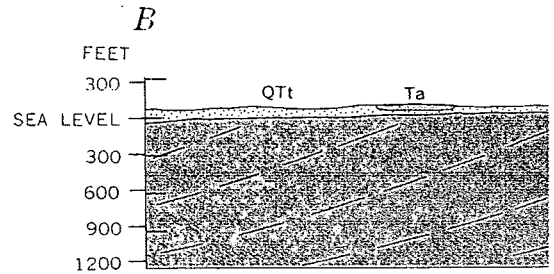
CONTOUR INTERVAL 5 METERS
DOTTED LINES REPRESENT 1-METER CONTOURS
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 0.3 METERS



PUERTO RICO

QUADRANGLE LOCATION

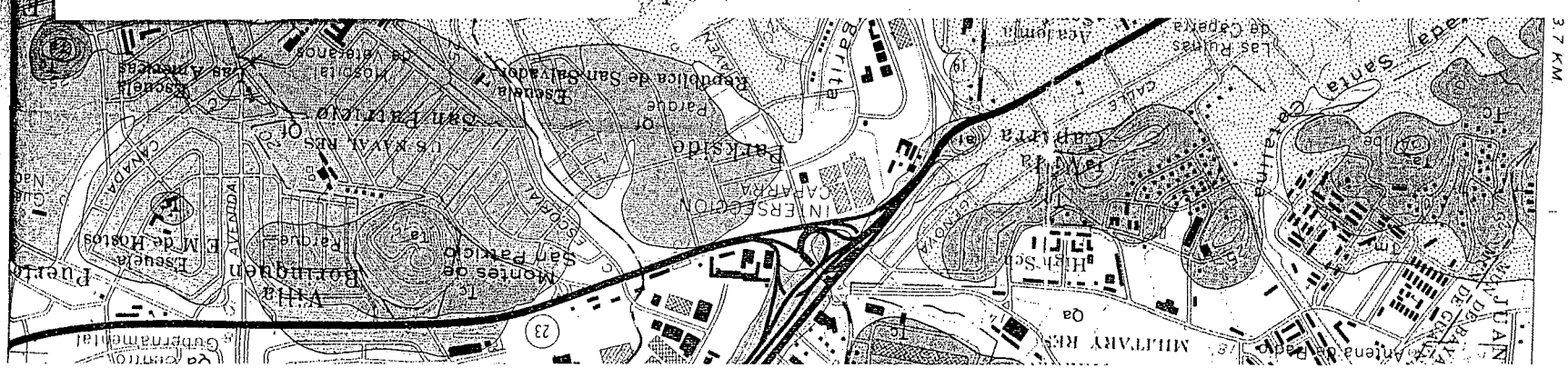


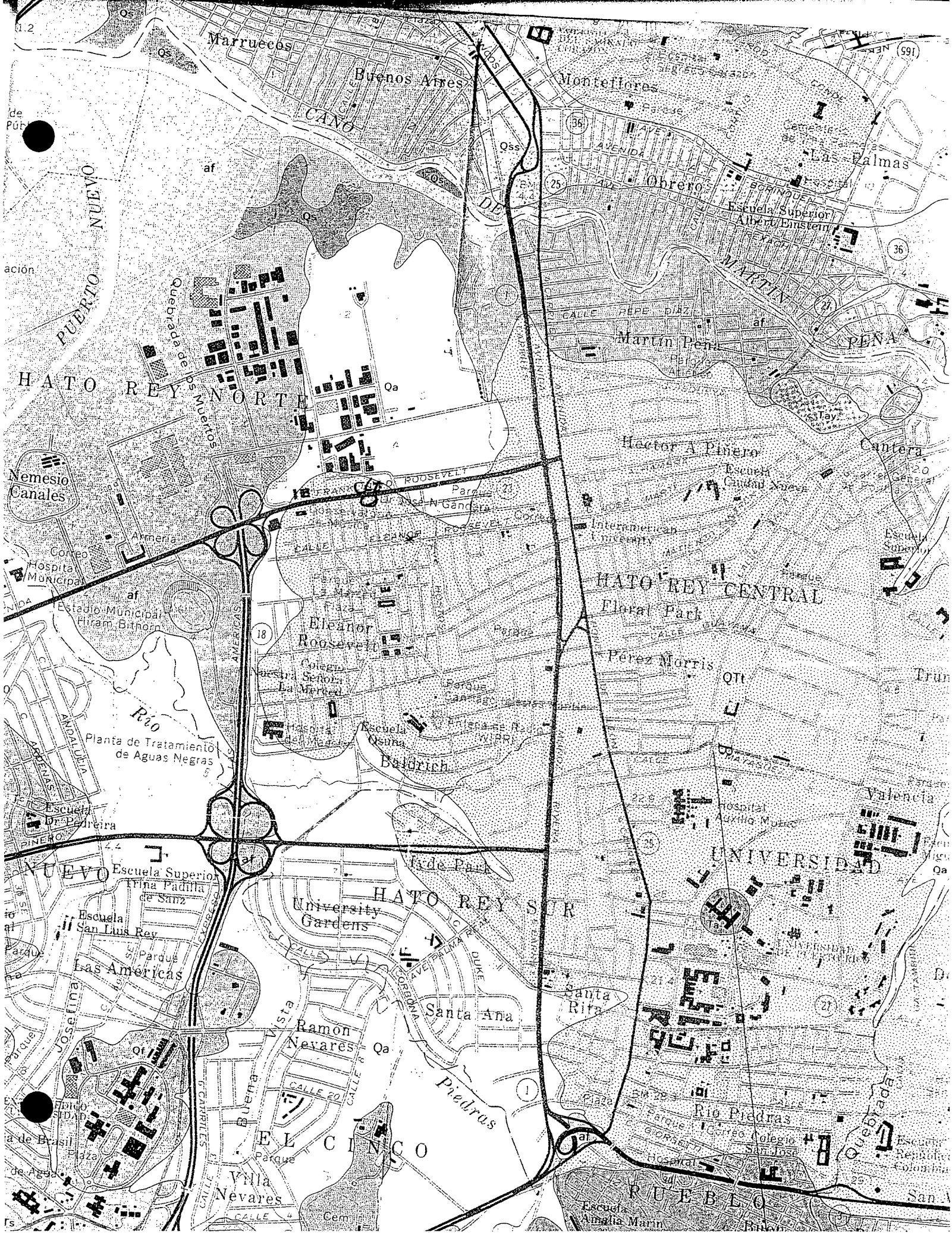


MAP OF THE SAN JUAN QUADRANGLE, PUERTO RICO

By
M. H. Pease, Jr., and W. H. Monroe

1977





Marruecos
Buenos Aires
Monteflores
Las Palmas
Obrero
Escuela Superior Albert Einstein
MARTIN PEÑA
Martín Peña
Hector A Piñero
Cantera
Escuela Ciudad Nueva
Interamerican University
HATO REY CENTRAL
Floral Park
Pérez Morris
Valencia
UNIVERSIDAD
Hospital Auxilio Mutuo
Escuela Superior
Hato Rey Sur
Santa Ana
Santa Rita
Río Piedras
Colegio San José
Escuela Amalia Marin
PUEBLO
Eleanor Roosevelt
Colegio Nuestra Señora La Merced
Escuela Osuna
Baldrich
Hospital del Maestro
Ramón Nevares
Villa Nevares
EL CINCO
Piedras
Las Américas
Escuela San Luis Rey
Escuela Superior Trina Padilla de Sanz
Escuela Dr Pedreira
Planta de Tratamiento de Aguas Negras
Estadio Municipal Hiram Bithorn
Hospital Municipal
Nemesio Canales
Armería
Correo
Quebrada de los Muertos
PUERTO NUEVO
HATO REY NORTE
Río
Quebrada
Qs
Qss
Qa
Qf
QTt
af

REFERENCE: 3

OFF SITE/ON SITE RECONNAISSANCE INFORMATION REPORTING FORM

Date: November 29, 2001

Site Name: Celia's Laundry Inc. (CL)

0850 hours Departure from the PREQB. Drove north on the Ponce de León Avenue (State Road 25), turned left into Eleanor Roosevelt Street and continued driving west.

0855 hours Reached the site. CL is located on building 247, a two-stories concrete building located to the right hand side (to the north) of Eleanor Roosevelt Street. CL building has a parking area on the south side covered with concrete where the main entrance is located. Two other concrete buildings border the eastern and western sides of the property.

0857 hours Entered site and met with Mrs. Celia Aristy, Manager of CL. According to Mrs. Aristy the laundry has been operating for approximately 23 years. She also informed that Mrs. Noemi López, who also lives on the second floor, owns the property. Currently there are 10 employees working on site. Mrs. Aristy informed that they have an air emission permit (PFE-65-0101-0019-I-II-0) from the PREQB to operate a dry-cleaning machine, a boiler, and two electric dryers.

0900 hours According to Mrs. Aristy the operations at the site consist of clothing dry-cleaning, machine washing, drying and ironing. Tailoring is also performed at the site. Mrs. Aristy indicated that the dry-cleaning process is performed using Tetrachloroethylene and that the machine wash is performed using regular detergent. According to her the rinse water from the washing machines is discarded directly into the Puerto Rico Aqueduct and Sewers Authority (PRASA) sewer system.

0905 hours Completed the interview and proceeded to inspect the facility. Entered the ironing room where four industrial ironing machines are located.

0907 hours Entered a second room where two industrial washing machines and two electric dryers are located.

0910 hours Exit the building and arrived to the dry cleaning area located on the northern side of the property, besides the building. This area is covered by a metal roof and consists of a concrete platform where there is also a ditch, right below the dry cleaning machine. According to Mrs. Aristy the ditch collects any tetrachloroethylene accidentally released from the dry cleaning machine and then this solvent is mechanically pumped back into a 55-gallon metal drum that is located besides and is connected to the machine. After collection the solvent is reused. No secondary containment system exists at the site that will prevent the chemical to reach the backyard of the property. In addition there is a concrete ramp next to the dry cleaning machine that reaches the backyard.

0915 hours Left the dry-cleaning area and reached the backyard of the site. The property's backyard is completly bordered on the eastern, northern and western sides by a cylone fence and several contrete walls that run along the fence. These walls are part of the adjacent buildings located to the east, north and west side of the property. Between the western fence and CL's building, there is a concrete platform that runs north to south reaching the parking zone on the north side of the property. There is an electrical power plant over this platform. According to Mrs. Aristy they are applying for a PREQB permit to operate this power plant.

Outdoors and immediately next to the concrete ramp that leads to the backyard there is another concrete platform where two (2) corroded 55-gallon metal drums were observed. There is no containment system surrounding this concrete platform. Mrs. Aristy indicated that both drums were empty and were used to store the Tetrachloroethylene (UN 1897) used for the dry-cleaning process.

To the north and west side of this platform there are areas covered with vegetation, covered with gravel and with exposed soil. Observed another corroded 55-gallon metal drum bent over an area covered with gravel next and to the north of the concrete platform previously described. According to Mrs. Aristy this drum was also empty and were used to store Tetrachloroethylene.

Continue towards the areas with exposed soil to the north of both the area covered with gravel and the concrete platform being used as a drum storage area. Observed two other corroded 55-gallon metal drums over the area with exposed soil. Both drum were partially buried in the ground. Mrs. Aristy informed that these drums were used to store Kerosene, the fuel previously used for a boiler located in the backyard and to the east of the concrete platform, next to two above ground storage tanks. One of the above ground storage tanks stores up to 10,000 gallons of water and another stores up to 600 gallon of diesel, the fuel currently being used for the boiler. The two tanks and the boiler are between the eastern fence and the concrete platform.

0930 hours Complete the Onsite Reconnaissance and left CL.

* * *

OFF SITE/ON SITE RECONNAISSANCE INFORMATION REPORTING FORM

Date: November 29, 2001

Site Name: Celia's Laundry Inc. (CL)

Camera: Canon Sure Shot

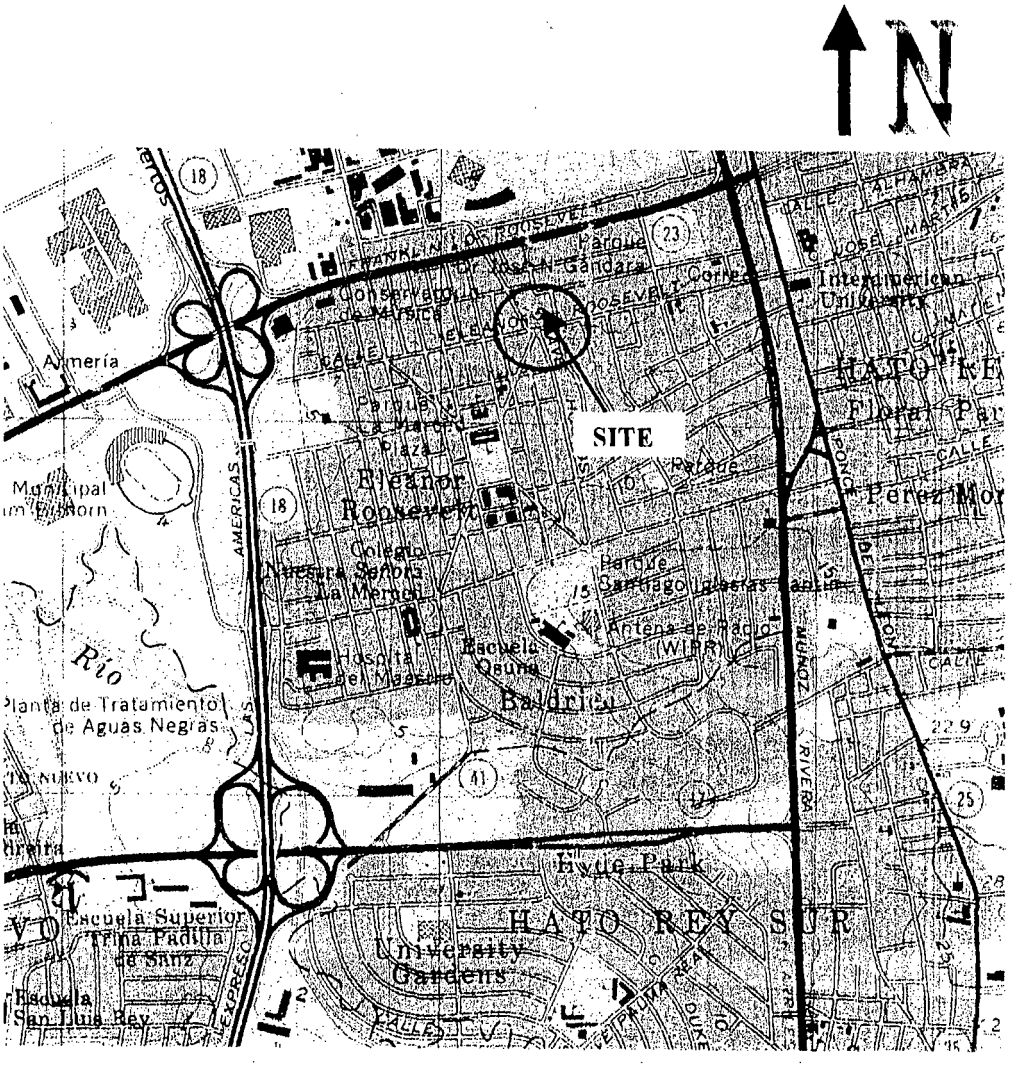
Film: FujiFilm, FujiColor Super G Plus; ASA 100; 12 Exposures; CN135

Photographer: Miriam Ortiz

PHOTOLOG

PHOTO	TIME	DESCRIPTION
1	0920	View of three corroded 55-gallon metal drums located over the concrete platform and an area covered with gravel on the backyard and to the north of CL's building. Photo was taken looking southeast towards the building and the concrete platform. Observed that one of the drums was bent over directly over an area covered with gravel, next and to the north of the concrete platform.
2	0921	View of the dry-cleaning area, the concrete platform, and the areas covered with gravel or with exposed soil in the backyard. Photo was taken looking south toward the CL's building. Observed three corroded 55-gallon metal drums over a concrete platform and an area covered with gravel.
3	0922	View of the dry-cleaning area, the concrete platform, and the areas covered with gravel or with exposed soil in the backyard. Photo was taken looking southeast toward the eastern fence and CL's building. Observed three corroded 55-gallon metal drums over a concrete platform and an area covered with gravel. One of the drums is bent over and directly over the ground covered with gravel.

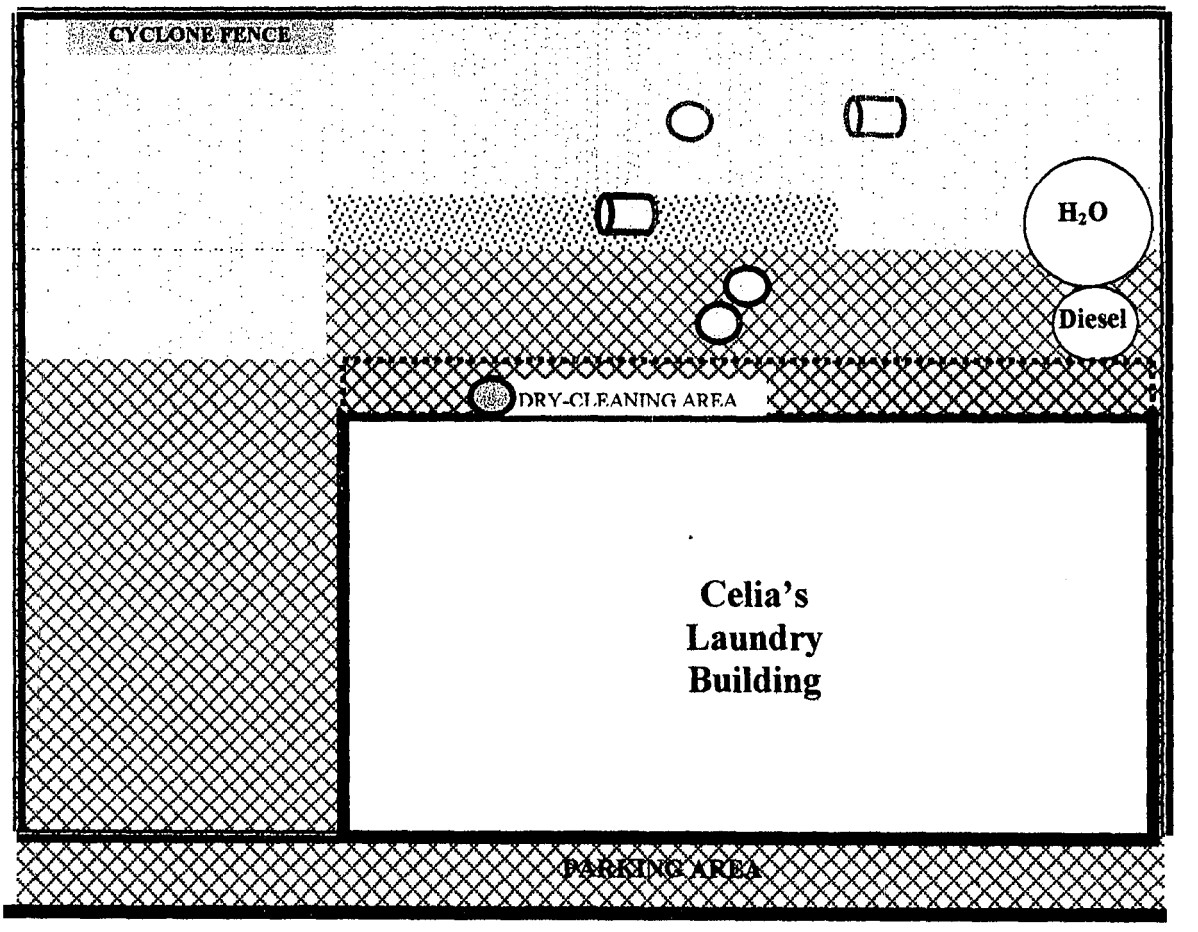
SITE LOCATION MAP
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO



SCALE : 1 : 20,000

FIGURE 1

SITE LOCATION MAP
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO



KEY:

- AREAS COVERED WITH GRAVEL
- AREAS WITH EXPOSED SOIL (WITH LITTLE VEGETATION)
- CONCRETE COVERED AREAS
- BENT OVER DRUM
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR TETRACHLOROETHYLENE)
- 55-GALLON METAL DRUMS CONTAINING TETRACHLOROETHYLENE)
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR KEROSENE), PARTIALLY BURIED

(NOT TO SCALE)

FIGURE 3

Appendix C
Additional Comments

Use this space to further clarify or explain responses to questions in the NPL Data Collection Form or Supplemental Data Collection Form For Unknown Source Sites. When clarifying or explaining a response, please ***make sure to provide the question number.*** Attach additional sheets if necessary.

The following information summarizes all the findings during the Pre-CERCLIS Screening of Celia's Laundry (CL). This site is on lot 247 on Eleanor Roosevelt Street, San Juan, PR (Figure 1). The scope of the investigation included the review of available information from the PREQB files, several telephone interviews, a target survey, and an Off/On-Site Reconnaissance on November 29, 2001.

CL is a laundry that began operations in 1978 and is engaged in the dry-cleaning, mashine washing, drying, and ironing of clothing. The site is located in a two stories building bordered by a parking area on the southern side and by a cyclone fence and three other concrete buildings on the eastern, western and northern side. The laundry operates on the first floor while there is a residential apartment on the second floor. There are two concrete platforms on the western and northern sides of CL building, and there is a large area with exposed soil or covered with vegetation or gravel on the backyard of the property, located on the north side of the property (Figure 2).

The dry-cleaning process is performed using **tetrachloroethylene** (UN 1897) pumped from a 55-gallon drum connected to and located besides the dry-cleaning machine. This process is performed over a concrete platform with a primary containment system in an outdoor and roofed area besides CL building. During the Off/On Site Reconnaissance five corroded, metal 55-gallon drums were observed on the backyard of the property (northern side). Three of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system and over an area covered with gravel next to the platform (Figure 2). Both the concrete platform and the area covered with gravel were next to an area with exposed soil where two other corroded metal 55-gallon drums were observed. These drums, previously used to store kerosene, were partially buried in the ground (Figure 2). During the same inspection it was observed that the drum over the gravel area and one of the drums partially buried were bent over their side (Figure 2).

Due to the fact that within a 4-mile radius from the site three (3) of twenty-seven (27) PRASA drinking water wells were closed because contamination with volatile organic compounds, including tetrachloroethylene among others, which is being used at the site, and due to the conditions at the site may pose a threat to the groundwater, further assessment under the Superfund Program or other State Program is recommended.

REFERENCE: 4

Questionnaire dealing with chemicals in dry-cleaned textile

The questionnaire has been divided into 2 parts.

The first part includes a number of general questions relating to the dry-cleaning shop and its operation.

The second part includes a number of questions relating to the use of chemicals in connection with the dry-cleaning.

In case of any questions to this material, please do not hesitate to contact Dorte Glensvig or Jan Dam Christensen, Kampsax A/S, telephone +45 36 39 07 00.

We thank you very much for your assistance.

PART 1:

Basis data	
The name of the dry-cleaning shop	
Address	
Telephone number	
Owner	

Information about the dry-cleaning machine

The manufacture of the dry-cleaning machines (machine name/brand) and the cleaning fluid being used (Rynex, hydrocarbons)?

Machine 1: _____ Cleaning fluid: _____

Machine 2: _____ Cleaning fluid: _____

Please enclose any available information about the machines.

When were the dry-cleaning machines installed?

Machine 1: _____

Machine 2: _____

Have any essential changes been made to the machine since the installation?

Machine 1: Yes No

If "Yes" – which changes have been made and when? _____

Machine 2: Yes No

If "Yes" – which changes have been made and when? _____

Does the machine have automatic drying control?

Machine 1: Yes No

If "Yes" - please briefly describe how the automatic drying control works (according to the residue in the drum air or according to the drying time)

_____

_____

_____

Other control mechanisms: Yes No

If "Yes" - which? _____

Machine 2: Yes No

Other control mechanisms: Yes No

If "Yes" - which? _____

If "Yes" - please briefly describe how the automatic drying control works (according to the residue in the drum air or according to the drying time)

_____

_____

_____

What is the capacity of the machine?

Machine 1: _____kg/charge

Machine 2: _____kg/charge

Quantity of dry-cleaned clothes per year (kg)?

Number of charges per year?

Number of working days per year?

Evaluation of the cleaning fluids, helping agents, etc.

Have you experienced any obnoxious smells due to the cleaning fluid used and/or the helping agents and additives?

Yes No

If "Yes" – please describe the problem:_____

Have you experienced any operation problems due to the cleaning fluid used and/or the helping agents and additives?

Yes No

If "Yes" – please describe the problem:_____

Have you received any complaints from the customers due to the cleaning fluid used and/or the helping agents and additives?

Yes No

If "Yes" – please describe the problem:_____

Do you find the dry-cleaning sufficiently good?

Yes No

If "No" – please describe the problem:

Any other advantages or disadvantages connected to the cleaning fluids, helping agents and additives?

PART 2: Consumption of chemicals during the dry-cleaning process

Consumption of chemicals for pre-treatment, dry-cleaning and final treatment:
[A]: Please enclose any available data sheets
[B]: Cleaning fluid, cleaning intensifiers, bactericides, helping agents, spot removers, deodorizers, etc.
[C]: Name, address, telephone number, contact person

Trade name[A]	Use[B]	Supplier/producer[C]	Consumption per year Please state the unit (litre or kg)	Consumption per kg clothes

Consumption of chemicals for pre-treatment, dry-cleaning and final treatment:

[A]: Please enclose any available data sheets
[B]: Cleaning fluid, cleaning intensifiers, bactericides, helping agents, spot removers, deodorizers, etc.
[C]: Name, address, telephone number, contact person

Trade name[A]	**Use**[B]	**Supplier/producer**[C]	**Consumption per year Please state the unit (litre or kg)**	**Consumption per kilo clothes**

			Dry-cleaning shop A	Dry-cleaning shop B
The dry-cleaning machine		Machine 1	Satec	Satec
		Cleaning fluid	**Rynex**	**Rynex**
		Installation of machine	06.08.2001	11.04.2001
		Changes made	No	No
		Machine 2	None	None
		Automatic drying control	No	No
		How	Automatic time control, 70 minutes. Can also be set manually.	Automatic time control, 70 minutes. Can also be set manually.
		Other control mechanisms	No	No
		Which		
		Normal drying time in minutes	70	70
		Machine capacity - kg	15	15
		Quantity per year	Approx. 9,500 kg	6,000
		Charges per year	Approx. 900	750
		The quantity dry-cleaned per kilo (without pressing)	< 5%	Only half of the curtains
		Number of working days a year	240	230
Evaluation of cleaning fluids, etc.		Obnoxious smells	No	No
		Operation problems	Long drying time	No
		Complaints from customers	No	No
		Is the dry-cleaning good?	Yes	Yes
		Other advantages or disadvantages	No comments	No comments

			Dry-cleaning shop A	Dry-cleaning shop B
Consumption of chemicals	1 Pre-brushing fluid	Trade name	Secafix 1-2-3	Devantol Soft
		Use	Spot removers	Pre-brushing - masking off
		Supplier/producer	Bendsen A/S	Bendsen A/S
		Consumption per year	Few litres	20 kg
	1 Pre-brushing fluid	Trade name	Polysol	DetaProfi and Detafix series
		Use	Pre-brushing fluid	Spot removal
		Supplier/producer	Aktern A/S	Bendsen A/S
		Consumption per year	20 l	500 ml
	2 Pre-cleaning fluid	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	3 Cleaning fluid	Trade name	Rynex 2	Rynex 2
		Use	Cleaning fluid	Cleaning fluid
		Supplier/producer	HJM Teknik	HJM Teknik
		Consumption per year	No consumption	60 l
	4 Cleaning intensifiers	Trade name	Tempo Ryn	TPM 1075
		Use	Cleaning intensifier	Cleaning intensifier
		Supplier/producer	Bendsen A/S	Bendsen A/S
		Consumption per year	150 l	20 kg
	5 Starching fluid	Trade name	Ingredient of cleaning intensifier	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	6 Anstistatica	Trade name	Ingredient of cleaning intensifier	Ingredient of cleaning intensifier
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	7 Waterproofing fluids	Trade name	Vinoy Plus	Vinoy Plus
		Use	Waterproofing fluid	Waterproofing
		Supplier/ producer	H.H.	H.H.
		Consumption per year	20 l	15 kg
	8 Spotting fluids	Trade name	-	Same products as in 1)
		Use	-	-
		Supplier/producer	-	-

		Consumption per year	-	-
	9 Filter powder	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	10 Dubbin	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-

-: No information available

The supplier informs, that in Dry-celaning shop C, D, E and F the same technical construction of cleaning machines has been used.

			Dry-cleaning shop C	Dry-cleaning shop D
The dry-cleaning machine		Machine 1	Satec B-300	Satec B-700
		Cleaning fluid	**Hydrocarbon**	**Hydrocarbon**
		Installation of machine	23.12.2001	06.2001
		Changes made	No	No
		Machine 2	None	None
		Automatic drying control	Yes	Yes
		How	Infra-red sensor for measuring residue in the drum air	Infra-red sensor for measuring residue in the drum air. Heating stops at 75% of LEL
		Other control mechanisms	Yes	Yes
		Which	Minimum time for drying, typically 25-35 minutes.	Minimum time for drying, typically 25-35 minutes.
		Normal drying time in minutes		30
		Machine capacity – kg	15	35
		Quantity per year	22,000 kg	40,000 kg
		Charges per year	1,600	1,300
		Quantity dry-cleaned per kilo (without pressing)	Max. 1%	< 3%
		Number of working days a year	220	275
Evaluation of cleaning fluids, etc.		Obnoxious smells	No	No
		Operation problems	No	No
		Complaints from customers	No	No
		Is the dry-cleaning good?	Yes	Yes
		Other advantages or disadvantages	Is very satisfied with the non-smelling cleaning fluid	More comfortable smell in the dry-cleaning shop

			Dry-cleaning shop C	Dry-cleaning shop D
Consumption of chemicals	1 Pre-brushing fluid	Trade name	Product from Kreussler	Solvex 1, 2 and 3
		Use	Spot removal	Spot removal
		Supplier/producer	H.H.	Aktern A/S
		Consumption per year	Low	3 x 10 l
	1 Pre-brushing fluid	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	2 Pre-cleaning fluid	Trade name	Prenett Pur	Prenet
		Use	Pre-cleaning fluid	Pre-rinse
		Supplier/producer	H.H.	H.H.
		Consumption per year	7 l	120 l
	3 Cleaning fluid	Trade name	-	Toptrel HP
		Use	-	Cleaning fluid
		Supplier/producer	-	H.H.
		Consumption per year	No consumption	100 l have been drawn off
	4 Cleaning intensifiers e	Trade name	Clip Comfort	Frankotex and Preclin
		Use	Cleaning intensifier	Cleaning intensifier
		Supplier/producer	H.H.	Aktern A/S
		Consumption per year	150 l	425 l in total
	5 Starching fluid	Trade name	Included in 2)	Included in 2)
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	6 Anstistatica	Trade name	Included in 2)	Included in 2)
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	7 Waterproofing fluids	Trade name	Included in 2)	Cetox KWI
		Use	-	Waterproofing
		Supplier/producer	-	Aktern A/S
		Consumption per year	-	160 l
	8 Spotting fluids	Trade name	Included in 2)	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	9 Filter powder	Trade name	-	Kieselguhr
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	15 kg
	10 Dubbin	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-

-: No information available

			Dry-cleaning shop E	Dry-cleaning shop F
The dry-cleaning machine		Machine 1	Satec B-300	Satec B-440
		Cleaning fluid	**Hydrocarbon**	**Hydrocarbon**
		Installation of machine	06.2002	28.03.2002
		Changes made	No	No
		Machine 2	None	
		Automatic drying control	Yes	Yes
		How	Infra-red sensor for measuring residue in the drum air	Infra-red sensor for measuring residue in the drum air
		Other control mechanisms	Yes	Yes-
		Which	Minimum time for drying, typically 25-35 minutes.	Minimum time for drying, typically 25-35 minutes.
		Normal drying time in minutes		
		Machine capacity - kg	15	22
		Quantity per year	Unknown new machine	25,000
		Charges per year	Unknown new machine	1,800
		Quantity dry-cleaned per kilo	-	<10%
		Number of working days a year	300	312
Evaluation of cleaning fluids, etc.		Obnoxious smells	No	No
		Operation problems	No	No
		Complaints from customers	No	No
		Is the dry-cleaning good?	Yes	Yes
		Other advantages or disadvantages	Positive feedback from customers	-

			Dry-cleaning shop E	Dry-cleaning shop F
Consumption of chemicals	1 Pre-brushing fluid	Trade name	Solvex 1, 2 and 3	Solvex 1, 2 and 3
		Use	Spot removal	Spot removal
		Supplier/producer	Aktern A/S	Aktern A/S
		Consumption per year	4 l (new)	3 x 10 l
	1 Pre-brushing fluid	Trade name	Polysol KWV	-
		Use	Pre-brushing	-
		Supplier/producer	Aktern A/S	-
		Consumption per year	-	-
	2 Pre-cleaning fluid	Trade name	Preclin Odosorb	-
		Use	Pre-cleaning fluid	-
		Supplier/producer	Aktern A/S	-
		Consumption per year	-	-
	3 Cleaning fluid	Trade name	Actrel 3356 D	Toptrel HP
		Use	Cleaning fluid	Cleaning fluid
		Supplier/producer	Aktern A/S	H.H.
		Consumption per year	-	50 l
	4 Cleaning intensifiers	Trade name	Frankotex HCR	Prenet Pur and Clip Comfort
		Use	Cleaning intensifier	Cleaning intensifier
		Supplier/producer	Aktern A/S	H.H.
		Consumption per year	-	200 and 150 kg respectively
	5 Starching fluid	Trade name	Included in 2)	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	6 Anstistatica	Trade name	Included in 2)	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	7 Waterproofing fluids	Trade name	Cetox KWI	Vinoy Plus
		Use	Waterproofing	Waterproofing
		Supplier/producer	Aktern A/S	H.H.
		Consumption per year	-	100 kg
	8 Spotting fluids	Trade name	Solvex 1, 2 and 3	-
		Use	Spot removal	-
		Supplier/producer	Aktern A/S	-
		Consumption per year	-	-
	9 Filter powder	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-
	10 Dubbin	Trade name	-	-
		Use	-	-
		Supplier/producer	-	-
		Consumption per year	-	-

-: No information available

			Dry-cleaning shop G
The dry-cleaning machine		Machine 1	Satec DX 101
		Cleaning fluid	**Aroma free hydrocarbon**
		Installation of machine	12.1993
		Changes made	No
		Machine 2	None
		Automatic drying control	Yes
		How	Drying time
		Other control mechanisms	-
		Which	-
		Normal drying time in minutes	-
		Machine capacity - kg	10
		Quantity per year	14,000
		Charges per year	1,800
		Quantity dry-cleaned per kilo (without pressing)	<1%
		Number of working days a year	250
Evaluation of cleaning fluids, etc.		Obnoxious smells	No
		Operation problems	No
		Complaints from customers	No
		Is the dry-cleaning good?	Yes
		Other advantages or disadvantages	No comments

			Dry-cleaning shop G
Consumption of chemicals	1 Pre-brushing fluid	Trade name	Polysol KWV
		Use	Pre-brushing
		Supplier/producer	Aktern A/S
		Consumption per year	45 l
	1 Pre-brushing fluid	Trade name	-
		Use	-
		Supplier/producer	-
		Consumption per year	-
	2 Pre-cleaning fluid	Trade name	Preclin Odosorb
		Use	Pre cleaning intensifier
		Supplier/producer	Aktern A/S
		Consumption per year	25 l
	3 Cleaning fluid	Trade name	-
		Use	-
		Supplier/producer	-
		Consumption per year	80 l
	4 Cleaning intensifiers	Trade name	Frankotex HCR
		Use	Cleaning intensifier
		Supplier/producer	Aktern A/S
		Consumption per year	45 l
	5 Starching fluid	Trade name	Included in 4)
		Use	-
		Supplier/producer	-
		Consumption per year	-
	6 Anstistatica	Trade name	Included in 4)
		Use	-
		Supplier/producer	-
		Consumption per year	-
	7 Waterproofing fluids	Trade name	Cetox KWI
		Use	Waterproofing
		Supplier/producer	Aktern A/S
		Consumption per year	60 l
	8 Spotting fluids	Trade name	Solvex 1, 2 and 3
		Use	-
		Supplier/producer	-
		Consumption per year	-
	9 Filter powder	Trade name	-
		Use	-
		Supplier/producer	-
		Consumption per year	-
	10 Dubbin	Trade name	Leder Öl
		Use	Dubbin
		Supplier/producer	Aktern A/S
		Consumption per year	65 l

-: No information available

Product name	Use[2]	Dealer/ importer	Producer[1]	PR No.[1]	Consumption per year [2]
Devantol Soft	Pre-treatment	F1	P1	807-0004	B: 20 kg
Rynex 2	Cleaning fluid	F2	P2	-	A: - B: 60 l
TPM 1075	Cleaning intensifier	F1	P1	803-0001	B: 20 kg
Secafix 1	Pre-brushing	F1	P1	848-0101	A: few litres
Secafix 2	Pre-brushing	F1	P1	848-0102	A: few litres
Secafix 3	Pre-brushing	F1	P1	848-0103	A: few litres
Tempo Ryn	Identical to TPM 1075	F1	P1	803-0001	A: 150 l
Detafix Rostol	Pre-brushing - rust, food and blood	F1	P1	844-0006	B:*
Detafix Tintol	Pre-brushing – ink and felt pen	F1	P1	844-0005	B:*
Detafix Color	Pre-brushing – oil, paint, lubricating oil, etc.	F1	P1	844-0004	B: 250-500 ml
Detafix Tanol	Pre-brushing – tannin and tanning agents	F1	P1	844-0003	
Detafix Blotol	Pre-brushing - blood and albumens	F1	P1	844-0002	
Detaprofi Tanex	Pre-brushing – tannin and tanning agent spots	F1	P1	842-0012	
Detaprofi Blodex	Pre-brushing – blood and albumens	F1	P1	842-0011	
Detaprofi Lacex	Pre-brushing – colour, grease and wax spots	F1	P1	842-0013	
Detaprofi Ferex	Pre-brushing - rust and metal stains	F1	P1	842-0015	
Detaprofi Medex	Pre-brushing – medicaments, etc.	F1	P1	842-0014	
Polysol KwV	Pre-brushing	F3	P3	1 304 111	A: 20 l
Vinoy Plus	Waterproofing	F4	P4	-	A: 20 l B: 15 kg

NOTES:

Dealer/importer:
F1: Bendsen A/S
F2: HJM Teknik APS
F3: Aktern A/S
F4: H.H. Pels- og skindservice A/S

Producer:
P1: Büsing & Fasch GmbH
P2: Vopak Products Europe
P3: Seitz GmbH
P4: Kreussler & Co GmbH

1: From safety datasheets
2: From response to questionnaire – dry-cleaning shops
Dry-cleaning shop A: 9,500 kg textile dry-cleaned annually
Dry-cleaning shop B: 6,000 kg textile dry-cleaned annually
-: No information available
*: No longer used

Product name	Use[2]	CAS No. [1]	Chemicals [1]	Content in % [1]	Danger symbol [1]
Devantol Soft	Pre-treatment	112-34-5	2-(2-butoxyethoxy)ethanol	2,51-10,00	Xi; 36
		64742-48-9	Isoparafinisches Kohlenwassestoffgemish	10,01-25,00	
		68425-47-8	Fettsäurediethanolamid	10,01-25,00	Xi; 36 38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36 38
		69011-36-5	Fettalkoholethoxylat	2,51-10,00	Xi: 36 38
		68411-30-3	Alkylbenzolsulfonate	0,01-2,50	Xi; 36 38
Rynex 2	Cleaning fluid	-	Propandiolether	-	-
TPM 1075	Cleaning intensifier	112-34-5	2-(2-butoxyethoxy)ethanol	2,5-10,00	Xi; 36
		69011-36-5	Fettalkoholethoxylat	25,01-50,00	Xi; 36/38
Secafix 1	Pre-brushing	112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
		64742-48-9	Isoparafinisches Kohlenwassestoffgemish	10,01-25,00	
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36 38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36 38
		69011-36-5	Fettalkoholethoxylat	10,01-25,00	Xi: 36 38
Secafix 2	Pre-brushing	112-34-5	2-(2-butoxyethoxy)ethanol	2,5-10,00	Xi; 36
		64742-48-9	Isoparafinisches Kohlenwassestoffgemish	10,01-25,00	
		50-21-5	2-Hydroxypropionsäure (milchsäure)	0,01-2,50	Xi; 36/38
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36 38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	10,00-25,00	Xi; 36 38
		69011-36-5	Fettalkoholethoxylat	10,01-25,00	Xi: 36 38
Secafix 3	Pre-brushing	345590-94-8	Diprpylenglykolmethylether (Isomerengemish)	2,51-10,00	
		112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36 38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36 38
		69011-36-5	Fettalkoholethoxylat	10,01-25,00	Xi: 36 38
Tempo Ryn	Identical to TPM 1075	112-34-5	2-(2-butoxyethoxy)ethanol	2,5-10,00	Xi; 36
		69011-36-5	Fettalkoholethoxylat	25,01-50,00	Xi; 36/38
Detafix Rostol	Pre-brushing - rust, food and blood	7664-38-2	Phosphoric acid	2,51-10,00	C; 34/36/38
		1341-49-7	Ammonium hydrogen fluoride	2,51-10,00	C; 34/36/38
Detafix Tintol	Pre-brushing	100-51-6	Benzyl alcohol	2,51-10,00	Xn; 20/22
	- ink and felt pen	112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36/38
		69011-36-5	Fettalkoholethoxylat	10,01-25,00	Xi; 36/38
		22-99-6	2-Phenoxyethanol	10,01-25,00	Xi; 36

Product name	Use	CAS No. [1]	Chemicals [1]	Content in % [1]	Danger symbol [1]
Detafix Color	Pre-brushing	100-51-6	benzylalkohol	2,51-10,00	Xn; 20/22
	- oil, paint, lubricating oil, etc.	112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
		64742-48-9	Isoparafinisches Kohlenwassestoffgemish	10,01-25,00	
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36 38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36 38
		22-99-6	2-Phenoxyethanol	2,51-10,00	Xi; 36
		68411-30-3	Alkylbenzolsulfonate	2,51-10,00	Xi; 36/38
Detafix Tanol	Pre-brushing	112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
	- tannin and	69011-36-5	Fettalkoholethoxylat	10,01-25,00	Xi; 36/38
	tanning agents	68411-30-3	Alkylbenzolsulfonate	2,51-10,00	Xi; 36 38
Detafix Blotol	Pre-brushing	112-34-5	2-(2-butoxyethoxy)ethanol	2,51-10,00	Xi; 36
	- blood and	68425-47-8	Fettsäurediethanolamid	0,01-2,50	Xi; 36 38
	albumens	577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36/38
		69011-36-5	Fettalkoholethoxylat	2,51-10,00	Xi; 36/38
Detaprofi Tanex	Pre-brushing	112-34-5	2-(2-butoxyethoxy)ethanol	2,5-10,00	Xi; 36
	- tannin and tanning agent	69011-36-5	Fettalkoholethoxylat	2,5-10,00	Xi; 36/38
	spots	68411-30-3	Alkylbenzolsulfonate	2,5-10,00	Xi; 36/38
Detaprofi Blodex	Pre-brushing - blood and albumens	61790-12-3	Ölsäure	2,5-10,00	Xi; 36
Detaprofi Lacex	Pre-brushing	123-86-4	n-butylacetat	25,01-50,00	
	- colour, grease	107-41-5	2-methyl-2,4-pentandiol	2,51-10,00	Xi; 36/38
	and wax spots	68425-48-9	Fettsäurediethanolamid	10,01-25,00	Xi; 36/38
		68411-30-3	Alkylbenzolsulfonate	2,5-10,00	Xi; 36/38
Detaprofi Ferex	Pre-brushing - rust and metal	7664-38-2	Phosphoric acid	2,5-10,00	C; 34
	stains	1341-49-7	Ammonium hydrogen diflouride	2,5-10,00	T; 25. C; 34
Detaprofi Medex	Pre-brushing	872-50-4	Nmethyl-2-pyrrolidon	10,01-25,00	Xi; 36/38
	- medicaments,	112-34-5	2-(2-butoxyethoxy)ethanol	10,01-25,00	Xi; 36
	etc.	141-43-5	2-aminoethanol	2,51-10,00	Xi; 36/37/38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	0,01-2,5	Xi; 36/38
Polysol KwV	Pre-brushing	-	Non-ionic tensid	10-30	Xi; 36/38-53
		-	Anion active tensid	10-20	Xi; 36/38
		90622-57-4	Isoalkanes	10-20	Xn; 65
		112-34-5	2-(2-butoxyethoxy)ethanol	10-20	Xi; 36
Vinoy Plus	Waterproofing	-	Fluoride carbon resin dissolved in isoparaffin	-	Xn; 62 65

NOTES:
[1]: From safety datasheets
[2]: From response to questionnaires - dry-cleaning shops
-: No information available

Product name	Use[2]	Dealer/ importer	Producer [1]	PR No. [1]	Consumption per year [2]
Solvex 1	Pre-brushing fluid	F3	P3	1 321 552	D: 10 l E: 4 l F: 10 l *
Solvex 2	Pre-brushing fluid	F3	P3	1 321 560	D: 10 l E: 4 l F: 10 l *
Solvex 3	Pre-brushing fluid	F3	P3	1 321 579	D: 10 l E: 4 l F: 10 l *
Leder Öl LW	Dubbin	F3	P3	1 321 413	G: 65 l
Actrel 3356-D	Cleaning fluid	F3	P2	-	G: 80 l E: -
Polysol KWV	Pre-brushing fluid	F3	P3	1 304 111	G: 45 l E: -
Frankotex KW	Cleaning intensifier	F3	P3	1 304 058	G: 45 l E: - D: 425 l
Preclin Odosorb	Cleaning intensifier, first bath	F3	P3	1 435 349	G: 25 l E: -
Cetox KWI	Waterproofing fluid	F3	P3	-	D: 160 l G: 60 l E: -
Benzapon Sanofresh	Cleaning intensifier	F1	P1	817-0020	Only informed by the supplier
Benzapon Summer Wind	Cleaning intensifier	F1	P1	817-0022	Only informed by the supplier
Benzapon Sanofresh	-	F1	P1	817-0020	Only informed by the supplier
Benzapon Pre	Pre-brushing fluid	F1	P1	807-0011	Only informed by the supplier
Toptrel HP	Cleaning fluid	F4	-	-	D:-100 l. F: 50 l.
Prenett Pur	Pre-brushing fluid	F4	P4	-	C: 7 l D: 120 l
Clip Comfort	Cleaning intensifier	F4	P4	-	C: 150 l; F: 150 kg
Vinoy Plus	Waterproofing fluid	F4	P4	-	F: 100 kg

NOTES:
Dealer/importer:
F1: Bendsen A/S
F2: HJM Teknik APS
F3: Aktern A/S
F4: H.H. Pels- og skindservice A/S

Producer:
P1: Büsing & Fasch GmbH
P2: Chemex Products A/S
P3: Seitz GmbH
P4: Kreussler & Co GmbH

[1]: From safety datasheets
[2]: From response to questionnaire – dry-cleaning shops
Dry-cleaning shop C: 22,000 kg textile dry-cleaned annually
Dry-cleaning shop D: 40,000 kg textile dry-cleaned annually
Dry-cleaning shop E: Unknown new machine
Dry-cleaning shop F: 25,000 kg textile dry-cleaned annually
Dry-cleaning shop G: 14,000 kg textile dry-cleaned annually
-: No information available
*: No longer used

Product name	Use[2]	CAS No.[1]	Chemicals[1]	Content in %[1]	Danger symbol[1]
Solvex 1	Pre-brushing fluid	90622-57-4	Isoalkanes	10-30	Xn; 65
		-	Anion active tensid	10-20	C; 34
		112-34-5	2-(2-Butoxyethoxy)ethanol	<5	Xi; 36
Solvex 2	Pre-brushing fluid	-	Anion active tensid	10-30	C; 34
		112-34-5	2-(2-Butoxyethoxy)ethanol	<20	Xi; 36
		90622-57-4	Isoalkanes	<5	Xn; 65
Solvex 3	Pre-brushing fluid	34590-94-8	(2-Methoxymethylethoxy)propanol	10-30	
		-	Anion active tensid	10-20	C; 34
		-	Cationic tensid	<5	C; N; 22-34-50/53
		-	Non-ionic tensid	<5	Xi; 36/38-53
		112-34-5	2-(2-Butoxyethoxy)ethanol	<5	Xi; 36
Leder Öl LW	Dubbin	-	Cationic tensid	<20	Xi; 36/38
Actrel 3356-D	Cleaning fluid	-	3295 Hydrocarbons floating N.O.S:		
		-	Iso-undekanes		
		-	Isododecanes		
Polysol KWV	Pre-brushing fluid	-	Non-ionic tensid	10-30	xi, 36/38-53
		-	Anion active tensid	10-20	xi,; 36/38
		90622-57-4	Isoalkanes	10-20	Xn; 65
		112-34-5	2-(2-Butoxyethoxy)ethanol	10-20	Xi; 36
Frankotex KW	Cleaning intensifier	90622-57-4	Isoalkanes	30-50	Xn; 65
		-	Mixture of tensids	20-50	Xi; 36/38
		112-34-5	2-(2-Butoxyethoxy)ethanol	<5	Xi; 36
Preclin Odosorb	Cleaning intensifier, first bath	-	Non-ionic tensid	<20	Xi; R36/38-53
		34590-94-8	(2-methoxymethylethoxy)propanol	<20	-
		-	Anion active tensid	<10	Xn; R22-36/38
		90622-57-4	Isoalkanes	<10	Xn; R65
Cetox KWI	Waterproofing fluid	-	Hydrocarbon mixture, isoparaffin	15-39	
		-	Flouride alkyl polymers		Xi; R36/38
		90622-57-4	Isoalkanes	50-100	Xn; R65
		-	Glycol ether acetate	<5	Xn; R20/21

Product name	Use[2]	CAS No.[1]	Chemicals[1]	Content in %[1]	Danger symbol[1]
Benzapon Sanofresh	Cleaning intensifier	64742-48-9	Isoparafinisches Kohlenwassestoffgemish	25,01-50,00	Xn; 65
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36/38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	10,01-25,00	Xi; 36/38
		69011-36-5	Fettalkoholethoxylat	2,51-10,00	Xi; 36/38
Benzapon Summer Wind	Cleaning intensifier	112-34-5	2-(2-butoxyethoxy)ethanol	2,5-10,00	Xi; 36
		64742-48-9	Isoparafinisches Kohlenwassestoffgemish	25,01-50,00	Xn; 65
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	2,51-10,00	Xi; 36/38
		68411-30-3	Alkylbenzolsulfonate	2,5-10,00	Xi; 36/38
		61790-12-3	Ölsäure	2,5-10,00	Xi; 36
Benzapon Sanofresh	-	64742-48-9	Isoparafinisches Kohlenwassestoffgemish	25,01-50,00	Xn; 65
		68425-47-8	Fettsäurediethanolamid	2,51-10,00	Xi; 36/38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	10,01-25,00	Xi; 36/38
		69011-36-5	Fettalkoholethoxylat	2,51-10,00	Xi; 36/38
Benzapon Pre	Pre-brushing fluid	64742-48-9	Isoparafinisches Kohlenwassestoffgemish	25,01-50,00	Xn; 65
		68425-47-8	Fettsäurediethanolamid	0,01-2,50	Xi; 36/38
		577-11-7	Diisooctylsulfosuccinat, Natriumsalz	10,01-25,00	Xi; 36/38
		69011-36-5	Fettalkoholethoxylat	2,51-10,00	Xi; 36/38
Toptrel HP	Cleaning fluid	90622-57-4	Isoalkanes, C9-C12	-	Xn, R65, R66
Prenett Pur	Pre-brushing fluid	-	Alkyl benzene	-	-
		-	Coconut soap	-	-
		-	Sulfbernstensyraester	-	-
		-	Alkyl glycol	-	-
Clip Comfort	Cleaning intensifier	-	-	-	Xi; 36/38
Vinoy Plus	Waterproofing fluid	-	-	-	Xn; 62 65

NOTES:
[1]: From safety datasheets
[2]: From response to questionnaires – dry-cleaning shops
-: No information available

The Danish Environmental Protection Agency
Consumer project – mapping of chemical substances in dry cleaner shops
Prepared by: Peter Mortensen, Eurofins Danmark A/S & Dorte Glensvig, Kampsax A/S

Revised 01, 9 September 2002

Test protocol

The purpose is to perform an analysis for residual content in textiles cleaned with hydrocarbon based cleaning fluid and Rynex cleaning fluid respectively.

The tests include volatile compounds as well as non-volatile compounds. Prior to the tests a selection of analytical parameters has been carried out based on the obtained product information from the supplier.

Analysis for volatile compounds

Principle: Selected textiles are added standardised stains. Accordingly the textiles are cleaned in a hydrocarbon dry cleaner and a Rynex dry cleaner respectively. The liberation of volatile compounds is measured over a period of fourteen days with selective measurement methods that allows qualitative and quantitative analyses.

Textiles: The tests are carried out with a dress, a pair of trousers, and a jacket. Each textile is purchased in duplicate.

Pletter: The textiles are each added a stain of approximately 2x2 cm of the following dirt types:

- Soot/oil mixture (carbon black suspended in olive oil)
- Blood (from cattle or pig)
- Cocoa (purchased ready-made cocoa)
- Red wine
- Blackcurrant juice
- Egg

The stains are dried for 48 hours before delivery to dry cleaning.

Dry cleaning: Carried out in commercial dry cleaner shops. The dry cleaner applies methods considered necessary to remove the stains.

The stain treatment and cleaning are monitored because a number of significant parameters are recorded for later assessment of the results:

- Pre-treatment: Name and amount of the applied products
- Cleaning fluid and subsidiary materials: product name, and supplier

- Cleaning machine: type and age
- Progress: cleaning time, drying time, other textiles in same batch, stop criteria for drying (e.g. % LEL in the spin air's or the likes).
- Finishing treatment: Type, scope, and duration
- Emission reducing measures: filters and coolers
- Ventilation: type and age
- Discard: age, placing of ventilator

Plans for registration of information have been prepared.

Transport: When ready from the dry cleaners the textiles are transported to the laboratory immediately. In the laboratory they are placed in climate chambers with a view to measuring the emission of volatile compounds. The textiles are wrapped in ordinary wrapping from the dry cleaner during transport (typically plastic bag).

Climate chamber: Thermostatic climate chambers of polished stainless steel are used. The chambers are cleaned thoroughly with aqueous cleaning materials prior to the test. A blind sample is taken immediately before the testing with the climate chamber connected to the air supply.

The following test conditions are used:

- Temperature: 23° C ± 1°C
- Air humidity: 50% ± 5%RF
- Air change: 0.5 times per hour

Sampling: Samples are taken of the chamber air 1, 3, 5, 7, 9, 11, and 13 days and nights after test start. The samples are taken on combi-adsorption tubes typed Tenax TA/Chromosorb 106 and carbon tubes by drawing known air amounts through the tubes. The flow is controlled with a calibrated mass flow controller.

Analyses: The analysis is carried out for volatile organic compounds at thermal desorption/solvent desorption/gas chromatography with mass selective detector (ATD/GC/MS).

Identification and quantification are carried out of the volatile organic compounds.
The following are quantified as a minimum:

- Hydrocarbons
- Glycol ether (Rynex)
- Chlorinated solvents

When the screening analyses test results of the five products are available additional analytical types may be included if necessary.

The analyses of the initial sample set (day 1) are analysed by emergency procedure immediately after collection. Based in the analytical results and the product information on the applied chemicals, the final compounds are selected for identification and quantification in the samples.

Report: The emission is stated as source strength of the single components (µg/kg/hour subsidiary µg/m^2/hour). However, for hydrocarbons as a sum of components for relevant boiling point intervals.

Analysis for non-volatile compounds

Principle: A sample is taken of the textile following the climate chamber test. The samples are analysed for selected chemical compounds. The result is compared with the result of the analysis for the identical compounds on samples taken from the textiles before dry cleaning.

Sampling: Before hand on to dry cleaning three pieces of 10x20 cm are taken from each textile. The samples are identified and stored in annealed glass packaging until analysis.

Following the climate chamber test conclusion a similar piece is cut of the textiles.

Analysis The samples are extracted with a suited extraction agent and analysed accordingly.

The analytical programme is arranged based on collected information in product composition, including possibly applied stabilisations in the cleaning fluids.

Analysis for alkylphenolpolyethoxylates is performed on each textile.

Results The result is stated as residual amount per kg textile. Possible content before dry cleaning is compensated.

Product	Sampling data
Toptrel HP	Sample taken on 02.09.2002 at HJM Teknik, Ringsted. Sample taken from 200 l metal drum with a residue of approximately 50 l
Rynex 2	Sample taken on 27.08.2002 at HJM Teknik, Ringsted. Sample taken from 200 l metal drum with a residue of approximately 5 l.
Tempo Ryn	Sample taken on 28.08.2002 at Aktern A/S, Allerød. Sample taken from unopened 20 l plastic bottle.
Actrel 3356 D	Sample taken on 28.08.2002 at Aktern A/S, Allerød. Sample taken from unopened 200 l metal drum.
Frankotex HCR	Sample taken on 29.08.2002 at Sober Rens, Allerød. Sample taken from 25 l bottle with a residue of approximately 15 l.
Prenett Pur	Sample taken on 29.08.2002 at Sober Rens, Allerød. Sample taken from unopened 20 l bottle.
Cetox KWI	Sample taken on 29.08.2002 at Sober Rens, Allerød. Sample taken from unopened 20 l bottle.
Preclin Odosorp	Sample taken on 08.11.2002 at Aktern A/S, Allerød. Sample taken from unopened 25 l dunk
Polysot Kwv	Sample taken on 05.11.2002 at Sober Rens, Allerød 25 l bottle, approximately 10 l left
Solvex 1	Sample taken on 05.11.2002 at Sober Rens, Allerød 5 l bottle, approximately 2.5 l left
Solvex 2	Sample taken on 05.11.2002 at Sober Rens, Allerød 5 l bottle, approximately 1.5 l left
Solvex 3	Sample taken on 05.11.2002 at Sober Rens, Allerød 5 l bottle, approximately 2.5 l left
Clip Comfort	Sample taken on 05.11.2002 at Sober Rens, Allerød 25 l bottle, approximately 10 l left
Contact water	Sample taken on 06.11.2002 at Sober Rens, Allerød

Sampling procedures:
The chemical samples have been taken with either 20 ml plastic syringes or bailers or they have been poured directly into 100 ml Red-Cap glasses that were sent to the analysis laboratory the same day.

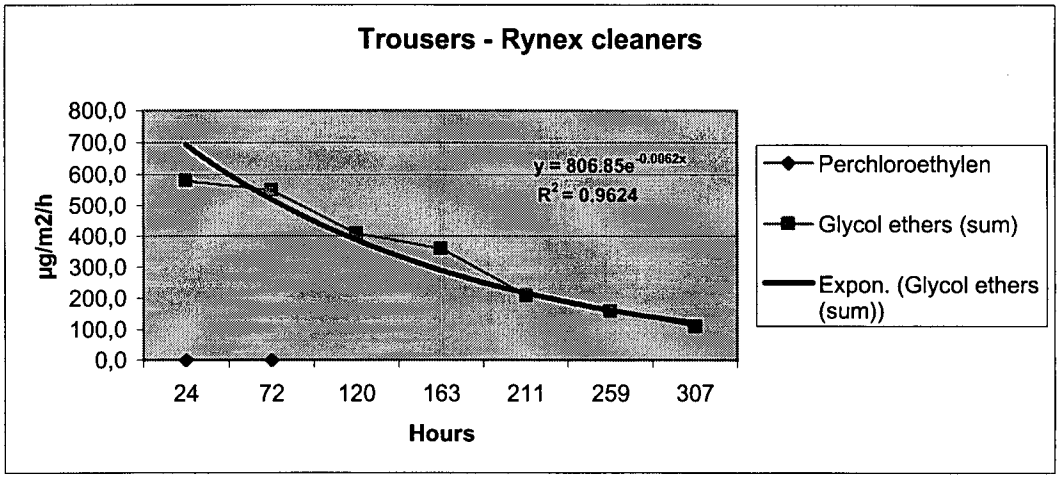
Sample identification	**Trousers no 6, Rynex**	Chamber conditions		
		temperature:	23	°C
		Air change	0,5	per hour
Chamber no:	13	Rel. Humidity	50	%
		Chamber volume	0.119	m³
		weight of sample:	0.485	kg
		Area of sample	1.34	m²

Weight specific emission rate µg/kg/h

Component	1	3	5	7	9	11	13
Perchloroethylen	2,0	<2					
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	<2						
Dipropylene glycol butyl ether (DPMB)	<2						
2-Ethylhexanol	<2						
Glycol ethers (sum)	1600	1500	1100	990	590	430	310

Area specific emission rate µg/m²/h

Component Hours	1 24	3 72	5 120	7 163	9 211	11 259	13 307
Perchloroethylen	0.7	<1					
Propylene glycol butyl ether	<1						
Hydrocarbons (as Decan)	<1						
Dipropylene glycol butyl ether (DPMB)	<1						
2-Ethylhexanol	<1						
Glycol ethers (sum)	580	550	410	360	210	160	110



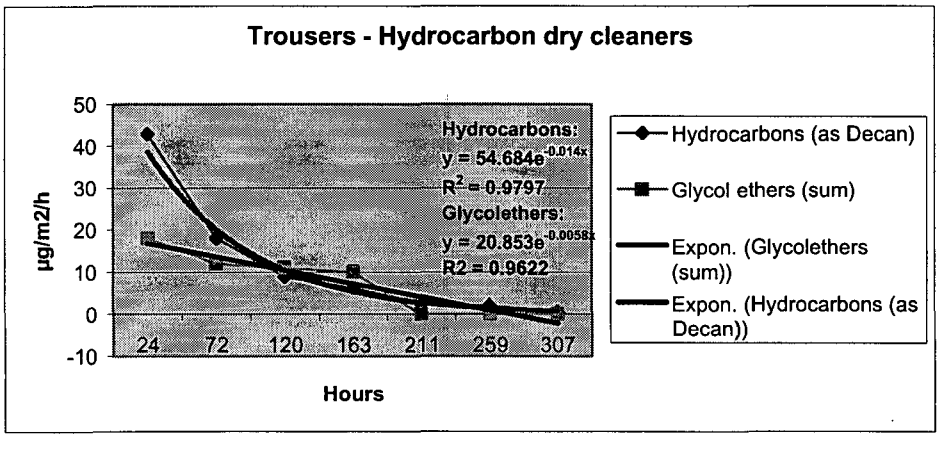
Sample identification	**Trousers no 4, Hydrocarbon**	Chamber conditions		
		temperature:	23	°C
		Air change	0.5	per hour
Chamber no:	15	Rel. Humidity	50	%
		Chamber volume	0.119	m^3
		weight of sample:	0.502	kg
		Area of sample	1.34	m^2

Weight specific emission rate µg/kg/h

Component	1	3	5	7	9	11	13
Perchloroethylen	<2						
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	110	47	24	17	6.8	5.6	1.7
Dipropylene glycol butyl ether (DPMB)	30	26	25	22	12	11	7,0
2-Ethylhexanol	8.7	7.5	3.6	3.2	1.2	0.6	0.45
Glycol ethers (sum)	49	33	29	28	15	13	8.7

Area specific emission rate µg/m²/h

Component / Hours	1 24	3 72	5 120	7 163	9 211	11 259	13 307
Perchloroethylen	<2						
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	43	18	8,9	6,3	2,5	2,1	0,6
Dipropylene glycol butyl ether (DPMB)	11	9,7	9,3	8,2	4,5	4,1	2,6
2-Ethylhexanol	3.3	2.8	1.3	1.2	0.4	0.2	0.2
Glycol ethers (sum)	18	12	11	10	5.6	4.9	3.3



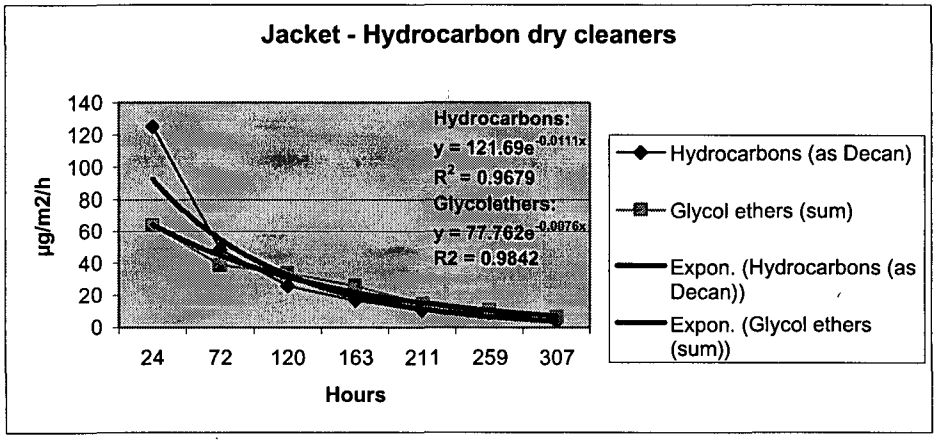
Sample identification	**Jacket no 5, Hydrocarbon**	Chamber conditions		
		temperature:	23	°C
		Air change	0,5	per hour
Chamber no:	11	Rel. Humidity	50	%
		Chamber volume	0,238	m³
		weight of sample:	0,704	kg
		Area of sample	1,26	m²

Weight specific emission rate µg/kg/h

Component	1	3	5	7	9	11	13
Perchloroethylene	<2						
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	220	88	46	30	19	16	7,2
Dipropylene glycol butyl ether (DPMB)	91	65	58	44	26	19	12
2-Ethylhexanol	12	6,2	3,5	2,3	1,1	1,0	
Glycol ethers (sum)	110	70	61	47	27	20	12

Area specific emission rate µg/m²/h

Component	1	3	5	7	9	11	13
Hours	24	72	120	163	211	259	307
Perchloroethylene	<1						
Propylene glycol butyl ether	<1						
Hydrocarbons (as Decan)	125	49	26	17	11	9,1	4,0
Dipropylene glycol butyl ether (DPMB)	51	36	32	24	15	11	6,7
2-Ethylhexanol	6,9	3,5	2,0	1,3	0,6	0,6	
Glycol ethers (sum)	64	39	34	26	15	11	6,9



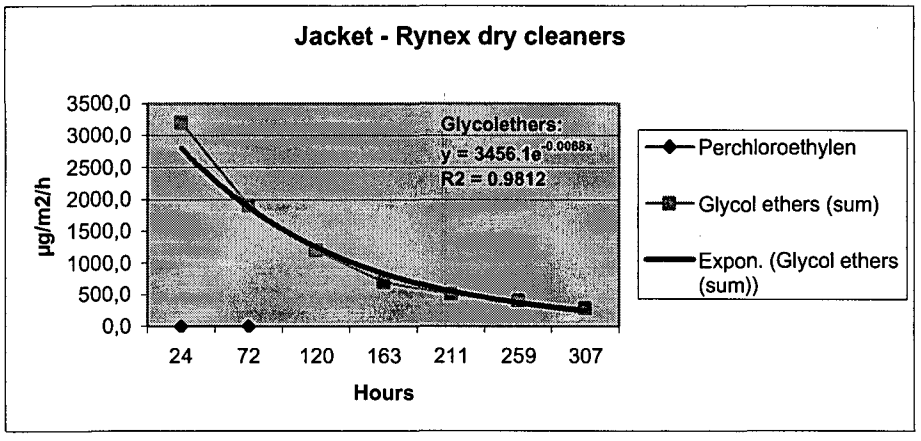
Sample identification	**Jacket no 3, Rynex**		Chamber conditions		
			temperature:	23	°C
			Air change	0,5	per hour
Chamber no:	8		Rel. Humidity	50	%
			Chamber volume	0,238	m³
			weight of sample:	0,73	kg
			Area of sample	1,26	m²

Weight specific emission rate µg/kg/h

Component	1	3	5	7	9	11	13
Perchloroethylen	2,5	<2					
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	<2						
Dipropylene glycol butyl ether (DPMB)	<2						
2-Ethylhexanol	<2						
Glycol ethers (sum)	5500	3300	2000	1200	890	690	480

Area specific emission rate µg/m²/h

Component Hours	1 24	3 72	5 120	7 163	9 211	11 259	13 307
Perchloroethylen	1.4	<1					
Propylene glycol butyl ether	<1						
Hydrocarbons (as Decan)	<1						
Dipropylene glycol butyl ether (DPMB)	<1						
2-Ethylhexanol	<1						
Glycol ethers (sum)	3200	1900	1200	700	510	400	280



Sample identification	**Dress no 1, Hydrocarbon**	Chamber conditions		
		temperature:	23	°C
		Air change	0.5	per hour
Chamber no:	2	Rel. Humidity	50	%
		Chamber volume	0.238	m^3
		weight of sample:	0.21	kg
		Area of sample	1.32	m^2

Weight specific emission rate µg/kg/h

Component	1	3	5	7	9	11	13
Perchloroethylene	<2						
Propylene glycol butyl ether	<2						
Hydrocarbons (as Decan)	<2						
Dipropylene glycol butyl ether (DPMB)	<2						
2-Ethylhexanol	<2						
Glycol ethers (sum)	<2						

Area specific emission rate µg/m^2/h

Component	1	3	5	7	9	11	13
Hours	24	72	120	163	211	259	307
Perchloroethylene	<1						
Propylene glycol butyl ether	<1						
Hydrocarbons (as Decan)	<1						
Dipropylene glycol butyl ether (DPMB)	<1						
2-Ethylhexanol	<1						
Glycol ethers (sum)	<1						

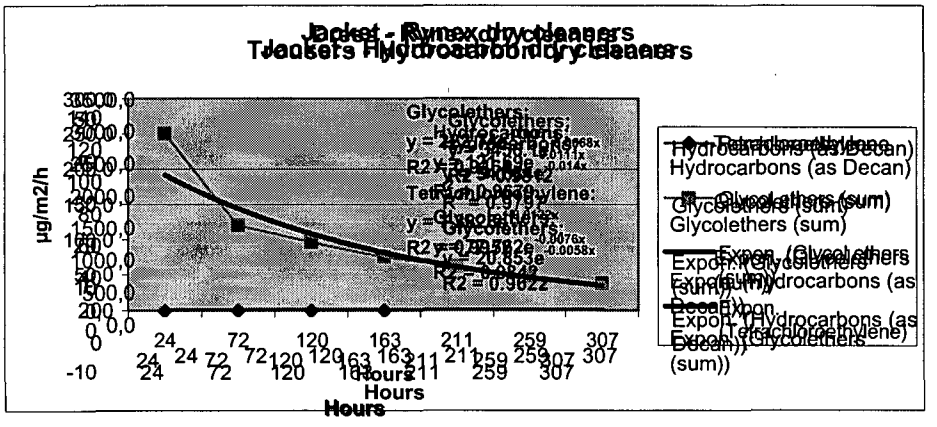
Sample identification	[illegible]	Chamber conditions		
		temperature:	23	°C
		Air change	0,5	per hour
Chamber no:	1[illegible]	Rel. Humidity	50	%
		Chamber volume	0,23[illegible]	m³
		weight of sample:	0,[illegible]	kg
		Area of sample	1,2[illegible]	m²

Weight specific degassing velocity µg/kg/h

Component	1	3	5	7	9	11	13
Tetrachloroethylene	32,[illegible]	16,[illegible]	9,2	5,8			
1-tert-Butoxy-2-propanole	<2						
Hydrocarbons (as Decan)	<2						
Dipropylenegly col-n-butylether (DPMB)	22[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5,6	7,2
2-Ethylhexanole	<2						
Glycolethers (sum)	8,2	7,2	3,6	2,2	1,2	0,6	0.45
Glycolethers (sum)	[illegible]	3[illegible]	2[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]

Area specific degassing velocity µg/m²/h

Component	1	3	5	7	9	11	13
Hours	24	72	120	163	211	259	307
Tetrachloroethylene	5,8	2,9	1.7	1.0			
1-tert-Butoxy-2-propanole	<2						
Hydrocarbons (as Decan)	<1						
Dipropylenegly col-n-butylether (DPMB)	1[illegible]	4[illegible]	[illegible]	[illegible]	2,5	2,1	[illegible]
2-Ethylhexanole	<1						
Glycolethers (sum)	8,9	3,6	2,8	1,3	0,6	0,8	0,2
Glycolethers (sum)	32[illegible]	19[illegible]	12[illegible]	7[illegible]	5[illegible]	4[illegible]	2[illegible]



Climate chamber test

Climate chamber test (MK-method 9810G)

Principle: The tests are performed in a 120 liters climate chamber of polished stainless steel. The chambers are equipped with purified atmospheric air from a central supply system. Temperature, air humidity, and added air amount are monitored and registered continuously by EDP.

Temperature:	21 ± 1°C
Air humidity:	50 ± 5%RF
Air exchange rate:	0.5 times per hour

References: ISO 13419-1
Prøvningsstandard for Dansk Indeklimamærkning

Volatile organic solvents (VOC) in air (MK-2404)

Principle: Volatile organic components are collected on carbon tubes, desorbed with dimethylformamide, and analysed by gas chromatography with flame ionisation detector (GC/FID).

References: AMI L1 (mod.)
ISO/FDIS 16200-1
MDHS 1-54
NIOSH 1403
VDI 3482

Product samples

Cleaning fluids, alkylamines etc.

Principle: Part samples are shaken in dichloromethane. Analysis is carried out at GC/MS without further dilution. References of the following compounds: n-octane, n-triacontane, 2-propylenglycone-t-butylether, dipropylenglycolbutylether, dipropylenglycolmonomethylether, and tetrachloroethylene have been taken.

Alkylphenolethoxylates

Principle: The textiles are extracted with methanol/ammonium chloride solution. The extracts are analysed for content of nonyl- and octylphenolpolyethoxylates at LC/MS. Double determination and standard addition are carried out on a number of samples in each sample series.

Cleaning fluids and subsidiary chemicals are analysed after dilution according to the same method.

REFERENCE: 5

ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DEL GOBERNADOR

Junta de Calidad Ambiental

LAS LAVANDERIAS Y ESTABLECIMIENTOS DE LAVADO EN SECO

CONTROL CONTAMINACION DE TERRENOS
PROGRAMA DE PEQUEÑOS GENERADORES

Desperdicios Peligrosos de las Operaciones de Lavado en Seco

Las plantas de percloroetileno potencialmente producen tres tipos de desperdicios peligrosos.

Residuos inertes de la destilación de solventes (el peso completo).

Filtros usados (peso total del filtro y del solvente remanente despues de la filtración).

Residuos de polvo cocido (el peso total de residuos de polvos de filtración despues de calentar para remover el exceso de solvente).

Las plantas de valcleno potencialemente producen dos tipos de desperdicios peligrosos:

Residuos inertes de la destilación de solventes (el peso completo).

Filtros usados (el peso total del filtro y el solvente remanente despues de la filtración).

Las plantas de solventes de petróleo potencialmente producen solo un tipo de desperdicio peligroso:

Residuos inertes de la destilación de solventes (el peso completo). Sin embargo se se usa un solvente 140-F, el residuo normalmente no se considera peligroso.

Cantidades y Descripciones de Desperdicios

Si su planta produce 220 lbs o mas de desperdicios peligrosos por mes, esta sujeto a ciertos requisitos, incluyendo el uso del Manifiesto Uniforme de Desperdicios Peligrosos cuando transporte estos desperdicios fuera de su facilidad.

Para determinar si su establecimiento cualifica como pequeno generador regulado, y para completar el Manifiesto, tiene que pesar los desperdicios peligrosos que genera. La tabla 1 indica los tipos mas comunes y cantidades promedio de desperdicios peligrosos producidas por cada 1,000 lbs de ropa lavada.

El inciso 11 del Maniesto requiere la descripción del desperdicio según el Departamento de Transportación (DOT), la característica que lo hace peligroso y el número de identificación UN/NA. Esta información se produce en la tabla 2 para ayudarlo en al preparación del Manifiesto; sin embargo, otras descripciones del DOT y códigos de identificación pueden ser aplicables en algunas circunstancias.

Metodos de Disposición de Desperdicios

Generalmente hay tres Metodos para la disposición adecuada de desperdicios peligrosos que estan considerados como aceptables por APA y por las agencias estatales que regulan el manejo de desperdicios peligrosos:

Disposición en un vertedero autorizado de desperdicios peligrosos.

Disposición en una facilidad autorizada de incineración a temperaturas altas.

Disposición a traves de una facilidad de recuperación de desperdicios peligrosos autorizada.

Desde el punto de vista ambiental, la recuperación o incineración es generalmente

preferible a la disposición en el terreno.

Disposición en el terreno de desperdicios PERC o de Valcleno

Bajo las nuevas provisiones de RCRA, se requiere a EPA que apruebe para el 8 de noviembre de 1986, la nueva reglamentación para el control de la disposición en el terreno de desperdicios peligrosos que contienen algunos solventes incluyendo percloroetileno y valcleno. Sin embargo, las popciones para la disposición de desperdicios peligrosos serán restringidas.

Table 1

TYPICAL QUANTITIES OF HAZARDOUS WASTE FROM DRYCLEANING

(Pounds of waste per 1,000 pounds of clothes cleaned)

WASTE TYPE	CLEANING METHOD		
	PERC	VALCLENE	PETROLEUM SOLVENTS
	Average Quantity of Hazardous Waste (pounds)		
Still Residues	25	10	20
Spent Cartridge Filters:			
Standard (carbon core)	20	15	*
Adsorptive (split)	30	20	*
Cooked Powder Residue	40	NA	NA
Drained Filter Muck	NA	NA	*

*Well-drained filter cartridges or drained filter muck are solids and do not meet the criteria for classification as an ignitable solid; therefore, they are not hazardous wastes.

Table 2

WASTE DESCRIPTIONS*

WASTE	Information for Item 11 of the Manifest: DOT SHIPPING NAME	HAZARD CLASS	UN/NA ID NUMBER
Perc	Waste Perchloroethylene or Waste Tetrachloroethylene	ORM A	UN 1897
Valclene	Hazardous Waste, NOS	ORM-E	UN 9189
Petroleum Solvents	Waste Petroleum Distillate	Combustible Liquid**	UN 1268
	Waste Petroleum Naphtha	Combustible Liquid**	UN 1255

*In certain situations, other DOT descriptions may be applicable to the wastes listed

**If the flash point of the solvent or residue *as disposed of* is less than 100°F, the hazard class would be "flammable liquid." Although the flash point of petroleum drycleaning solvents is above 100°F, the presence of contaminants (such as printing inks) could lower the overall flash point to below 100°F.

LAS LAVANDERIAS Y ESTABLECIMIENTOS DE LAVADO EN SECO Y LOS DESPERDICIOS PELIGROSOS

Los establecimientos bajo esta categoría incluyen:

Tiendas de sercivio de lavado en seco.
Plantas industriales para la limpieza de lienzos mediante el lavado en seco.
Plantas para la limpieza de pieles y artículos de cuero.
Lavanderías de auto servicio que tienen equipo de equipo en seco.
Otros establecimientos que realizan operaciones en lavado en seco.

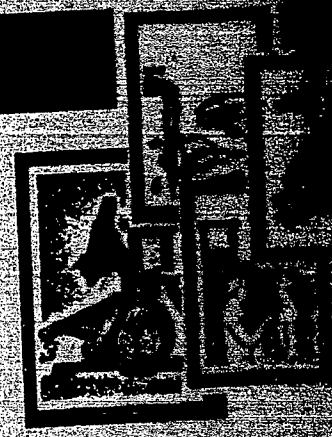
Aunque, no todas estas facilidades producirán desperdicios peligrosos, aquellas facilidades que usen solventes peligrosos pueden estar sujetos a las nuevas, provisiones de la Ley de Conservación y Recuperación de Recursos (RCRA) relativas al tratamiento, almacenamiento, disposición y transportación de pequenas cantidades de desperdicios peligrosos. Estos solventes incluyen:

percloroetileno, tambien conocido como: perc, PCE o tetracloroetileno.
valcleno, tambien conocido como fluorocarbono 113 o tetracloro-trifluoroetano.
Solventes de petróleo, tales como: "Stoddard", "quick-dry", "low-odor"y otros solventes que tienen un punto de centelleo menor que 140F (solvente 140-F y otros solventes con un punto de centelleo igual o mayor que 140F no están considerados como peligroso bajo la definición de RCRA. Sin tiene duda acerca del punto de centelleo, verifique con el distribuidor del solvente).

REFERENCE: 6

NIOSH

POCKET GUIDE TO CHEMICAL HAZARDS



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	 VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
1,1,1,2-Tetrachloroethane CCl_3CH_2Cl 630-20-6 KI8450000 1702 151	None	NIOSH Handle with caution in the workplace See Appendix C (Chloroethanes) OSHA none	N.D	Yellowish-red liquid	MW: 167.9 BP: 267°F Sol: 0.1% Fl.P: ? IP: ? Sp.Gr: 1.54	VP(77°F): 14mm FRZ: 94°F UEL: ? LEL: ?	Potassium; sodium; dinitrogen tetraoxide; potassium hydroxide; nitrogen tetroxide; sodium potassium alloy; 2,4-dinitrophenyl disulfide	None available
1,1,2,2-Tetrachloroethane $CHCl_2CHCl_2$ 79-34-5 KI8575000 1702 151	Acetylene tetrachloride, Symmetrical tetrachloroethane 1 ppm = 6.87 mg/m³	NIOSH Ca See Appendix A See Appendix C (Chloroethanes) 1 ppm (7 mg/m³) [skin] OSHA† 5 ppm (35 mg/m³) [skin]	Ca [100 ppm]	Colorless to pale-yellow liquid with a pungent, chloroform-like odor.	MW: 167.9 BP: 296°F Sol: 0.3% Fl.P: NA IP: 11.10eV Sp.Gr(77°F): 1.59 Noncombustible Liquid	VP: 5 mm FRZ: -33°F UEL: NA LEL: NA	Chemically-active metals, strong caustics, fuming sulfuric acid [Note: Degrades slowly when exposed to air.]	Char(pet); CS_2; GC/FID; IV [#1019]
Tetrachloroethylene $Cl_2C{=}CCl_2$ 127-18-4 KX3850000 1897 160	Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene 1 ppm = 6.78 mg/m³	NIOSH Ca See Appendix A Minimize workplace exposure concentrations; limit number of workers exposed OSHA† 100 ppm C: 200 ppm 300 ppm (5-min max peak in any 3 hrs)	Ca [150 ppm]	Colorless liquid with a mild, chloroform-like odor	MW: 165.8 BP: 250°F Sol: 0.02% Fl.P: NA IP: 9.32 eV Sp.Gr: 1.62 Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.	VP: 14 mm FRZ: 2°F UEL: NA LEL: NA	Strong oxidizers, chemically-active metals such as lithium, beryllium & barium; caustic soda, sodium hydroxide, potash	Char; CS; GC/FID; IV [#1003; Halogenated Hydrocarbons]
Tetrachloronaphthalene $C_{10}H_4Cl_4$ 1335-88-2 QK3700000	Halowax®, Nibren wax, Seekay wax	NIOSH/OSHA 2 mg/m³ [skin]	Unknown	Colorless to pale-yellow solid with an aromatic odor.	MW: 265.9 BP: 599-680°F Sol: Insoluble Fl.P(oc): 410°F IP: ? Sp.Gr: 1.59-1.65 Combustible Solid	VP: <1 mm MLT: 360°F UEL: ? LEL: ?	Strong oxidizers	Filter/Bub; none; GC/FID; II(2) [#S130]

Personal protection and sanitation (See Table 3)	Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards			
		Route	Symptoms (See Table 5)	First aid (See Table 6)	Target organs (See Table 5)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	TBAL	Inh Ing Con	Irrit eyes, skin; weak, restless, irreg respiration; musc incoo; in animals: liver changes	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Eyes, skin, CNS, liver

[1,1,1,2-Tetrachloroethane]

Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Nau, vomit, abdom pain; tremor fingers; jaun, hepatitis, liver tend; derm; monocy; kidney damage; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Skin, liver, kidneys, CNS, GI tract [in animals: liver tumors]

[1,1,2,2-Tetrachloroethane]

Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R. Provide: Eyewash, Quick drench	NIOSH ¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	Inh Abs Ing Con	Irrit eyes, nose, throat; nau; flush face, neck; verti, dizz, inco; head; som; skin eryt; liver damage; [carc]	Eye: Skin: Breath: Swallow: Irr immed Soap wash prompt Resp support Medical attention immed	Eyes, skin; resp sys; liver, kidneys; CNS; [in animals: liver tumors]

[Tetrachloroethylene]

Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily	NIOSH/OSHA 20 mg/m³: SCBAF/SAF §: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	Inh Abs Ing Con	Acne-form derm; head, ftg, anor, verti; jaun, liver inj	Eye: Skin: Breath: Swallow: Irr immed Soap wash immed Resp support Medical attention immed	Liver, skin, CNS

[Tetrachloronaphthalene]

REFERENCE: 7

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DE LA GOBERNADORA

Junta de Calidad Ambiental
Área Calidad de Aire
División de Permisos e Ingeniería

17 de junio de 2004

SRA. CELIA ARISTY
PROPIETARIA
LAUNDRY CELIA
AVE. ELEONOR ROOSEVELT #247
HATO REY, PR 00918

Estimada señora Aristy:

Re: LAUNDRY CELIA
HATO REY, P.R.
PFE-65-0101-0119-I-II-O

La Junta de Calidad Ambiental le incluye la **Modificación** al permiso arriba mencionado para su revisión.

La modificación se autoriza con el propósito de añadir un generador de electricidad de emergencia y aumentar el consumo anual de percloroetileno de la máquina de lavado en seco. Deseamos informarle que se sustituyen las Secciones II y III del permiso anterior.

Tendrá la oportunidad de enviar comentarios en 20 días a partir del recibo de esta carta. De no recibir contestación, entenderemos que está aceptando todas las condiciones en el permiso.

Si necesita más información puede comunicarse al 787-767-8025.

Cordialmente,

Junta de Calidad Ambiental

Ihor L. del Valle López
Vice Presidenta

Angel O. Berrios Silvestre
Miembro Asociado

Esteban Mujica Cotto
Presidente

PERMISO DE OPERACION
AREA DE CALIDAD DE AIRE
JUNTA DE CALIDAD AMBIENTAL

Sección I - Información General

Nombre de la Fuente:	**LAUNDRY CELIA**
Número de Permiso:	**PFE-65-0101-0119-I-II-O**
Dirección Física:	**AVENIDA ELEONOR ROOSEVELT #247** **HATO REY, P.R. 00918**
Dirección Postal:	**AVENIDA ELEONOR ROOSEVELT #247** **HATO REY, P.R. 00918**
Oficial Responsable:	**SRA. CELIA ARISTY** **PROPIETARIA**
Teléfono:	**(787) 765-4325**

Sección II – Fuentes de Emisión Incluidas en el Permiso

Fuente de Emisión	Equipo de Control	Descripción
Máquina de lavado en seco (dry to dry)	Condensador Refrigerado.	Marca Economatic, tiene una capacidad de 35 lbs. Consume 220 gals/año de percloroetileno como solvente.
Caldera de vapor	----------	Marca Fulton, tiene una capacidad de 15 hp, y consume queroseno con 0.05% por peso como combustible a razón de 3.5 gals/hora.
Dos secadoras de ropa	Filtros de tela	Marca HUEBSCH con una capacidad de 25 y 35 libras, respectivamente.

Generador de Electricidad	----------	Capacidad de 67 hp (50 KW). Consume diesel como combustible a razón de 9.6 galones por hora. El contenido máximo de azufre en el combustible es de 0.05%. Marca Olympian, Modelo D50P1S, Serie F3539H/001

Sección III – Condiciones de Permiso

1. De acuerdo con la sección 63.320 (a), el dueño u operador de cada instalación de lavado en seco que utilice percloroetileno deberá cumplir con los requisitos aplicables del Título 40 del Código de Reglamentaciones Federales (CRF), parte 63, subparte M: Normas Nacionales para las Emisiones de Percloroetileno para las Instalaciones de Lavado en Seco.

2. De mantener un consumo anual de percloroetileno menor que 140 o 200 galones, el dueño u operador de la instalación deberá cumplir con los requisitos establecidos para la categoría de fuente de área pequeña. Si el consumo anual de percloroetileno excede los 140 galones pero es menor o igual a 2,100 galones ó excede 200 galones pero es menor o igual a 1,800 galones, la instalación deberá cumplir con los requisitos establecidos para fuente de área grande dentro 180 días consecutivos a partir de la fecha en que determinó la excedencia. Si el consumo anual de percloroetileno excede los 2,100 galones ó los 1,800 galones, deberá cumplir con los requisitos establecidos para instalaciones clasificadas como fuente mayor dentro de 180 días consecutivos a partir de la fecha que determinó la excedencia.

3. El dueño u operador de una instalación de lavado en seco sujeta a las disposiciones del 40 CRF, parte 63, subparte M tendrá que cumplir con los requisitos de permiso Título V, según la sección 63.320(k) del 40 CRF. Sin embargo, aquellas fuentes que no sean mayores podrán aplazar la fecha para someter su solicitud de permiso Título V hasta el 9 de diciembre de 2004, según lo establece la sección 63.320(k) y la Regla 601 incisos (B)(1) y (B)(2) del RCCA. Dentro de un año a partir de esta fecha deberá someter a la Junta una solicitud Título V que cumpla con las disposiciones establecidas en la Regla 602 del RCCA. **La fuente continuará en cumplimiento con los requisitos aplicables de la subparte M aún cuando reciba el aplazamiento o exención del requisitos de permiso Título V.**

4. Las emisiones de percloroetileno deben ser controladas mediante un condensador refrigerado o un aparato equivalente, según la sección 63.322(a)(1) o (b)(1) del 40 CRF.

5. De acuerdo con la sección 63.322(c) del 40 CRF, el dueño u operador de una instalación afectada cerrará la puerta de cada máquina de lavado en seco inmediatamente despúes de

transferir los artículos a la máquina o de la máquina, y mantendrá la puerta de la máquina de lavado en seco cerrada en todo momento.

6. El dueño u operador de una instalación afectada operará y mantendrá el sistema de lavado en seco de acuerdo con las especificaciones y recomendaciones del manufacturero, según la sección 63.322(d) del 40 CRF.

7. El condensador refrigerado debe ser operado con una válvula de desviación para prevenir que el aire que le entra a la máquina de lavado en seco cuando se abre la puerta pase al condensador refrigerado, según la sección 63.322(e) del 40 CRF.

8. De acuerdo con la sección 63.322(i) del 40 CRF, el dueño u operador de una instalación afectada drenará los filtros de cartuchos en sus envases u otros envases cerrados por un mínimo de 24 horas o tratará estos filtros en una forma equivalente antes de removerlos de la instalación de lavado en seco.

9. De acuerdo con la sección 63.322(j) del 40 CRF, el dueño u operador de una instalación afectada mantendrá todo el percloroetileno y los desperdicios que contienen percloroetileno en envases cerrados para solventes sin escapes perceptibles.

10. El dueño u operador de una instalación afectada deberá inspeccionar el sistema de lavado en seco para asegurarse de que no hayan escapes perceptibles durante la operación del mismo, según la sección 63.322(k). Se inspeccionarán semanalmente en siguientes partes:

    a. Conectores de mangueras y tubos, piezas de unión, empalmes y válvulas;

    b. Empaquetadura de puertas y asientos;

    c. Empaquetadura de filtros y asientos;

    d. Bombas;

    e. Tanques y recipientes de solventes;

    f. Separadores de agua;

    g. Destilador;

    h. Amortiguadores de escape;

    i. Válvulas de desviación; y

    j. Cajas de cartuchos de filtros.

11. De acuerdo con la sección 63.322(l), el dueño u operador de una instalación de lavado en seco con un consumo total de percloroetileno bajo los niveles de consumo de la sección 63.320(d) o (e) (Refiérase a la Tabla 1: Fuente de área pequeña), deberá inspeccionar para la detección de escapes perceptibles los componentes mencionados en la condición anterior y en la sección 63.322(k) bisemanalmente, mientras el sistema de lavado en seco esté en operación.

12. Si como resultado de la inspección se detectan fugas en el sistema, entonces el dueño u operador deberá reparar las mismas en un período de 24 horas, según la sección 63.322(m) del 40 CRF. Además, si la reparación de la fuga requiere la compra de una pieza, el dueño u operador dispondrá de sólo 2 días laborales para ordenar la misma. Una vez se reciba la pieza, el dueño u operador dispondrá de 5 días laborables para instalar la misma.

13. De acuerdo con la sección 63.322(n), si el valor del parámetro muestreado según la sección 63.322(e) del 40 CRF (ésto es la temperarura de la corriente de aire con percloroetileno a la salida del condensador refrigerado) no cumple con el valor especificado en la sección 63.323(a) del 40 CRF (45°F o menor), deberá hacer los ajustes o reparaciones al sistema de lavado en seco o al equipo de control para cumplir con éste. Si las partes para la reparación deben ser ordenadas, una orden escrita o verbal para tales partes debe ser iniciada dentro de 2 días laborables después de detectar un valor bajo los parámetros establecidos. Las partes de reparación deben ser instaladas dentro de 5 días laborables después de recibidas.

14. De acuerdo con la sección 63.323(a)(1) del 40 CRF, el dueño u operador medirá la temperatura la corriente de aire a la salida del condensador refrigerado al final de un ciclo de lavado en seco semanalmente con un sensor de temperatura para determinar si ésta es igual a 45°F (7.2°C) o menor. El sensor de temperatura será utilizado de acuerdo con las instrucciones del manufacturero y debe estar diseñado para medir una temperatura de 45°F(7.2°C) con una exactitud de ±2°F (1.1°C). Si excede esta temperatura deberá hacer la reparación o ajuste necesario.

15. El dueño u operador de la instalación determinará el consumo mensual y anual de percloroetileno mediante un registro de las compras realizadas. Utilizará los recibos de compra para determinar el consumo.

16. De acuerdo con la sección 63.323(d), cuando calcule el consumo anual de percloroetileno para demostrar la aplicabilidad de la sección 63.320 del 40 CRF, el dueño u operador realizará el siguiente cálculo en el primer día de cada mes.

    a. Sumará el volumen de todas las compras de percloroetileno hechas en cada uno de los 12 meses previos, según es anotado en el registro descrito en la sección 63.324(d)(1) del 40 CRF y en la condición **20**.

    b. Si no se hicieron compras de percloroetileno en un mes dado, entonces el consumo de percloroetileno para este mes es cero galones.

c. La suma total calculada en la condición **15a** es el consumo de percloroetileno de la instalación.

17. El dueño u operador determinará la categoría de fuente a la cual pertenece la instalación (Refiérase a la Tabla 1), basado en el consumo anual de percloroetileno.

18. El dueño u operador deberá someter a la Junta, por correo registrado, en o antes del día 30 siguiente a la fecha de cumplimiento que se especifica en la sección 63.320(b), lo que sea más tarde, una notificación de estado de cumplimiento en la que provea la siguiente información, según la sección 63.324(b) del 40 CRF. Esta notificación debe estar firmada por el oficial responsable, quien certificará su exactitud.

    a. El límite de consumo de percloroetileno basado en el consumo anual calculado anualmente de acuerdo con la sección 63.323(d) y en la condición **15**.

    b. Si está en cumplimiento o no con cada requisito aplicable de la sección 63.322; y

    c. Toda la información contenida en esta declaración es exacta y verdadera.

19. De acuerdo con la sección 63.324(c) del 40 CRF, si el consumo anual de percloroetileno excede los límites de fuente de área de manera que la instalación pasa a ser una fuente de área grande ó fuente mayor, el dueño u operador deberá someter a la Junta una notificación de cumplimiento, dentro de 180 días calendarios después que la instalación haya determinado que excedió el límite de consumo de la categoría bajo la cual estaba previamente clasificada, que provea la siguiente información. Esta notificación debe estar firmada por el oficial responsable, quien certificará su exactitud.

    a. El límite de consumo de percloroetileno basado en el consumo anual calculado anualmente de acuerdo con la sección 63.323(d) y en la condición **15**;

    b. Si está en cumplimiento o no con cada requisito aplicable de la sección 63.322; y

    c. Toda la información contenida en esta declaración es exacta y verdadera.

20. De acuerdo con la sección 63.324(d) del 40 CRF, cada dueño u operador de una instalación de lavado en seco mantendrá los recibos de las compras de percloroetileno y un registro con la siguiente información por un período de 5 años. Mantendrá esta información en la instalación y la mostrará cuando la soliciten.

    a. la cantidad de percloroetileno comprado cada mes basado en los recibos de compra. De no efectuarse compras para un determinado mes, anotará cero en el registro;

    b. de acuerdo a la sección 63.323(d) se calculará el consumo de percloroetileno a través del año el primer día de cada mes;

c. las fechas en las que se realizaron inspecciones de escape de percloroetileno al sistema de lavado en seco según especificado en la sección 63.322(k) ó (l), y el nombre o localización de los componentes del sistema de lavado en seco donde se detectaron los escapes;

d. las fechas de reparación y registro de las ordenes, verbales o escritas, de piezas de reparación para demostrar cumplimiento con la sección 63.322(m) y (n);

e. la fecha y los resultados del sensor de temperatura según la sección 63.323 si se utiliza un condensador refrigerado para cumplir con la sección 63.322(a) ó (b); y

f. la fecha y los resultados de la monitoría con tubos detectores colorimétricos, como se especifica en la sección 63.323, si se utiliza un adsorbedor de carbón para cumplir con la sección 63.322(a)(2) ó (b)(3).

21. De acuerdo con la sección 63.324(e), el dueño u operador de una instalación afectada mantendrá copia del manual de operación y mantenimiento de todo el equipo de lavado en seco y del equipo de control en la instalación.

22. El consumo de combustible queroseno de la caldera no excederá de 8,736 gals/año.

23. El consumo máximo de combustible diesel en el generador de electricidad de 67 Hp (50 KW) no excederá de 2,304 galones al año. El contenido máximo de azufre en el combustible no excederá de 0.05 % por peso.

24. El horario de operación máximo para el generador de electricidad será de 240 horas por año.

25. Mantendrá un registro diario del horario de operación, el consumo de combustible y el porciento de azufre del combustible en porciento por peso para el generador de electricidad y la caldera de vapor. Los mismos deberán estar disponibles en todo momento en la instalación para ser revisados por personal técnico de la Junta.

26. Enviará a la Junta un informe anual donde se indique el consumo mensual de combustible y las horas de operación del generador de electricidad y la caldera de vapor. Estos informes serán enviados a la Junta no más tarde de los próximos quince (15) días del siguiente año para el cual los informes son representativos. Los mismos deberán ser enviados a la atención del Jefe de la División de Validación y Manejo de Datos del Area de Calidad de Aire.

27. No causará ni permitirá la emisión a la atmósfera de materia que produzca un olor objetable o desagradable que pueda percibir en predios que no sean aquellos que han sido designados para propósitos industriales, según la Regla 420 del RCCA.

28. No se permitirá la construcción o instalación de equipos de emisión adicional sin obtener previamente un permiso de construcción según lo requiere la Regla 203 del RCCA.

29. En caso de que se establezca alguna regulación o se enmiende alguna existente (estatal o federal) y se determine que le aplique a **Laundry Celia**, deberá cumplir con lo establecido una vez esta regulación o enmienda entre en vigor.

30. El incumplimiento con cualquiera de los requisitos de esta autorización constituirá una violación, y la persona responsable de la fuente de emisión estará sujeta a una orden, a una penalidad administrativa o ambas.

31. De surgir en el futuro interés por cambiar esta condición, los equipos de emisión o sus respectivos equipos de control, deberán solicitarlo por escrito al Area de Calidad de Aire de la Junta para su evaluación, a menos que estén exentos por la Regla 206 del RCCA.

REFERENCE: 8

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DE LA GOBERNADORA

Junta de Calidad Ambiental
Área Calidad de Aire
División de Permisos e Ingeniería

Memorando

15 de junio de 2004

Sr. Nelsón Moreno
Jefe Interino
División de Permisos e Ingeniería
Area de Calidad de Aire

Angel L. Morales, MS
Especialista en Ciencias Ambientales Pcte.
División de Permisos e Ingeniería
Area de Calidad de Aire

Modificación Permiso de Operación
Laundry Celia
Hato Rey, Puerto Rico
PFE-65-0101-0119-I-II-O

La lavandería en referencia está localizada en la Ave. Eleonor Roosevelt #247 en Hato Rey. El oficial responsable es la Sra. Celia Aristy, propietaria.

El 7 de mayo de 2004 sometieron documentación solicitando una modificación al permiso arriba indicado para incluir un generador de electricidad y realizar cambios al consumo de percloroetileno de la máquina de lavado en seco de la instalación. Dicha documentación fué sometida a través de su consultor, el Sr. Orlando Silva Sánchez, de la compañía S-S Environ Experts.

El 17 de septiembre de 2003 se le otorgó el permiso de construcción PFE-65-0603-0950-I-C para aumentar el consumo de percloroetileno (Perc) de la máquina de lavado en seco. Este permiso fue modificado el 18 de marzo de 2004 para incluir el generador de electricidad que se menciona en la solicitud de modificación del permiso de operación. Dado que ambos equipos se encuentran en el mismo permiso de construcción, la instalación debió haber sometido una hoja Parte II para incluir la máquina de lavado en seco como parte de la modificación al permiso de operación. Además, se debió haber sometido los cálculos de emisión correspondientes por el aumento en emisiones y hacer los pagos correspondientes por este aumento en emisiones. Esta diferencia en emisiones debía ser calculada desde el momento en que fue aumentado el consumo de Perc de la máquina de lavado en seco.

La hoja Parte II junto con los cálculos de emisión le fueron solicitados por facsímil el 17 de mayo de 2004. Luego de varias llamadas telefónicas dirigidas al consultor, la información fue finalmente sometida el 14 de junio de 2004.

Luego de evaluar la información para ambos equipos encontramos que la solicitud de modificación esta completa. Sin embargo, se encontró una diferencia en los pagos realizados por el aumento en las emisiones de Perc. La diferencia consiste en que la facilidad pagó $91.82 por el aumento en emisiones de Perc por el periodo de vigencia del permiso (hasta el año 2006). Esta cantidad se desglosa de la siguiente manera de acuerdo con el consultor:

- $59.56 correspondientes al periodo de abril de 2001 hasta abril 2004 ($14.89 por año)
- $2.48 correspondientes a los meses de mayo y junio de 2004 ($14.89 ÷ 12 meses = $1.24 por mes)
- $29.78 correspondientes a los años restantes del permiso (2004 al 2006)

El pago correcto debió ser el siguiente:

$74.45 ($14.89 por año; por cinco años de vigencia del permiso)
menos $18.65 ($3.73 por cinco años; pagados al radicar al permiso en el año 2001)

Al analizar esta información encontramos una diferencia de $36.02. Por otro lado, los cálculos para las emisiones producidas por el generador de electricidad, asi como los pagos correspondientes, están correctos. Recomendamos la otorgación de la modificación al permiso de operación y la devolución de $36.02.

NM/almc

JUNTA DE CALIDAD AMBIENTAL

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DE L A GOBERNADORA
MEJORAMIENTO CALIDAD DE AIRE

AREA CALIDAD DE AIRE

'04 JUN 14 P1:48

PERMISOS E INGENIERIA

HOJA DE PAGO

Número de Solicitud: PFE-GS-0101-0119-I-II-0
Nombre del Solicitante: SRA CELIA ARISTY
Título: PROPIETARIA
Nombre del Proyecto o Fuente de Emisión: LAUNDRY CELIA
Dirección Postal: AVE. ELEANOR ROUSEVELT 247
HATO REY PUERTO RICO 00918

I. Pago por Solicitud de Permiso:
1. Pago por Radicación ($100.00): ( ) Construcción (✓) Operación
( ) Remoción de Asbestos ( ) Escuela de Entrenamiento de Asbestos
2. (✓) Pago por Permiso 3. ( ) Pago por Renovación 4. (✓) Pago por Modificación ($10.00 por toneladas por contaminante)

CONTAMINANTE	EMISIONES (Ton/año)	CARGO TOTAL
Material Particulado (PM_{10})		
Dióxido de Azufre (SO_x)		
Óxido de Nitrógeno (No_x)		
Compuestos Orgánicos Volátiles (VOC) e Hidrocarburos (HC)	1.489	14.89
Otros (Favor de identificar)		
Total a pagar		14.89

ACTIVIDADES DE ASBESTOS

1. Duración del Proyecto de Remoción			
( ) De 1 a 30 días	$175.00		
( ) De 31 a 90 días	$450.00		
( ) De 91 hasta 365 días	$725.00		
2. Escuela de Entrenamiento de Asbestos	$600.00		
Registro de Asbestos			
( ) Certificación de supresión de Asbestos	( ) Escuela de Inspectores		
( ) Escuela de Administración de Planificadores	( ) Supervisores de Supresión		
( ) Escuela de Supresión para Proyectos de Diseñadores	( ) Trabajadores de Supresión $40.00 (por cada categoría)		
( ) Especialista en Monitoreo de Aire			
4. Cambio de dueño o localización	(50% del cargo por radicación)		
5. Pago por Revisión	(50% del cargo por radicación)		
6. Duplicados de Permisos	$10.00		
7. Pago por Exceso de Emisiones:			
A. Dispensas	($25.00/ton/contaminante)		
B. Pequeños Negocios	($12.50/ton/cantaminante)		

PAGO TOTAL DE LA SOLICITUD:
II. Pago anual (pago por un año)
III. Pago por cuatro (4) años extras (pago por 4 años)
IV. TOTAL $91.82

PARA COMPLETARSE EN LA OFICINA DEL PROGRAMA DE AIRE

Cantidad a pagar: $91.82 Fecha: 10-14-2004 Recibido por: L Morales
Número de cheque: Efec ATH Número de recibo: 20102-9756

L Morales
Firma del Representante autorizado JCA

Jessica Melendez
Firma División de Finanzas

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DE LA GOBERNADORA
MEJORAMIENTO CALIDAD DE AIRE

JUNTA DE CALIDAD AMBIENTAL

PARTE II - PROCESO DE LA PLANTA Y DESCRIPCION DE EMISIONES

I. EMISIONES INDUSTRIALES: (Movimiento de terreno, almacenaje en tanques, talleres de pintado, etc.)

1. Descripción del proceso u operación que emite contaminantes atmosféricos:
Proceso de lavado en seco en una maquina Economatic de 35 lbs.

2. Materia prima usada o procesada: PERC (Tipo) 220 (Cantidad) gals/año (unidad/unidad tiempo)

3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso
cond. Refrigerado	95%

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
pies	pulg.	°F	pies/seg.
pies	pulg.	°F	pies/seg.

5. Volumen de descarga de emisiones: _____ $Pies^3/min.$

Emisiones actuales: Estimado basado en: _____

Tipo de contaminante	Cantidad (masa/tiempo)	Duración (tiempo/unidad tiempo)
VOC	1.489 ton/año	6 hrs/día

7. Incluya un diagrama de flujo del proceso (tipo bloque) demostrando puntos, cantidades y tipos de emisiones.

II. EMISIONES POR COMBUSTION: (Calderas, calentadores, plantas de emergencia, bombas de incendio, etc.)

1. Equipo de combustión: n/a (Tipo) _____ (BTU/hr) ó _____ (HP)

2. Combustible:

Tipo	Gal/hr	ó Lb/hr	% azufre

3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
pies	pulg.	°F	pies/seg.
pies	pulg.	°F	pies/seg.

III. EMISIONES POR INCINERACION O DISPOCISION DE DESPERDICIOS: (Sólidos, liquidos, gaseosos)

1. Método para disponer los desperdicios: n/a.
2. Tipo de desperdicios: _____ Cantidad: _____ Lb/día.
3. Incinerador: _____ (Tipo) _____ (Marca) _____ (Capacidad (Lb/día))
4. Chimenea: _____ Pies (Altura) _____ Pies (Diámetro Salida) _____ °F (Temp. Salida) _____ Pies/seg. (Velocidad Salida)
5. Combustible auxiliar:

Tipo	Gal/hr	ó Lb/hr	% azufre

6. Equipo de control: _____ (Tipo) _____ % por peso. (Eficiencia)

IV. CUMPLIMIENTO: Incluya datos o información demostrando que las emisiones no exceden los límites establecidos.
V. EQUIPO DE CONTROL: Incluya esquema de la instalación del equipo de control de la fuente de emisión.

CERTIFICACION DE UN INGENIERO, QUIMICO O ARQUITECTO LICENCIADO

Certifico que estoy registrado y autorizado para practicar mi profesión en Puerto Rico; que el equipo y medidas para el control de emisiones son adecuadas y cumplen con las disposiciones del Reglamento de Control de Contaminantes Atmosféricos de la Junta de Calidad Ambiental de Puerto Rico y que, de acuerdo a mis mejores conocimientos y creencias, la información suministrada es veraz, completa y exacta.

PE-11012 (Número de Licencia) — ANGIE MARTINEZ CALDERON (Nombre (Letra de molde)) — Firma y Sello

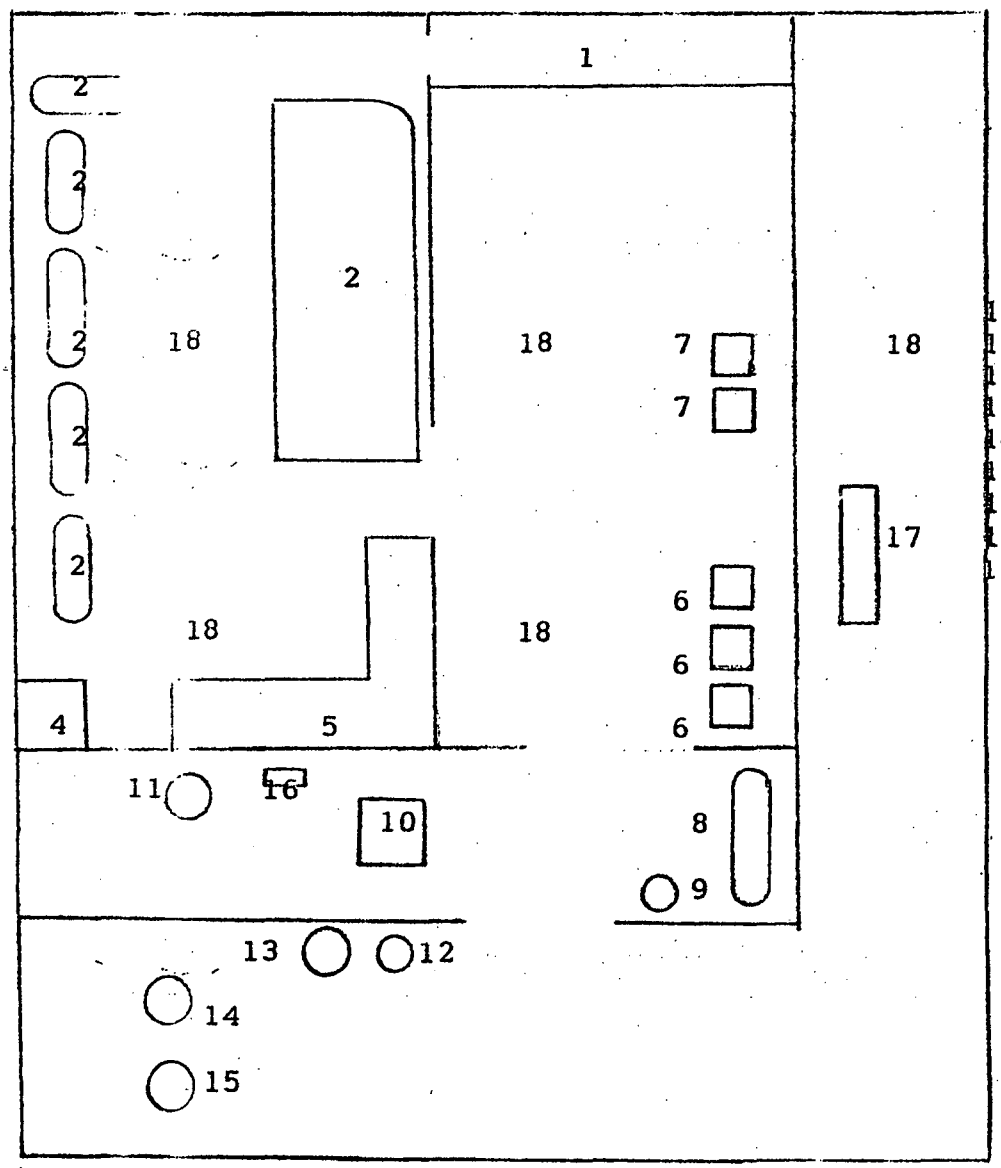
Fecha: _____ Número de solicitud: _____

S&S ENVIRON EXPERTS

APARTADO 40598 SAN JUAN PUERTO RICO 00940-0598
CALLE ESTEBAN GONZALEZ # 836 SANTA RITA RIO PIEDRAS PR
TEL/FAX (787) 282-7225 CEL. 787-923-4943

LAUNDRY CELIA
HATO REY PUERTO RICO

CALLE ELEONOR ROOSEVELT



LEYENDA
1. Recidor
2. Ropa Terminada
3. Planchas
4. Baño
5. Cocina
6. Lavadoras
7. Secadoras
8. Tabla Potear
9. Esprimidor
10. Dry Clean Unit
11. Caldera
12. Tanque de Presić
13. Torre de Enfria.
14. Tanque de Comb.
15. Tanque de Agua
16. Compresor
17. ICE
18. Area de Trabajo

NORTE

"no a escala"

ENGINE SPECIFICATION	60 Hz	50 Hz
Manufacturer:	Perkins Engine Co.	
Model:	T4.236	
Type:	4 Cycle	
Aspiration:	Turbocharged	
Cylinder Configuration:	4 In Line	
Displacement: cu.in. (L)	236 (3.9)	
Bore/Stroke: in (mm)	3.9 (98.4) / 5.00 (127.0)	
Compression Ratio:	16.0:1	
Governor: Type	Mechanical	
Class	Class A1	
Air Cleaner Type:	Dry, Replaceable Paper Element, Type with Restriction Indicator	
Engine Speed: rpm	1800	1500
Max Power at Rated rpm: hp (kW)		
Standby:	98.4 (73.4)	81.4 (60.7)
Prime:	89.8 (67.0)	74.3 (55.4)
BMEP: psi (kPa)		
Standby:	184 (1266)	182 (1256)
Prime:	168 (1157)	166 (1146)
Piston Speed: ft/sec (m/sec)	25.0 (7.62)	20.8 (6.35)
Regenerative Power: kW	11.7	10.9
Motor Starting Capability: kW	43.8	38.4

COOLING SYSTEM	60 Hz	50 Hz
Radiator System Capacity		
Incl. Engine: US gal (L)	5.0 (19.1)	5.0 (19.1)
Water Pump Type:	Centrifugal	
Max Coolant Static Head: ft H_2O (mH_2O)	9.7 (3.0)	6.7 (2.0)
Min Temperature to		
Engine: °F (°C)	171 (77)	77 (171)
Temperature Rise Across		
Engine: °F (°C)	9.0 (5.0)	9.0 (5.0)
Heat Rejected to Coolant		
at Rated Power: Btu/min (kW)		
Standby:	2645 (46.5)	2247 (39.5)
Prime:	2400 (42.2)	1991 (35.0)
Total Heat Radiated to Room		
at Rated Power: Btu/min (kW)		
Standby:	1428 (25.1)	1246 (21.9)
Prime:	1308 (23.0)	1115 (19.6)
Radiator Fan Load: hp (kW)	2.5 (1.9)	1.5 (1.1)

LUBRICATING SYSTEM	60 Hz	50 Hz
Type:	Full Pressure	
Total Oil Capacity: US Gal (L)	2.1 (8.1)	
Oil Pan: US Gal (L)	1.9 (7.1)	
Oil Filter	Spin-On, Full Flow	
Oil Cooler:	Water Cooled	
Oil Type Required:	API CD 15W-40	

AIR REQUIREMENTS	60 Hz	50 Hz
Combustion Air Flow: cfm (m^3/min)		
Standby:	170 (4.8)	142 (4.0)
Prime:	165 (4.7)	137 (3.9)
Max. Air Cleaner		
Restriction: in H_2O (kPa)	32 (8.0)	32 (8.0)
Radiator Cooling Air: cfm (m^3/min)	6956 (197)	5932 (168)
Alternator Cooling Air: cfm (m^3/min)	985 (27.9)	820 (23.2)

FUEL SYSTEM	60 Hz	50 Hz
Fuel Filter Type:	Replaceable Element	
Recommended Fuel:	#2 Diesel	

Generator Set Fuel Consumption: US gal/hr (L/hr)

	100% Load Standby	100% Load Prime	75% Load Standby	50% Load Standby
60 Hz	4.96 (18.76)	4.45 (16.84)	3.84 (14.52)	2.80 (10.61)
50 Hz	3.92 (14.83)	3.49 (13.22)	3.00 (11.34)	2.14 (8.09)

EXHAUST SYSTEM	60 Hz	50 Hz
Max. Allowable Back		
Pressure: in Hg (kPa)	3.0 (10.2)	3.0 (10.2)
Exhaust Flow at Rated		
kW: cfm (m^3/min) Standby:	459 (13.0)	395 (11.2)
Prime:	427 (12.1)	364 (10.3)
Exhaust Temp at Rated kW		
Dry Exhaust: °F (°C)		
Standby:	1040 (560)	1085 (585)
Prime:	977 (525)	1013 (545)

ENGINE ELECTRICAL SYSTEM	60 Hz	50 Hz
Voltage / Ground:	12 / Negative	
Battery Charging Alternator		
Ampere Rating:	55	

GENERATOR SET NOISE RATING (WITHOUT INLET OR OUTLET MUFFLER) AT 3 FEET (1 METER)	60 Hz	50 Hz
Standby	93 dBA	92 dBA
Prime	93 dBA	92 dBA

dBA levels are for guidance only

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DE LA GOBERNADORA

Junta de Calidad Ambiental
Área Calidad de Aire
División de Permisos e Ingeniería

Memorando

15 de enero de 2004

Sra. Margie Rios Medina
Jefa, División de Permisos e Ingeniería
Area de Calidad de Aire

Angel L. Morales, MS
Especialista en Ciencias Ambientales Pcte.
División de Permisos e Ingeniería
Area de Calidad de Aire

Laundry Celia
Hato Rey, Puerto Rico
PFE-65-0503-0950-I-C

La lavandería de referencia está localizada en la Ave. Eleonor Roosevelt #247 en Hato Rey. El oficial responsible es la Sra. Celia Aristy, propietaria. El 13 de junio de 2003, solicitaron un permiso de construcción con el propósito de establecer el consumo de 220 gal/año de percloroetileno (perc) de la máquina de lavado en seco de la facilidad. La solicitud de construcción surge a raíz de una notificación de violación emitida el 25 de abril de 2003 debido al consumo de 220 gal/año comparado con la cantidad de consumo de 55 gal/año mencionado en el permiso de operación (PFE-65-0101-0119-I-II-O).

En la notificación de violación también se indica que la facilidad ha instalado y operado un generador de electricidad sin los debidos permisos. La facilidad responde la notificación de violación indicando que solicitarán un permiso de construcción para corregir el consumo de perc e incluir el generador de electricidad. Al momento de la evaluacion de la solicitud no sometieron evidencia de haber cumplido con el Aritículo 4(C) para el generador por lo que no fue incluido en el permiso de construcción.

El 15 de diciembre de 2003 sometieron documentación solicitando una modificación al permiso de construcción (PFE-65-0503-0950-I-C), otorgado el 17 de septiembre de 2003, para incluir el generador de electricidad. Luego de evaluar el expediente entendemos que la solicitud de modificación está incompleta por lo que recomendamos se solicite la siguiente información para completar la misma.

1. Evidencia o pago de sellos del Colegio de Ingenieros y Agrimensores de PR y de Rentas Internas.
2. Plano o croquis de la facilidad indicando la localización del generador.
3. Especificaciones del fabricante para el generador y sus medidas o equipo de control.
4. Copia del presupuesto o estimado de costo de la fuente de emisión a construirse, detalles y desglozado.

Junta
de Calidad
Ambiental

17 de septiembre de 2003

SRA CELIA ARISTY
PROPIETARIA
LAUNDRY CELIA
AVE ELEONOR ROOSEVELT #247
HATO REY P R 00918

Estimada señora Aristy:

Re: LAUNDRY CELIA
HATO REY, P.R.
PFE-65-0303-0950-I-C
6 4/96

La Junta de Calidad Ambiental le incluye el permiso de construcción arriba mencionado.

Tendrá la oportunidad de enviar comentarios en 20 días a partir de la fecha de esta comunicación. De no recibir contestación, entenderemos que acepta todas las condiciones en el permiso.

Si necesita más información puede comunícarse al (787) 767-8025.

Cordialmente,

Evelyn Rodríguez Cintrón
Directora
Area Calidad de Aire

ai/mr/cr

PERMISO DE CONSTRUCCION
AREA CALIDAD DE AIRE
JUNTA DE CALIDAD AMBIENTAL

Sección I - Información General

Nombre de la Fuente:	LAUNDRY CELIA
Número de Permiso:	PFE-65-0603-0950-I-C
Dirección Física:	AVE. ELEONOR ROOSEVELT #247 HATO REY, P.R.
Dirección Postal:	AVE. ELEONOR ROOSEVELT #247 HATO REY P R 00918
Oficial Responsable:	SRA. CELIA ARISTY PROPIETARIA LAUNDRY CELIA
Teléfono:	(787) 765-4325

Sección II - Fuentes de Emisión Incluidas en este Permiso

FUENTE	EQUIPO DE CONTROL	DESCRIPCION
Una máquina de lavado en seco (dry to dry)	Condensador refrigerado	Marca Economatic, con capacidad de 35 lbs. Utiliza percloroetileno como solvente con un consumo máximo de 220 gal/año.

Sección III - Condiciones de Permiso

1. De acuerdo con la sección 63.320 (a), el dueño u operador de cada instalación de lavado en seco que utilice percloroetileno deberá cumplir con los requisitos aplicables del Título 40 del Código de Reglamentaciones Federales (CRF), parte 63, subparte M: Normas Nacionales para las Emisiones de Percloroetileno para las Instalaciones de Lavado en Seco.

2. El dueño u operador de una instalación de lavado en seco sujeta a las disposiciones del 40 CRF, parte 63, subparte M tendrá que cumplir con los requisitos de permiso Título V, según la sección 63.320(k) del 40 CRF. Sin embargo, aquellas fuentes que no sean mayores podrán aplazar la fecha para someter su solicitud de permiso Título V hasta el 9 de diciembre de 2004, según lo establece la sección 63.320(k) y la Regla 601 incisos (B)(1) y (B)(2) del RCCA. Dentro de un año a partir de esta fecha deberá someter a la Junta una solicitud Título V que cumpla con las disposiciones establecidas en la Regla 602 del RCCA. **La fuente continuará en cumplimiento con los requisitos aplicables de la subparte M aún cuando reciba el aplazamiento o exención del requisitos de permiso Título V.**

3. Las emisiones de percloroetileno deben ser controladas mediante un condensador refrigerado o un aparato equivalente, según la sección 63.322(a)(1) o (b)(1) del 40 CRF.

4. De acuerdo con la sección 63.322(c) del 40 CRF, el dueño u operador de una instalación afectada cerrará la puerta de cada máquina de lavado en seco inmediatamente despúes de transferir los artículos a la máquina o de la máquina, y mantendrá la puerta de la máquina de lavado en seco cerrada en todo momento.

5. El dueño u operador de una instalación afectada operará y mantendrá el sistema de lavado en seco de acuerdo con las especificaciones y recomendaciones del manufacturero, según la sección 63.322(d) del 40 CRF.

6. El condensador refrigerado debe ser operado con una válvula de desviación para prevenir que el aire que le entra a la máquina de lavado en seco cuando se abre la puerta pase al condensador refrigerado, según la sección 63.322(e) del 40 CRF.

7. De acuerdo con la sección 63.322(i) del 40 CRF, el dueño u operador de una instalación afectada drenará los filtros de cartuchos en sus envases u otros envases cerrados por un mínimo de 24 horas o tratará estos filtros en una forma equivalente antes de removerlos de la instalación de lavado en seco.

8. De acuerdo con la sección 63.322(j) del 40 CRF, el dueño u operador de una instalación afectada mantendrá todo el percloroetileno y los desperdicios que contienen percloroetileno en envases cerrados para solventes sin escapes perceptibles.

9. El dueño u operador de una instalación afectada deberá inspeccionar el sistema de lavado en seco para asegurarse de que no hayan escapes perceptibles durante la operación del mismo, según la sección 63.322(k). La inspección se realizará semanalmente. Inspeccionará las siguientes partes:

   a. Conectores de mangueras y tubos, piezas de unión, empalmes y válvulas;

   b. Empaquetadura de puertas y asientos;

   c. Empaquetadura de filtros y asientos;

   d. Bombas;

e. Tanques y recipientes de solventes;

f. Separadores de agua;

g. Destilador;

h. Amortiguadores de escape;

i. Válvulas de desviación; y

j. Cajas de cartuchos de filtros.

10. De acuerdo con la sección 63.322(l), el dueño u operador de una instalación de lavado en seco con un consumo total de percloroetileno bajo los niveles de consumo de la sección 63.320(d) o (e) del 40 CRF (Refiérase a la Tabla 1: Fuente de área pequeña), deberá inspeccionar para la detección de escapes perceptibles los componentes mencionados en la condición anterior y en la sección 63.322(k) bisemanalmente, mientras el sistema de lavado en seco esté en operación.

11. Si como resultado de la inspección se detectan fugas en el sistema, entonces el dueño u operador deberá reparar las mismas en un período de 24 horas, según la sección 63.322(m) del 40 CRF. Además, si la reparación de la fuga requiere la compra de una pieza, el dueño u operador dispondrá de sólo 2 días laborales para ordenar la misma. Una vez se reciba la pieza, el dueño u operador dispondrá de 5 días laborables para instalar la misma.

12. De acuerdo con la sección 63.322(n), si el valor del parámetro muestreado según la sección 63.322(e) del 40 CRF (ésto es la temperarura de la corriente de aire con percloroetileno a la salida del condensador refrigerado) no cumple con el valor especificado en la sección 63.323(a) del 40 CRF (45°F o menor), deberá hacer los ajustes o reparaciones al sistema de lavado en seco o al equipo de control para cumplir con éste. Si las partes para la reparación deben ser ordenadas, una orden escrita o verbal para tales partes debe ser iniciada dentro de 2 días laborables después de detectar un valor bajo los parámetros establecidos. Las partes de reparación deben ser instaladas dentro de 5 días laborables después de recibidas.

13. De acuerdo con la sección 63.323(a)(1) del 40 CRF, el dueño u operador medirá la temperatura la corriente de aire a la salida del condensador refrigerado al final de un ciclo de lavado en seco semanalmente con un sensor de temperatura para determinar si ésta es igual a 45°F (7.2°C) o menor. El sensor de temperatura será utilizado de acuerdo con las instrucciones del manufacturero y debe estar diseñado para medir una temperatura de 45°F(7.2°C) con una exactitud de ±2°F (1.1°C). Si excede esta temperatura deberá hacer la reparación o ajuste necesario.

14. El dueño u operador de la instalación determinará el consumo mensual y anual de percloroetileno mediante un registro de las compras realizadas. Utilizará los recibos de compra para determinar el consumo.

15. De acuerdo con la sección 63.323(d), cuando calcule el consumo anual de percloroetileno para demostrar la aplicabilidad de la sección 63.320 del 40 CRF, el dueño u operador realizará el siguiente cálculo en el primer día de cada mes.

    a. Sumará el volumen de todas las compras de percloroetileno hechas en cada uno de los 12 meses previos, según es anotado en el registro descrito en la sección 63.324(d)(1) del 40 CRF y en la condición **20**.

    b. Si no se hicieron compras de percloroetileno en un mes dado, entonces el consumo de percloroetileno para este mes es cero galones.

    c. La suma total calculada en la condición **15a** es el consumo de percloroetileno de la instalación.

16. El dueño u operador determinará la categoría de fuente a la cual pertenece la instalación (Refiérase a la Tabla 1), basado en el consumo anual de percloroetileno.

17. De mantener un consumo anual de percloroetileno menor que 140 o 200 galones, el dueño u operador de la instalación deberá cumplir con los requisitos establecidos para la categoría de fuente de área pequeña. Si el consumo anual de percloroetileno excede los 140 galones pero es menor o igual a 2,100 galones ó excede 200 galones pero es menor o igual a 1,800 galones, la instalación deberá cumplir con los requisitos establecidos para fuente de área grande dentro 180 días consecutivos a partir de la fecha en que determinó la excedencia. Si el consumo anual de percloroetileno excede los 2,100 galones ó los 1,800 galones, deberá cumplir con los requisitos establecidos para instalaciones clasificadas como fuente mayor dentro de 180 días consecutivos a partir de la fecha que determinó la excedencia.

18. El dueño u operador deberá someter a la Junta, por correo registrado, en o antes del día 30 siguiente a la fecha de cumplimiento que se especifica en la sección 63.320(b), lo que sea más tarde, una notificación de estado de cumplimiento en la que provea la siguiente información, según la sección 63.324(b) del 40 CRF. Esta notificación debe estar firmada por el oficial responsable, quien certificará su exactitud.

    a. El límite de consumo de percloroetileno basado en el consumo anual calculado anualmente de acuerdo con la sección 63.323(d) y en la condición **15**.

    b. Si está en cumplimiento o no con cada requisito aplicable de la sección 63.322; y

    c. Toda la información contenida en esta declaración es exacta y verdadera.

19. De acuerdo con la sección 63.324(c) del 40 CRF, si el consumo anual de percloroetileno excede los límites de fuente de área de manera que la instalación pasa a ser una fuente de área grande ó fuente mayor, el dueño u operador deberá someter a la Junta una notificación de cumplimiento, dentro de 180 días calendarios después que la instalación haya determinado que excedió el límite de consumo de la categoría bajo la cual estaba previamente clasificada, que provea la siguiente información. Esta notificación debe estar firmada por el oficial responsable, quien certificará su exactitud.

a. El límite de consumo de percloroetileno basado en el consumo anual calculado anualmente de acuerdo con la sección 63.323(d) y en la condición **15**;

b. Si está en cumplimiento o no con cada requisito aplicable de la sección 63.322; y

c. Toda la información contenida en esta declaración es exacta y verdadera.

20. De acuerdo con la sección 63.324(d) del 40 CRF, cada dueño u operador de una instalación de lavado en seco mantendrá los recibos de las compras de percloroetileno y un registro con la siguiente información por un período de 5 años. Mantendrá esta información en la instalación y la mostrará cuando la soliciten.

21. De acuerdo con la sección 63.324(e), el dueño u operador de una instalación afectada mantendrá copia del manual de operación y mantenimiento de todo el equipo de lavado en seco y del equipo de control en la instalación.

22. No causará ni permitirá la emisión a la atmósfera de materia que produzca un olor objetable o desagradable" que pueda percibirse en predios que no sean aquellos que han sido designados para propósitos industriales. [Regla 420 del RCCA].

23. No se permitirá la construcción o instalación de equipos de emisión adicionales sin obtener previamente un permiso de construcción según lo requiere la Regla 203 del RCCA.

24. En caso de que se establezca alguna regulación o se enmiende alguna existente (estatal o federal) y se determine que le aplique a Laundry Celia, deberá cumplir con lo establecido una vez esta regulación o enmienda entre en vigor.

25. El incumplimiento con cualquiera de los requisitos de esta autorización constituirá una violación y la persona responsable de la fuente de emisión estará sujeta a una orden, penalidad administrativa o ambas.

26. De surgir en el futuro interés por cambiar esta condición, los equipos de emisión o sus respectivos equipos de control, deberán solicitarlo por escrito al Programa de Mejoramiento de Calidad de Aire de la Junta para su evaluación, a menos que estén exentos por la Regla 206 del RCCA.

Sección IV - Aprobación del Permiso

La Junta de Calidad Ambiental **autoriza a Laundry Celia a construir** las fuentes de emisión de contaminantes atmosféricos incluidas en este permiso. Está autorización vencerá el **17 de septiembre de 2006.** Podrá ser revocada (cancelada) antes de la fecha de vencimiento si se violan las condiciones del permiso o las disposiciones del reglamento. La información y condiciones sometidas en su solicitud forman parte de esta autorización.

LAUNDRY CELIA
HATO REY, P.R.
PFE-65-0603-0950-I-C

La Junta se reserva el derecho de intervenir con la fuente en otros aspectos no cubiertos en la autorización.

Otorgado en San Juan, Puerto Rico el 17 de septiembre de 2003.

Junta de Calidad Ambiental

Flor L. Del Valle López
Vice Presidenta

Angel O. Berrios Silvestre
Miembro Asociado

Esteban Mujica Cotto
Presidente

ai-mr/cr

ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DE LA GOBERNADORA

JUNTA
DE CALIDAD
AMBIENTAL

MEMORANDO

5 de septiembre de 2003

Félix Delgado Erausquín
Jefe
División de Inspección y Cumplimiento

Mónica López Román
Inspector Ambiental Principal
División de Inspección y Cumplimiento

Laundry Celia
San Juan, P.R.
PFE-65-0101-0119-I-II-O

El 4 de septiembre se inspeccionó la instalación de asunto. El propósito de la visita fue corroborar que se hubiesen corregido las violaciones encontradas en la inspección realizada el 5 de febrero y verificar cumplimiento con el Reglamento para el Control de la Contaminación Atmosférica (RCCA). Esta fuente está ubicada en la Ave. *Eleonor Rooselvelt* #247, Hato Rey. Fuimos atendidos por la Sra. Celia Aristy, propietaria de la lavandería.

Le solicitamos el permiso de operación y estaba disponible en la instalación. También le solicitamos los registros requeridos en el permiso tales como:

1. Registros de compra y consumo de Percloroetileno
2. Registros de los resultados del programa de inspección al sistema de lavado en seco
3. Registros de la temperatura de la corriente de aire a la salida del condensador refrigerado
4. Registros del horario de operación de la caldera, compra y consumo de combustible y evidencia del porciento de azufre en el combustible
5. Copia de los manifiestos de los desperdicios peligrosos
6. Copia del manual de operación y mantenimiento del equipo de lavado en seco

Todos los registros solicitados fueron mostrados. La compañía que recoge los desperdicios peligrosos es *Safety Kleen.* El consumo de Percloroetileno es de 55 gals/año. El horario de operación de la caldera es de 8:00 a.m. a 2:30 p.m. El consumo de combustible es de 6,000 galones hasta el momento. El consumo permitido es 8,736 galones por año. Durante los últimos meses no se han excedido en el consumo de combustible. La última inspección a la caldera fue el 20 de abril de 2003. El filtro de pelusa de la secadora es limpiado semanalmente. Al momento de la inspección el generador marca *Perkins*, ya no se encontraba en la instalación. El escape de la máquina de lavado en seco encontrado en la última inspección fue corregido. No se percibieron olores provenientes de la lavandería, ni se observaron emisiones visibles.

Durante el recorrido por la instalación se observaron los siguientes equipos:

Equipo	Marca/Modelo	Núm. de Serie	Capacidad
Máquina de lavado a seco/ Seco a Seco	*Economatic C-35*	121174	35 lbs
Secadora	*Huebsch*	STCK631806WD	35 lbs
Secadora	*Huebsch*	No se pudo observar la placa informativa	25 lbs
Caldera	*Fulton/ Fb-015-A*	50056	15 hp (Utiliza Keroseno)

Las violaciones encontradas anteriormente fueron corregidas. Recomendamos una inspección anual a la instalación, según el itinerario de inspecciones establecidas.

AI/MLR/mlr

ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DE LA GOBERNADORA

JUNTA DE CALIDAD AMBIENTAL

25 de abril de 2003

SRA CELIA ARISTI
PROPIETARIA
LAUNDRY CELIA
AVE ELEONOR ROOSEVELT 247
HATO REY PR 00918

Estimada señora Aristi:

Re: Notificación de Violación
Laundry Celia
Hato Rey, Puerto Rico
PFE-65-0101-0119-I-II-O

El 5 de febrero de 2003, personal técnico del Programa de Mejoramiento de Calidad de Aire inspeccionó la fuente de emisión en referencia. Esta fue operada en violación al Reglamento para el Control de la Contaminación Atmosférica (RCCA) y al 40 CFR 63, subparte M.

Las violaciones encontradas fueron las siguientes:

1. No llevan los registros requeridos del programa de inspección según, lo requiere la condición 5 del permiso de operación, en violación a la Regla 204(I) del RCCA. La condición 5 del permiso establece que se deberá inspeccionar el sistema de lavado en seco semanalmente para asegurarse de que no hayan escapes perceptibles durante la operación del mismo. Inspeccionará las siguientes partes:

    a. Conectores de mangueras y tubos, piezas de unión, empalmes y válvulas.
    b. Empaquetadura de puertas y asientos.
    c. Empaquetadura de filtros y asientos.
    d. Bombas
    e. Tanques y recipientes de solventes
    f. Separadores de agua
    g. Destilador
    h. Amortiguadores de escape
    i. Válvulas de desviación
    j. Cajas de cartuchos de filtros

JAO 4/25/03

2. Instalar y operar un generador de electricidad sin los debidos permisos, en violación a la Regla 203(A) y la Regla 204(A)(I). La Regla 203(A) establece que ninguna persona construirá o modificará una fuente de emisión sin antes obtener un permiso de la Junta. La Regla 204(A)(I) establece que ninguna persona operará o causará que se opere una fuente o un equipo de control de contaminación de aire sin un permiso para operar o un permiso temporal para operar de la Junta.

3. Se detectó un escape en la manga del sistema de lavado en seco, y no se ha corregido el mismo según lo requiere la condición 6 del permiso. La condición 6 del permiso establece que si como resultado de la inspección se detectan fugas en el sistema, entonces el dueño u operador deberá reparar las mismas en un período de 24 horas. Si la reparación de la fuga requiere la compra de una pieza, el dueño u operador dispondrá de solo dos días laborables para instalar la misma. Esto en violación a la regla 204(I) del RCCA.

4. Excedió por 275 gals el consumo annual, según su permiso en violación a la Regla 204(I) de Percloroetileno.

La **Regla 204(I) Condiciones al Conceder Permiso para Operar**, establece que la Junta puede imponer cualquier condición razonable sobre un permiso. Las condiciones así impuestas serán legalmente obligatorias antes de otorgarse el permiso para operar, incluyendo cualesquiera condición impuesta conjuntamente con el permiso para construir que, debido a su naturaleza y alcance deberá formar parte del permiso para operar.

Le solicitamos que notifique por escrito no más tarde de 15 días a partir del recibo de esta notificación lo siguiente:

1. Razón por la cual operó esta fuente en violación.

2. Un informe sobre las medidas realizadas para corregir las violaciones antes mencionadas y evitar que se repitan.

La Ley de Política Pública Ambiental permite a la Junta imponer sanciones y multas administrativas. No cumplir con las restricciones, órdenes, reglamentos de la Junta puede penalizarse con hasta $25,000.00. En caso de insistir en el incumplimiento con hasta $50,000.00.

Esperamos su pronta atención a este asunto.

Cordialmente,

Evelyn Rodríguez Cintrón
Directora
Área Calidad de Aire
AI-MLR-biv

ESTADO LIBRE ASOCIADO DE PUERTO RICO
OFICINA DE LA GOBERNADORA

JUNTA DE CALIDAD AMBIENTAL

MEMORANDO

13 de febrero de 2003

Félix Delgado Erausquín
Jefe
División de Inspección y Cumplimiento

Angel M. Rodríguez Andino
Ingeniero Graduado
División de Inspección y Cumplimiento

Mónica López Román
Inspector Ambiental Principal
División de Inspección y Cumplimiento

Laundry Celia
San Juan, P.R.
PFE-65-0101-0119-I-II-O

El 5 de febrero de 2003, visitamos la instalación de referencia. El propósito de la visita era corroborar cumplimiento con el Reglamento para el Control de la Contaminación Atmosférica (RCCA). Al llegar fuimos atendidos por la Sra. Celia Aristy, propietaria de la lavandería.

Luego, de explicar el propósito de nuestra visita le indicamos que nos mostrará todos los registros requeridos en el permiso de operación. Todos los registros solicitados fueron presentados. Esta nos indicó que el programa de inspección a los equipos se realiza bisemanal y no semanal como lo requiere el permiso. También, nos dijo que la compañía que recoge los desperdicios es *Safety Kleen.* El horario de la caldera es de 8:00 a.m. a 2:00 p.m. y el consumo de combustible es de 6000 gal. al año. El consumo de Perc. es de 55 gal/año, la lavandería usó 330 gal/año y este fue excedido por 275 gal.. Encontramos también un generador de electricidad marca *Perkins*, pero este se encontraba fuera de servicio. En la instalación encontramos un escape en la máquina de lavado en seco luego de revisarla con el instrumento para detectar escapes de Perc.. Luego, se procedió a hacer un recorrido por la instalación. No se observaron emisiones provenientes de la lavandería.

Durante la inspección por la instalación se observaron los siguientes equipos:

Equipo	Marca/Modelo	Núm. de Serie	Capacidad
Máquina de Lavado a seco/ Seco a Seco	*Economatic*/ C-35	121174	35 lbs
Secadora	*Huebesch*/ 37 csh	STCK631806WD	35 lbs
Secadora	*Huebesch*	No se pudo observar placa informativa	25 lbs
Caldera	*Fulton*/ Fb015-A	50056	15 hp (utiliza *Keroseno*)
Generador	*Perkins*/ D50P15	F3539H/001 (Fuera de Servicio)	50 hp (utiliza *Diesel*)

Como resultado de la inspección recomendamos enviar una Notificación de Violación por:

1. No llevar los registros requeridos del programa de inspección a los equipos semanalmente según lo requiere la condición 5 del permiso de operación

2. Se detectó un escape en la manga del sistema de lavado en seco, y no se ha corregido el mismo según lo requiere la condición 6 del permiso

3. Instalar y operar un generador de electricidad sin los debidos permisos, esto en violación a la Regla 203 (A) y la Regla 204 (A) (1)

4. Excedió por 275 gal. de Percloroetileno al consumo anual, esto en violación al permiso de operación

AI/FD/MLR

AIRS/AFS DATA ENTRY FORM

State		Date
72		01/5/29
Cnty		Pcd
127		00076
Plant Name	Celio Laundry	
Street Address	Eleanor Roosevelt.	
City Name	Hato Rey.	
State Registration Number: Pfe-	60-1095-13-06	Government Fac Code: O
Previous Pfe-		Significant Violator: n/a
Contact Perso	Celia Aristy.	Phone Number: 765-4325
Sic	7216	Air Program Status: O

AIR PROG. CODE	POLLUTANT	COMPLIANCE STATUS	CLASSIFICATION	ATT./NON-AT
O	PM10	3	B	A
	SO2			
	NO2			
	VOC			
	CO			
M	HC-53		B	A

Action Type / Action #: 58	Date/Dta1 (year month day)	Result Code	Staff Code / Initials:
	01/5/24	MC	P-55

Comments -->
Comment#__/__

Data Entry -->

PERMISO DE OPERACION
MEJORAMIENTO CALIDAD DE AIRE
JUNTA DE CALIDAD AMBIENTAL

Sección I - Información General

Nombre de la Fuente:	LAUNDRY CELIA
Número de Permiso:	PFE-65-0101-0119-I-II-O
Dirección Física:	AVE. ELEONOR ROOSEVELT #247 HATO REY, P.R. 00918
Dirección Postal:	AVE. ELEONOR ROOSEVELT #247 HATO REY, P.R. 00918
Oficial Responsable:	SRA. CELIA ARISTY PROPIETARIA
Teléfono:	(787) 765-4325

Sección II - Fuentes de Emisión Incluidas en el Permiso

FUENTE	EQUIPO DE CONTROL	DESCRIPCION
Una máquina de lavado en seco tipo seco a seco	Condensador Refrigerado	Marca ECONOMATIC. Tiene una capacidad de 35 lbs. y consume 55 gals/año de perc.
Caldera	N/A	Marca FULTON, tiene una capacidad de 15 hp y consume queroseno con un 0.05% de azufre por peso a razón de 3.5. gals/hr.
Dos secadoras de ropa	Filtros de tela	Marca HUEBSCH tienen capacidad de 25 y 35 libras respectivamente

Sección III - Condiciones de Permiso

1. El dueño u operador deberá cumplir con los requisitos establecidos bajo la Reglamentación Federal conocida como Norma Nacionales para las Emisiones de Percloroetileno (Perc) en las Instalaciones de Lavado en Seco, según el Título 40 del Código de Regulaciones Federales, Parte 63, Subparte M.

2. El dueño u operador de la instalación deberá determinar el consumo mensual y anual de Perc llevando un registro de las compras realizadas. Utilizará los recibos de compra para determinar el consumo. El registro y los recibos de compra deben mantenerse en la instalación por un período de 5 años.

3. El dueño u operador deberá determinar la categoría de fuente a la cual pertenece la instalación (Refiérase Tabla 1), a base de consumo anual de Perc.

4. De mantener un consumo anual de Perc menor que 140 o 200 galones, la instalación deberá cumplir con los requisitos establecidos para la categoría de fuente de área pequeña. Si el consumo anual de Perc excede los 140 galones pero es menor o igual a 2,100 galones ó excede 200 galones pero es menor o igual a 1,800 galones, la instalación deberá cumplir con los requisitos establecidos para fuente de área grande dentro 180 días consecutivos a partir de la fecha en que determinó la excedencia. Por otro lado, si el consumo anual de Perc excede los 2,100galones ó los 1,800 galones, deberá cumplir con los requisitos establecidos para instalaciones clasificadas como fuente mayor dentro de 180 días consecutivos a partir de la fecha que determinó la excedencia.

5. Deberá inspeccionar el sistema de lavado en seco semanalmente para asegurarse de que no hayan escapes perceptibles durante la operación del mismo. Inspeccionará las siguientes partes:

    a. Conectores de mangueras y tubos, piezas de unión, empalmes y válvulas;

    b. Empaquetadura de puertas y asientos;

    c. Empaquetadura de filtros y asientos;

    d. Bombas;

    e. Tanques y recipientes de solventes;

    f. Separadores de agua;

    g. Destilador;

    h. Amortiguadores de escape;

    i. Válvulas de desviación; y

j. Cajas de cartuchos de filtros.

g. Destilador;

h. Amortiguadores de escape;

i. Válvulas de desviación; y

j. Cajas de cartuchos de filtros.

6. Si como resultado de la inspección se detectan fugas en el sistema, entonces el dueño u operador deberá reparar las mismas en un período de 24 horas. Si la reparación de la fuga requiere la compra de una pieza, el dueño u operador dispondrá de sólo dos días laborales para ordenar la misma. Una vez se reciba la pieza, el dueño u operador dispondrá de cinco días laborables para instalar la misma.

7. El dueño u operador de la instalación deberá llevar un registro de los resultados de las inspecciones realizadas al sistema de lavado en seco. Debe indicar la fecha de la inspección y la parte donde encontró la fuga. Además, debe incluir las fechas de cuando reparó el equipo y de las órdenes verbales o escritas de las piezas de reparación para demostrar cumplimiento con la condición número 6. Este registro deberá mantenerlo en la instalación por un período de 5 años.

8. Deberá seguir las buenas prácticas de manejo que incluyen: mantener todo el Perc y los desperdicios que contienen Perc en envases cerrados sin escapes, drenar los filtros de cartuchos en envases cerrados y mantener la puerta de la máquina de lavado en seco cerrada en todo momento excepto cuando la ropa esté siendo transferida. Los desperdicios debe disponerlos a través de una compañía debidamente certificada.

9. Deberá operar y mantener el sistema de lavado en seco de acuerdo a las especificaciones y recomendaciones del manufacturero. Mantendrá copia del manual de operación y mantenimiento de todo el equipo de lavado en seco en la instalación.

10. Las emisiones de Perc deben ser controladas mediante un condensador refrigerado o un aparato equivalente.

11. El condensador refrigerado debe ser operado con una válvula de desviación para prevenir que el aire que le entra a la máquina de lavado en seco cuando se abre la puerta pase al condensador refrigerado.

12. Deberá medir la temperatura de la corriente de aire a la salida del condensador refrigerado al final de un ciclo de lavado en seco semanalmente. La temperatura debe ser menor que o igual a 45°F (7.2°C). Si excede esta temperatura deberá hacer la reparación o ajuste necesario. Las lecturas de temperatura y las reparaciones realizadas deben anotarse en un registro. Este registro deberá mantenerse en la instalación por un período de cinco años.

13. El dueño u operador deberá someter un informe de cumplimiento dentro de treinta días después de comenzar a operar el sistema de lavado en seco, firmado por el oficial responsable.

14. Si el consumo anual de Perc excede los límites de fuente de área de manera que la instalación pasa a ser una fuente de área grande ó fuente mayor, el dueño u operador deberá someter a la Junta una notificación de cumplimiento dentro de 180 días calendarios después que la instalación haya determinado que excedió el límite de consumo de la categoría bajo la cual estaba previamente clasificada.

15. El dueño u operador de una lavandería sujeta a las disposiciones del 40 CFR Parte 63 Subparte M tendrá que cumplir con los requisitos de permisos del Título V y la Parte VI del RCCA. Sin embargo, aquellas fuentes que no sean mayores podrán aplazar la fecha para someter su solicitud de permiso Título V hasta el 9 de diciembre de 2004, según lo establece el Administrador de APA y la Regla 601 incisos (b)(1) y (b)(2) del RCCA vigente. Dentro de un año a partir de esta fecha deberá someter a la Junta una solicitud Título V que cumpla con las disposiciones establecidas en la Regla 602 del RCCA. La fuente deberá cumplir con todos los requisitos aplicables que regulan su actividad para las fechas establecidas en el estándar correspondiente bajo la sección 112 (d).

16. El consumo del combustible queroseno de la caldera no excederá de 8,736 gals/año.

17. Mantendrá un registro diario del horario de operación, el consumo de combustible y el porciento de azufre del combustible quemado para la caldera. Estará disponible en la lavandería para evaluación y revisión del personal técnico de la Junta de Calidad Ambiental.

18- Enviará a la Junta un informe anual donde se indique el consumo mensual de combustible y las horas de operación de la caldera. Este informe será enviado a la Junta no más tarde de los próximos quince días del siguiente año para el cual el informe es representativo. El mismo deberá ser enviado a la División de Validación y Manejo de Datos a la atención de la Sra. Evelyn Rodríguez.

19. Mantendrá copia de este permiso en la instalación en todo momento. El mismo estará disponible en todo momento para ser revisado por personal técnico de la Junta.

Sección IV - Aprobación del Permiso

La Junta de Calidad Ambiental **autoriza a la Sra. Celia Aristy a operar** las fuentes de emisión de contaminantes atmosféricos incluidas en este permiso. Está autorización vencerá el 27 **de abril de 2006.** Podrá ser revocada (cancelada) antes de la fecha de vencimiento si se violan las condiciones del permiso o las disposiciones del reglamento. La información y condiciones sometidas en su solicitud forman parte de esta autorización.

LAUNDRY CELIA
HATO REY, P.R.
PFE-65-0101-0119-I-II-O

La Junta se reserva el derecho de intervenir con la fuente en otros aspectos no cubiertos en la autorización.

Otorgado en San Juan, Puerto Rico el 27 de abril de 2001.

Junta de Calidad Ambiental

Flor L. Del Valle López
Vice Presidenta

Jorge Marrero Huertas
Miembro Asociado

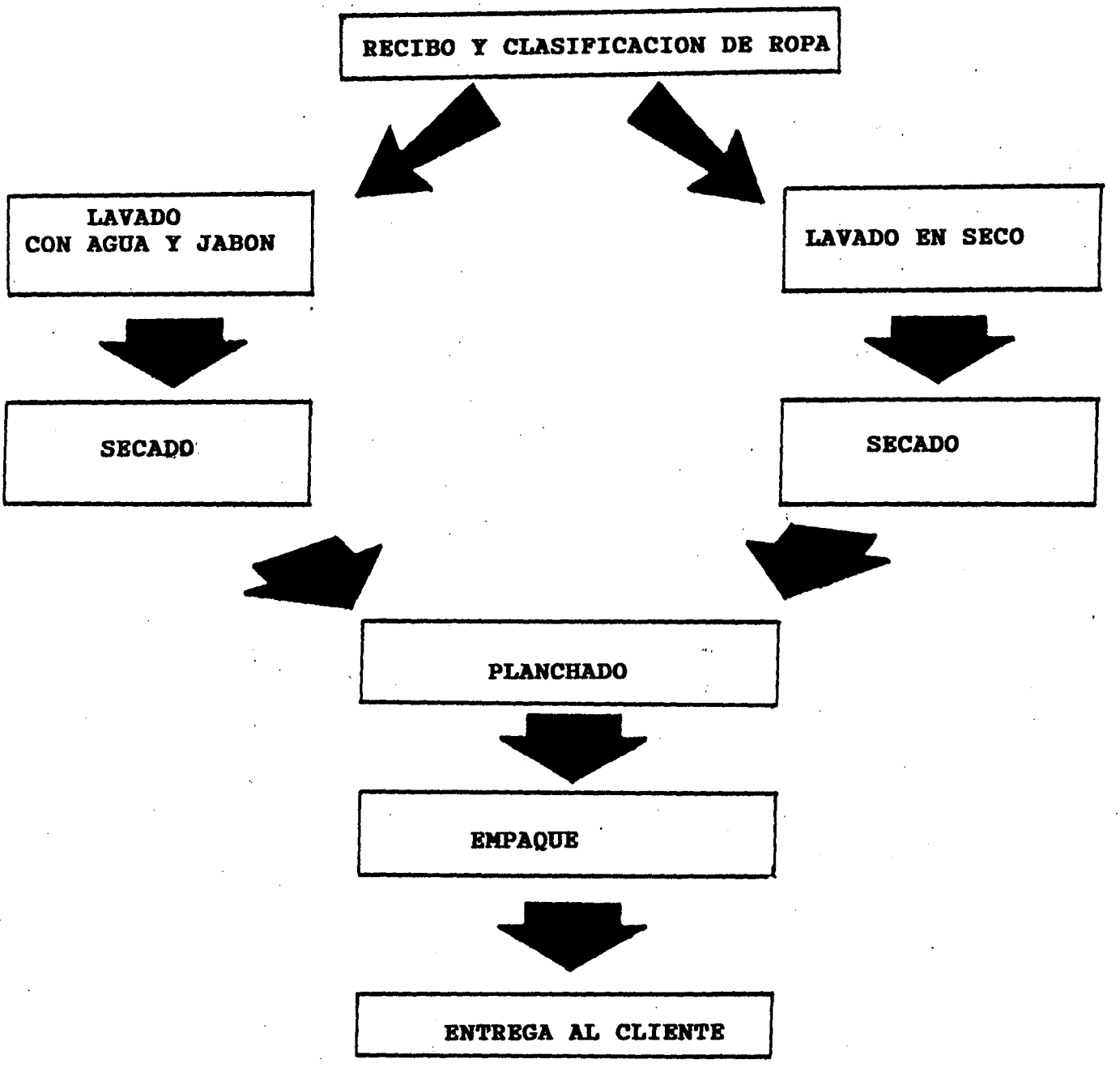
Gladys M. González Martínez
Presidenta

ai/mr/cr

S-S ENVIRON EXPERTS

LAUNDRY CELIA

DIAGRAMA DE FLUJO



APARTADO 40598, SAN JUAN, P.R. 00940-0598

JUNTA DE CALIDAD AMBIENTAL

GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

PUERTO RICO
AREA CALIDAD DE AIRE

'01 JAN 23 A10 :20

SOLICITUD DE PERMISO PARA LA CONSTRUCCION U OPERACION
DE FUENTES DE EMISION EN PUERTO RICO

RESIDUOS E INGENIERIA

PARTE I - INFORMACION GENERAL

( ) Primero ( ) Revisión (X) Renovación Fecha: _____

1. Solicitante:
   A. Nombre de la fuente de emisión: LAUNDRY CELIA
   B. Teléfono: 765-4325 SS Patronal: _____
   C. Localización: AVE ELEONOR ROOSEVELT # 247 HATO REY PUERTO RICO 00918
   D. Dirección Postal: LA MISMA
   E. Oficial Responsable:

LAUNDRY CELIA		
Organización		
CELIA ARISTY	PROPIETARIA	765-4325
Nombre	Título	Teléfono

   Dirección Postal: LA MISMA

2. Propósito de la solicitud: ( ) Construcción (X) Operación (marque sólo una)
3. Naturaleza de la actividad: TINTORERIA COMERCIAL
4. Número de empleados: 4
5. Producción anual máxima (especifique unidad): _____
6. Horario máximo de operación:

8	6	12
Horas/día	Días/semana	Meses/año

7. Si es operación intermitente, frecuencia máxima: _____ SIC: _____ (Código de Clasificación Industrial)
8. Se deben incluir los siguientes documentos:
   A. Plano de localización (proyectado o existente) indicando colindancias adyacentes y estructuras.
   B. Plano de la facilidad (proyectado o existente) indicando todos los puntos de emisión.
   C. Certificación del solicitante autorizando al representante (si aplica).
9. Anote todos los permisos otorgados por alguna agencia federal, estatal o local para la estructura o construcción, permiso de uso o número requerido:

Tipo de Permiso	Agencia	No. de Identificación	Fecha
OPERACION	JCA	PFE-65-1095-1306-I-II-0	

10. Esta facilidad, ¿existía o fué construída legalmente antes del 16 de septiembre de 1971?
    (X) sí ( ) no (marque sólo una)

CERTIFICACION

La presente solicitud se somete con el propósito de obtener autorización para la actividad aquí descrita. Certifico que, a mi mejor conocimiento y creencia, toda la información es correcta, completa y exacta.

Julia Aristy
Firma del solicitante

AFFIDAVIT

Affidavit No. 3682

Jurado y suscrito ante mí por Celia Aristy oficial responsable de Laundry Celia mayor de
lad, estatus civil soltera y residente de San Juan
San Juan, Puerto Rico, hoy día 13 de diciembre de 2000

Notario Público

SOLO PARA USO DE LA JUNTA DE CALIDAD AMBIENTAL

miso otorgado en _____ Expira _____ No. solicitud _____

LUIS ROBLES MARTINEZ
Abogado - Notario
PUERTO RICO

GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

JUNTA DE CALIDAD AMBIENTAL

SOLICITUD DE PERMISO PARA LA CONSTRUCCION U OPERACION
DE FUENTES DE EMISION EN PUERTO RICO

PARTE II - PROCESO DE LA PLANTA Y DESCRIPCION DE EMISIONES

I. EMISIONES INDUSTRIALES: (Movimiento de terreno, almacenaje en tanques, talleres de pintado, etc.)

1. Descripción del proceso u operación que emite contaminantes atmosféricos:
   PROCESO DE LAVADO EN SECO EN UNA MAQUINA ECONOMATIC C-35.
   DOS SECADORAS MARCA HUEBSCH CON FILTROS DE TELA
2. Materia prima usada o procesada: PERC (Tipo) 55 (Cantidad) GALS/AÑO (unidad/unidad tiempo)
3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso
FILTROS	95%
TORRE DE ENFRIAMIENTO	95%

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
____ pies	____ pulg.	____ °F	____ pies/seg.
____ pies	____ pulg.	____ °F	____ pies/seg.

5. Volumen de descarga de emisiones: _____ Pies³/min.
6. Emisiones actuales: Estimado basado en: _____

Tipo de contaminante	Cantidad (masa/tiempo)	Duración (tiempo/unidad tiempo)
PERC	0.372 TONS/AÑO	

7. Incluya un diagrama de flujo del proceso (tipo bloque) demostrando puntos, cantidades y tipos de emisiones.

II. EMISIONES POR COMBUSTION: (Calderas, calentadores, plantas de emergencia, bombas de incendio, etc.)

1. Equipo de combustión: CALDERA FULTON (Tipo) _____ (BTU/hr) ó 15 (HP)
2. Combustible:

Tipo	Gal/hr	ó Lb/hr	% azufre
KEROSENO	3.5		0.05

3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso
N/A	

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
10 pies	6 pulg.	____ °F	____ pies/seg.
____ pies	____ pulg.	____ °F	____ pies/seg.

III. EMISIONES POR INCINERACION O DISPOCISION DE DESPERDICIOS: (Sólidos, líquidos, gaseosos)

1. Método para disponer los desperdicios: _____
2. Tipo de desperdicios: _____ Cantidad: _____ Lb/día.
3. Incinerador: _____ (Tipo) _____ (Marca) _____ (Capacidad (Lb/día))
4. Chimenea: _____ (Altura) Pies _____ (Diámetro Salida) Pies _____ (Temp. Salida) °F _____ (Velocidad Salida) Pies/seg.
5. Combustible auxiliar: Tipo _____ Gal/hr _____ ó Lb/hr _____ % azufre _____
6. Equipo de control: _____ (Tipo) _____ (Eficiencia) % por peso.

IV. CUMPLIMIENTO: Incluya datos o información demostrando que las emisiones no exceden los límites establecidos.

V. EQUIPO DE CONTROL: Incluya esquema de la instalación del equipo de control de la fuente de emisión.

CERTIFICACION DE UN INGENIERO O ARQUITECTO LICENCIADO

Certifico que estoy registrado y autorizado para practicar mi profesión en Puerto Rico; que el equipo y medidas para el control d emisiones son adecuadas y cumplen con las disposiciones del Reglamento de Control de Contaminantes Atmosféricos de la Junt de Calidad Ambiental de Puerto Rico y que, de acuerdo a mis mejores conocimientos y creencias la información suministrada e veraz, completa y exacta.

PE-11012 (Número de Licencia) — ANGIE MARTINEZ CALDERON (Nombre (Letra de molde))

ANGIE MARTINEZ CALDERON INGENIERO LICENCIADO Firma LIC. 11012 PUERTO RICO

Fecha: _____ Número de solicitud: _____

JUNTA DE CALIDAD AMBIENTAL

GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

AREA CALIDAD DE AIRE

HOJA DE PAGO '01 JAN 23 A10:19

PERMISOS E INGENIERIA

Número de Solicitud: PFE-65-0101-0119-I-II-0
Nombre del Solicitante: CELIA ARISTY
Título: PROPIETARIA
Nombre del Proyecto o Fuente de Emisión: LAUNDRY CELIA
Dirección Postal: AVE ELEONOR ROOSEVELT # 247 HATO REY PUERTO RICO 00918

I. Pago por Solicitud de Permiso:
1. Pago por Radicación ($100.00): ( ) Construcción (x) Operación ( ) Plomo $100.00
( ) Remoción de Asbestos ( ) Escuela de Entrenamiento de Asbestos
2. XX Pago por Permiso 3. ( ) Pago por Renovación 4. ( ) Pago por Modificación ($10.00 por toneladas por contaminante)

CONTAMINANTE	EMISIONES (Ton/año)	CARGO TOTAL
Material Particulado (PM_{10})	0.009	0.09
Dióxido de Azufre (SO_x)	0.023	0.23
Oxido de Nitrógeno (No_x)	0.065	0.65
Plomo (Pb)		
Compuestos Orgánicos Volátiles (VOC) e Hidrocarburos (HC)	0.373	3.73
s (Favor de identificar)		

ACTIVIDADES DE ASBESTOS

1. Duración del Proyecto de Remoción

( ) De 1 a 30 días	$175.00		
( ) De 31 a 90 días	$450.00		
( ) De 91 hasta 365 días	$725.00		
2. Escuela de Entrenamiento de Asbestos	$600.00		
3. Registro de Asbestos			
( ) Certificación de supresión de Asbestos	( ) Escuela de Inspectores		
( ) Escuela de Administración de Planificadores	( ) Supervisores de Supresión		
( ) Escuela de Supresión para Proyectos de Diseñadores	( ) Trabajadores de Supresión		
	$40.00 (por cada categoría)		
( ) Especialista en Monitoreo de Aire			
4. Cambio de dueño o localización	(50% del cargo por radicación)		
5. Pago por Revisión	(50% del cargo por radicación)		
6. Duplicados de Permisos	$10.00		
7. Pago por Exceso de Emisiones:			
A. Dispensas	($25.00/ton/contaminante)		
B. Pequeños Negocios	($12.50/ton/cantaminante)		

PAGO TOTAL DE LA SOLICITUD:

II. Pago anual (pago por un año)	$104.70
III. Pago por cuatro (4) años extras (pago por 4 años)	$ 18.80
IV. TOTAL	$123.50

PARA COMPLETARSE EN LA OFICINA DEL PROGRAMA DE AIRE

Cantidad a pagar: $123.50 Fecha: 23/ene/01 Recibido por:
Número de cheque: 7111 Número de recibo: 2001004834

Firma del Representante autorizado JCA

Firma División de Finanzas

JUNTA
DE CALIDAD
AMBIENTAL

28 de marzo de 2001

SRA CELIA ARISTY
PROPIETARIA
LAUNDRY CELIA
AVE ELEONOR ROOSEVELT # 247
HATO REY PR 00918

Estimada señora Aristy:

Re: LAUNDRY CELIA
HATO REY, PUERTO RICO
PFE-65-0101-0019-I-II-O

Hemos evaluado la solicitud de permiso arriba mencionada.

La solicitud está incompleta. Para que su solicitud esté completa deberán enviar lo siguiente:

1. Una hoja Parte II de la solicitud para cada proceso donde se indique:

   a. Capacidad

   b. Equipo de control

2. Realizar pago de $18.70 por concepto de emisiones

3. Diagrama de flujo.

Le concedemos 10 días a partir de la fecha de esta comunicación para que envíe la información antes mencionada. De no recibir la información en el tiempo antes indicado procederemos a denegar la solicitud.

Si necesitan más información pueden comunicarse con Awilda Rosado al 767-8025.

Cordialmente,

Margie Ríos Medina
Jefa, División de Permisos
Mejoramiento Calidad de Aire

JUNTA
DE CALIDAD
AMBIENTAL

MEMORANDO

20 de marzo de 2001

Margie Ríos
Jefa División de Permisos
Mejoramiento Calidad de Aire

Awilda Rosado
Ingeniero Graduado
División de Permisos e Ingeniería

PFE-65-0101-0119-I-II-O
Laundry Celia
Ave.Eleonor Roosevelt
Hato Rey,P.R

Recibimos el 23 de enero una solicitud de permiso de operación de la compañía en asunto. El Oficial Reponsable lo es Celia Aristy , propietaria del Laundry Celia y el ingeniero que certifica los cálculos lo es Angie Martínez Calderón.

En el plan de trabajo nos informan que tienen una máquina de lavado en seco marca ECONOMATIC con capacidad de 35 libras., dos secadoras marca HUEBSCH y una caldera marca FULTON que utiliza combustible Keroseno a razón de 3.5 gal/hr con un 0.05 % de azufre por peso.

Al evaluar el caso encontramos unas deficiencias las cuales menciono:

1. En la solicitud de permiso para la construcción u operación de la planta específicamente en la descripción del proceso indican como equipo de control para la máquina de lavado en seco filtros con 95% de eficiencia y en las secadoras como equipo de control una torre de enfriamiento con 95 % de eficiencia. Entendemos que una máquina de lavado en seco no utiliza filtros

como equipo de control ni las secadoras una torre de enfriamiento.
Una torre de enfriamiento es un equipo que se utiliza para mantener temperaturas bajas. Por lo tanto podría ayudar al condensador refrigerado que sería el equipo de control en una máquina de lavado en seco. Deberá llenar dos hojas de proceso, una para la máquina de lavado en seco con el condensador refrigerado como equipo de control y la otra hoja para las dos secadoras y como equipo de control los filtros.

2. En la máquina de lavado en seco deberá indicar la capacidad en lb/día ó lb/año.

3. El consumo anual de la caldera es de 8,736 gal/año y no 6,552 gal/año como indican en el plan de trabajo. Basado en un período de (8 hr/día)(6 días/sem)(52 sem./año). Deberá pagar $[redacted] que es la diferencia.

4. Deberá traer un diagrama de flujo.

El pasado 16 de marzo le informamos al Sr.Silva (consultor de Celia Aristy) a las 4:15 pm personalmente y en adición a la Sra. Celia Aristy mediante conversación teléfonica y al momento no hemos recibido información alguna.

Recomendamos solicitar la información por escrito.

AI/arh

COLEGIO DE
INGENIEROS Y AGRIMENSORES
DE PUERTO RICO

21522

$ 150.00 Fecha: Sept 1 20

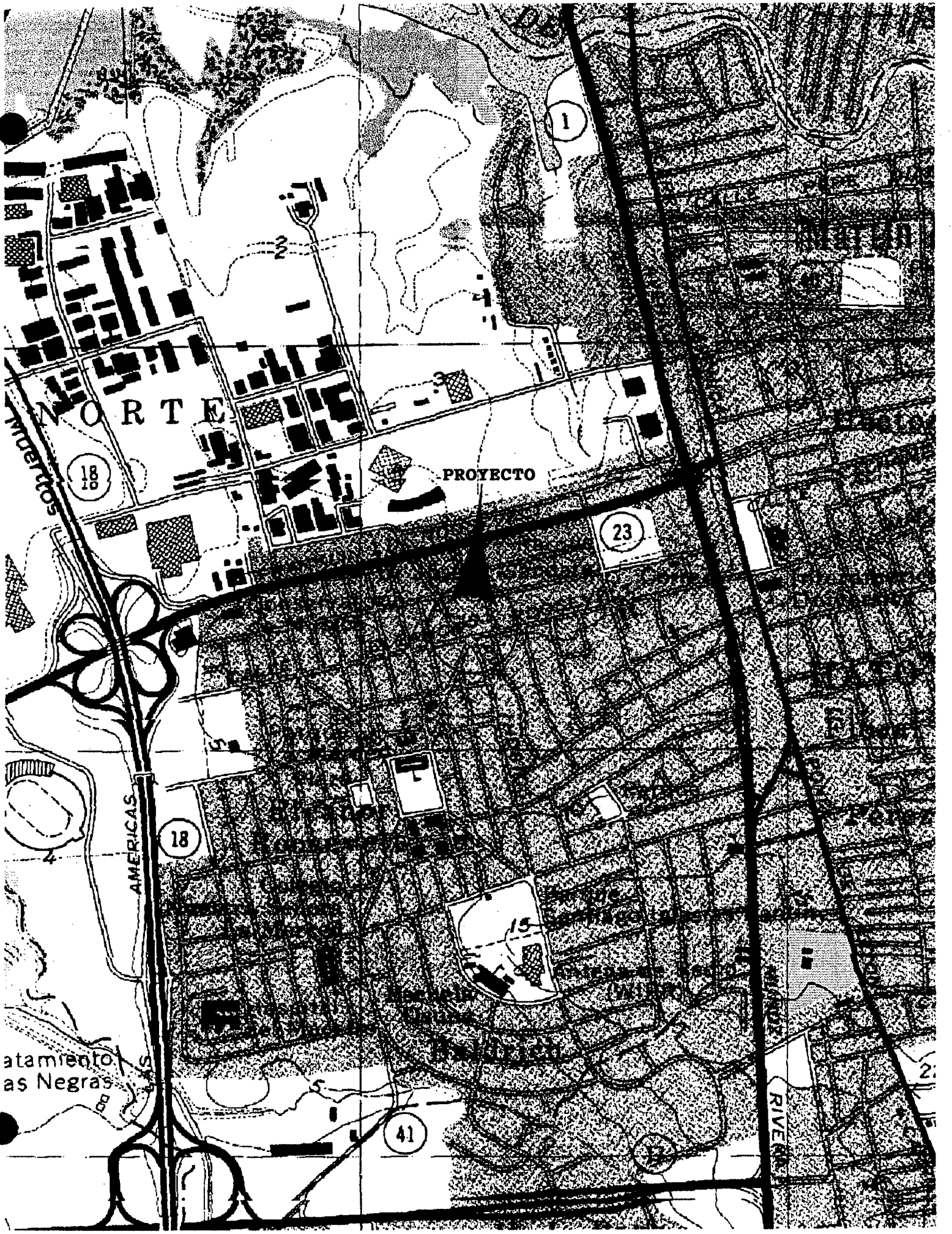
Recibí de: Ing. Angie. Martinez Calderon

Ciento Cincuenta Dóla

Para: Cuota 2000-2001

Efectivo ( )

Cheque ( )


NORTE
PROYECTO
Insurgentes
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23
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ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

JUNTA DE CALIDAD AMBIENTAL

HOJA DE PAGO

Número de Solicitud: PFE-65-0101-0119-I-II-0
Nombre del Solicitante: Celia Aristy
Título: Propietaria
Nombre del Proyecto o Fuente de Emisión: Laundry Celia
Dirección Postal: Hato Rey PR.

I. Pago por Solicitud de Permiso:
1. Pago por Radicación ($100.00): ( ) Construcción ( ) Operación _____
( ) Remoción de Asbestos ( ) Escuela de Entrenamiento de Asbestos
2. ( ) Pago por Permiso 3. ( ) Pago por Renovación 4. ( ) Pago por Modificación ($10.00 por toneladas por contaminante)

CONTAMINANTE	EMISIONES (Ton/año)	CARGO TOTAL
Material Particulado (PM_{10})	0.012	0.12
Dióxido de Azufre (SO_x)	0.031	0.31
(o de Nitrógeno (No_x)	0.087	0.87
Compuestos Orgánicos Volátiles (VOC) e Hidrocarburos (HC)	0.001	0.01
Otros (Favor de identificar)		
Total a pagar		

ACTIVIDADES DE ASBESTOS

1. Duración del Proyecto de Remoción

( ) De 1 a 30 días	$175.00		
( ) De 31 a 90 días	$450.00		
( ) De 91 hasta 365 días	$725.00		
2. Escuela de Entrenamiento de Asbestos	$600.00		
3. Registro de Asbestos			
(ertificación de supresión de Asbestos		( ) Escuela de Inspectores	
( ) Escuela de Administración de Planificadores		( ) Supervisores de Supresión	
( ) Escuela de Supresión para Proyectos de Diseñadores		( ) Trabajadores de Supresión $40.00 (por cada categoría)	
( ) Especialista en Monitoreo de Aire			
4. Cambio de dueño o localización	(50% del cargo por radicación)		
5. Pago por Revisión	(50% del cargo por radicación)		
6. Duplicados de Permisos	$10.00		
7. Pago por Exceso de Emisiones:			
A. Dispensas	($25.00/ton/contaminante)		
B. Pequeños Negocios	($12.50/ton/cantaminante)		

PAGO TOTAL DE LA SOLICITUD:

II. Pago anual (pago por un año)	$1.31
III. Pago por cuatro (4) años extras (pago por 4 años)	$5.24
IV. TOTAL	$6.55

PARA COMPLETARSE EN LA OFICINA DEL PROGRAMA DE AIRE

Cantidad a pagar: $6.55 Fecha: 29/mar/01 Recibido por: _____
Número de cheque: Cash Número de recibo: 2001006548

_____ _____
Firma del Representante autorizado JCA Firma División de Finanzas

GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

SOLICITUD DE PERMISO PARA LA CONSTRUCCION U OPERACION
DE FUENTES DE EMISION EN PUERTO RICO

PARTE II – PROCESO DE LA PLANTA Y DESCRIPCION DE EMISIONES

I. EMISIONES INDUSTRIALES: (Movimiento de terreno, almacenaje en tanques, talleres de pintado, etc.)

1. Descripción del proceso u operación que emite contaminantes atmosféricos:
   PROCESO DE SECADO DE ROPA A VAPOR EN DOS MAQUINAS MARCA HUEBSCH.
2. Materia prima usada o procesada: ROPA (Tipo) _____ (Cantidad) _____ (unidad/unidad tiempo)
3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso
FILTROS DE TELA	95%

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
_____ pies	_____ pulg.	_____ °F	_____ pies/seg.
_____ pies	_____ pulg.	_____ °F	_____ pies/seg.

5. Volumen de descarga de emisiones: _____ $Pies^3$/min.
6. Emisiones actuales: Estimado basado en: _____.

Tipo de contaminante	Cantidad (masa/tiempo)	Duración (tiempo/unidad tiempo)
PM	DESCONOCIDA	

7. Incluya un diagrama de flujo del proceso (tipo bloque) demostrando puntos, cantidades y tipos de emisiones.

II. EMISIONES POR COMBUSTION: (Calderas, calentadores, plantas de emergencia, bombas de incendio, etc.)

1. Equipo de combustión: _____ (Tipo) _____ (BTU/hr) ó _____ (HP).
2. Combustible:

Tipo	Gal/hr	ó Lb/hr	% azufre

3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
_____ pies	_____ pulg.	_____ °F	_____ pies/seg.
_____ pies	_____ pulg.	_____ °F	_____ pies/seg.

III. EMISIONES POR INCINERACION O DISPOCISION DE DESPERDICIOS: (Sólidos, líquidos, gaseosos)

1. Método para disponer los desperdicios: _____.
2. Tipo de desperdicios: _____ Cantidad: _____ Lb/día.
3. Incinerador: _____ (Tipo) _____ (Marca) _____ (Capacidad (Lb/día)).
4. Chimenea: _____ Pies (Altura) _____ Pies (Diámetro Salida) _____ °F (Temp. Salida) _____ Pies/seg. (Velocidad Salida)
5. Combustible auxiliar:

Tipo	Gal/hr	ó Lb/hr	% azufre

6. Equipo de control: _____ (Tipo) _____ % por peso. (Eficiencia)

IV. CUMPLIMIENTO: Incluya datos o información demostrando que las emisiones no exceden los límites establecidos.

V. EQUIPO DE CONTROL: Incluya esquema de la instalación del equipo de control de la fuente de emisión.

CERTIFICACION DE UN INGENIERO O ARQUITECTO LICENCIADO

Certifico que estoy registrado y autorizado para practicar mi profesión en Puerto Rico; que el equipo y medidas para el control de emisiones son adecuadas y cumplen con las disposiciones del Reglamento de Control de Contaminantes Atmosféricos de la Junta de Calidad Ambiental de Puerto Rico y que, de acuerdo a mis mejores conocimientos y creencias, la información suministrada es veraz, completa y exacta.

11012-PE (Número de Licencia) — ANGIE MARTINEZ CALDERON (Nombre (Letra de molde)) — _____ (Firma)

ANGIE MARTINEZ CALDERON
INGENIERO
LICENCIADO
PUERTO RICO

Fecha: _____. Número de solicitud: _____.

GOBIERNO DE PUERTO RICO / OFICINA DEL GOBERNADOR
AREA CALIDAD DE AIRE

SOLICITUD DE PERMISO PARA LA CONSTRUCCION U OPERACION
DE FUENTES DE EMISION EN PUERTO RICO

PARTE II – PROCESO DE LA PLANTA Y DESCRIPCION DE EMISIONES

I. EMISIONES INDUSTRIALES: (Movimiento de terreno, almacenaje en tanques, talleres de pintado, etc.)

1. Descripción del proceso u operación que emite contaminantes atmosféricos:
   PROCESO DE LAVADO EN SECO EN UNA MAQUINA ECONOMATIC DE 35 LIBRAS (SECO-A SECO). SE PROCESAN 46,800 LBS/AÑO DE ROPA CON UN CONSUMO DE PERC DE 55 GALONES POR AÑO.
2. Materia prima usada o procesada: PERC (Tipo) | 55 (Cantidad) | GALS/AÑO (unidad/unidad tiempo)
3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso
CONDENSADOR	REFRIGERADO 95%

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
____ pies	____ pulg.	____ °F	____ pies/seg.
____ pies	____ pulg.	____ °F	____ pies/seg.

5. Volumen de descarga de emisiones: _____ $Pies^3/min.$
6. Emisiones actuales: Estimado basado en: _____.

Tipo de contaminante	Cantidad (masa/tiempo)	Duración (tiempo/unidad tiempo)
VOC	0.372 TON/AÑO	

7. Incluya un diagrama de flujo del proceso (tipo bloque) demostrando puntos, cantidades y tipos de emisiones.

II. EMISIONES POR COMBUSTION: (Calderas, calentadores, plantas de emergencia, bombas de incendio, etc.)

1. Equipo de combustión: CALDERA FULTON (Tipo) _____ (BTU/hr) ó 15 (HP)
2. Combustible:

Tipo	Gal/hr	ó Lb/hr	% azufre
KEROSENO	3.5		0.05

3. Equipo de control para emisiones:

Tipo	Eficiencia % por peso

4. Chimeneas:

Altura	Diámetro Salida	Temp. Salida	Velocidad Salida
10 pies	6 pulg.	____ °F	____ pies/seg.
____ pies	____ pulg.	____ °F	____ pies/seg.

III. EMISIONES POR INCINERACION O DISPOCISION DE DESPERDICIOS: (Sólidos, líquidos, gaseosos)

1. Método para disponer los desperdicios: _____.
2. Tipo de desperdicios: _____ Cantidad: _____ Lb/día.
3. Incinerador: _____ (Tipo) _____ (Marca) _____ (Capacidad (Lb/día)).
4. Chimenea: _____ Pies (Altura) _____ Pies (Diámetro Salida) _____ °F (Temp. Salida) _____ Pies/seg. (Velocidad Salida)
5. Combustible auxiliar:

Tipo	Gal/hr	ó Lb/hr	% azufre

6. Equipo de control: _____ (Tipo) _____ % por peso. (Eficiencia)

IV. CUMPLIMIENTO: Incluya datos o información demostrando que las emisiones no exceden los límites establecidos.
V. EQUIPO DE CONTROL: Incluya esquema de la instalación del equipo de control de la fuente de emisión.

CERTIFICACION DE UN INGENIERO O ARQUITECTO LICENCIADO

Certifico que estoy registrado y autorizado para practicar mi profesión en Puerto Rico; que el equipo y medidas para el control de emisiones son adecuadas y cumplen con las disposiciones del Reglamento de Control de Contaminantes Atmosféricos de la Junta de Calidad Ambiental de Puerto Rico y que, de acuerdo a mis mejores conocimientos y creencias, la información suministrada es veraz, completa y exacta.

11012-PE	ANGIE MARTINEZ CALDERON	
Número de Licencia	Nombre (Letra de molde)	Firma

ANGIE MARTINEZ CALDERON — INGENIERO LICENCIADO — Lic. 11012 — PUERTO RICO

Fecha: _____. Número de solicitud: _____.

AIRS/AFS DATA ENTRY FORM

State	Cnty	Date	Pcds
72	127	8/6/99	00076

Celia Foundry

Plant Name	Eleanor Roosevelt # 247
Street Address	Hato Rey
City Name	
Zip Code	00918
State Registration Number: Pfe-	65-1095-1306 I II
Government Fac Code	0
Previous Pfe-	
Significant Violator	
Contact Person	Celia Arista
Phone Number	765-4325
Sic	7216
Air Program Status	0

IR PROG. CODE	POLLUTANT	COMPLIANCE STATUS	CLASSIFICATION	ATT./NON-ATT
M	HC-53	3	B	A
	VOC	3	B	A
	SO_2	3	B	A
	NO_2	3	B	A
	CO	3	B	A
	PM_{10}	3	B	A

Action Type	Date/Dta1	Result Code	Staff Code
Action #: 58	year month day		Initials:
	99 08 04	MC	P-54

Comments -->
Comment#:

Data Entry --> Date / / Initials:

AIRS/AFS DATA ENTRY FORM

State		Date
PR/72		19/agosto/98
Cnty		Pcds
127		00076

Plant Name	Celia's Laundry		
Street Address	Eleanor Roosevelt #247		
City Name	Hato Rey Puerto Rico	Zip Code	00918
State Registration Number: Pfe-	65-1095-1306-I-II-0	Government Fac.Code	0
Previous Pfe-	65-1193-1723-III-0	Significant Violator	
Contact Person	Celia Avisty	Phone Number	765-4325
Sic	7216	Air Program Status	0

AIR PROG. CODE	POLLUTANT	COMPLIANCE STATUS	CLASSIFICATION	ATT./NON-ATT
M	HC53	1	B	A
	PM_{10}	1		
	SO_2	1		
	NO_2	1		

Action Type	Date/Dta1	Result Code	Staff Code
Action #:	year month day		Initials:
S8	1998 August 13	NV	P52

Comments -->	In violation of Rule 204(I)
Comment#:	

Data Entry -->	Date	/ /	Initials:	

JUNTA
DE CALIDAD
AMBIENTAL

24 de agosto de 1998

SRA CELIA ARISTY
PROPIETARIA
LAUNDRY CELIA
AVE ELEANOR ROOSEVELT #247
HATO REY PR 00918

ASUNTO: **NOTIFICACIÓN DE VIOLACIÓN**
LAUNDRY CELIA
HATO REY, PUERTO RICO
PFE-65-1095-1306-II-O

Estimada señora Aristy:

Me refiero a la solicitud de permiso para operar la fuente de emisión que se menciona en el asunto.

El día **13 de agosto de 1998**, personal técnico del Área de Calidad de Aire inspeccionó la referida fuente de emisión, encontrando que la misma estaba siendo operada en **VIOLACIÓN** a la Regla **204** del Reglamento para el Control de la Contaminación Atmosférica, vigente y al 40 CFR Parte 63, Subparte M.

Esta violación se refiere a lo siguiente:

1. Ha fallado en mantener el registro de compra de PERC, el registro de detección de escapes desde **diciembre de 1997** y el registro diario de consumo de combustible de la caldera de **10 HP**.

2. Ha fallado en mantener en envases cerrados los filtros usados para desecho.

En vista de lo anterior expuesto, esta Junta le requiere que, en un período no mayor de **treinta (30)** días a partir de la fecha de recibo de esta notificación someta lo siguiente:

1- Razón por la cual se operó esta fuente en violación.

2- Un informe sobre las medidas realizadas para corregir las violaciones antes mencionadas.

Celia's Laundry, Inc.
247 E. Roosevelt
Hato Rey, PR 00918-0000

2 de octubre de 1998

Sra. Elisabeth Muñoz Matos
Directora
Mejoramiento Calidad de Aire
Gobierno de Puerto Rico
Apartado 11488
Santurce, PR 00910

Asunto: Notificación de Violación
PFE-65-1095-1306-II-O

Estimada Señora Muñoz:

Sirva la presente para excusarnos y explicarle las razones que crearon la situación de referencia, ya que estamos bien conscientes de la importancia de la misma:

1. Los registros de compra de PERC, el registro de detección de escapes desde diciembre de 1997; no fueron localizados al momento de la visita porque se habían caído detrás de un mueble con otros documento, al recogerlos los mezclaron todos. Se creo el registro diario de consumo de combustible de la caldera de 10HP, Actualmente los registros se organizaron en cartapacios en lugar seguro.

2. El mantener en envases cerrados los filtros para desecho, fue corregido, La "Safety-Kleen Corporation" ya paso a recoger estos desechos y continuara regularmente este proceso.

Por causas ajenas a nuestra voluntad, no nos fue posible informarle las medidas correctivas procesadas inmediatamente.

Atentamente,

Celia Aristy Rodriguez

REFERENCE: 9

NIOSH

POCKET GUIDE TO CHEMICAL HAZARDS

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Chemical name, structure/formula, CAS and RTECS Nos., and DOT ID and guide Nos.	Synonyms, trade names, and conversion factors	Exposure limits (TWA unless noted otherwise)	IDLH	Physical description	Chemical and physical properties: MW, BP, SOL Fl.P, IP, Sp, Gr, flammability	Chemical and physical properties: VP, FRZ UEL, LEL	Incompatibilities and reactivities	Measurement method (See Table 1)
Kepone $C_{10}Cl_{10}O$ 143-50-0 PC8575000	Chlordecone Decachlorooctahydro-kepone 2-one; Decachlorooctahydro-1,3,4- metheno-2H-cyclobuta(cd)- pentalen-2-one; Decachlorotetrahydro-4,7- methanoindeneone	NIOSH Ca See Appendix A 0.001 mg/m³ OSHA none	Ca [N.D.]	Tan to white, crystalline, odorless solid [insecticide]	MW: 490.6 BP: Sublimes Sol(212°F): 0.5% Fl.P: NA IP: ? Sp.Gr: ? Noncombustible Solid	VP(77°F): <3 x 10⁻⁷ mm MLT: 662°F (Sublimes) UEL: NA LEL: NA	Acids, acid fumes	Filter/ Imp.; Benzene/ Methanol; GC/ECD; IV; [#5508]
Kerosene 8008-20-6 OA5500000 1223 128	Fuel Oil No. 1, Range oil [Note: A refined petroleum solvent (predominantly C_9-C_{16}), which typically is 25% normal paraffins, 11% branched paraffins, 30% monocycloparaffins, 12% dicycloparaffins, 1% tricycloparaffins, 16% mononuclear aromatics & 5% dinuclear aromatics.]	NIOSH 100 mg/m³ OSHA none	N.D.	Colorless to yellowish, oily liquid with a strong, characteristic odor.	MW: 170(approx) BP: 347-617°F Sol: Insoluble Fl.P: 100-162°F IP: ? Sp.Gr: 0.81 Class II Combustible Liquid	VP(100°F): 5 mm FRZ: -50°F UEL: 5% LEL: 0.7%	Strong oxidizers	Char; CS_2; GC/FID; IV [#1550, Naphthas]
Ketene $CH_2=CO$ 463-51-4 OA7700000	Carbomethene Ethenone Keto-ethylene 1 ppm = 1.72 mg/m³	NIOSH 0.5 ppm (0.9 mg/m³) ST: 1.5 ppm (3. mg/m³) OSHA1 0.5 ppm (0.9 mg/m³)	5 ppm	Colorless gas with a penetrating odor	MW: 42.0 BP: -69°F Sol: Reacts Fl.P: NA (Gas) IP: 9.61 eV RGasD: 1.45 Flammable Gas	VP: >1 atm FRZ: -238°F UEL: ? LEL: ?	Water, alcohols, ammonia [Note: Readily polymerizes. Reacts with water to form acetic acid.]	Bub; $FeCl_3$; Vis; II(2); [#S92]
Lead Pb 7439-92-1 OF7525000	Lead metal, Plumbum	NIOSH* 0.100 mg/m³ See Appendix C OSHA* [1910.1025] 0.050 mg/m³ See Appendix C [*Note: The REL and PEL also apply to other lead compounds (as Pb) -- See Appendix C.]	100 mg/m³ (as Pb)	A heavy, ductile, soft, gray solid.	MW: 207.2 BP: 3164°F Sol: Insoluble Fl.P: NA IP: NA Sp.Gr: 11.34 Noncombustible Solid in bulk form.	VP: 0 mm (approx) MLT: 621°F UEL: NA LEL: NA	Strong oxidizers, hydrogen peroxide, acids	Filter; HNO_3/H_2O_2; AAS; III [#7082] [Also #7105.]

Personal protection and sanitation (See Table 3)		Recommendations for respirator selection — maximum concentration for use (MUC) (See Table 4)	Health hazards				
			Route	Symptoms (See Table 5)	First aid (See Table 6)		Target organs (See Table 5)
Skin:	Prevent skin contact	NIOSH	Inh	Head, ner, tremor; liver,	Eye:	Irr immed	Eyes, skin, resp sys,
Eyes:	Prevent eye contact	¥: SCBAF:PD,PP/SAF:PD,PP:ASCBA	Abs	kidney damage; vis dist;	Skin:	Soap wash immed	CNS, liver, kidneys,
Wash skin:	When contam/Daily	Escape: GMFOVHiE/SCBAE	Ing	ataxia, chest pain, skin	Breath:	Resp support	repro sys
Remove:	When wet or contam		Con	eryt; testicular atrophy;	Swallow:	Medical attention	[in animals:
Change:	Daily			low sperm count; [carc]		immed	liver cancer]
Provide:	Eyewash, Quick drench						
[Kepone]							
Skin:	Prevent skin contact	NIOSH	Inh	Irrit eyes, skin, nose,	Eye:	Irr immed	Eyes, skin, resp sys,
Eyes:	Prevent eye contact	1000 mg/m³: CCROV/SA	Ing	throat; burning sensation	Skin:	Soap flush immed	CNS
Wash skin:	When contam	2500 mg/m³: SA:CF/PAPROV	Con	in chest; head, nau, weak,	Breath:	Resp support	
Remove:	When wet or contam	5000 mg/m³: CCRFOV/GMFOV/PAPRTOV/		restless, inco, conf, drow;	Swallow:	Medical attention	
Change:	N.R.	SCBAF/SAF		vomit, diarr; derm;		immed	
Provide:	Quick drench	§: SCBAF:PD,PP/SAF:PD,PP:ASCBA		chemical pneu (aspir liq)			
		Escape: GMFOV/SCBAE					
[Kerosene]							
Skin:	N.R.	NIOSH/OSHA	Inh	Irrit eyes, skin, nose,	Breath	Resp support	Eyes, skin, resp sys
Eyes:	N.R.	5 ppm: SA*/SCBAF	Con	throat; resp sys; pulm edema			
Wash skin:	N.R.	§: SCBAF:PD,PP/SAF:PD,PP:ASCBA					
Remove:	N.R.	Escape: GMFOV/SCBAE					
Change:	N.R.						
[Ketene]							
Skin:	Prevent skin contact	OSHA	Inh	Weak, lass, insom; facial	Eye:	Irr immed	Eyes, GI tract, CNS,
Eyes:	Prevent eye contact	0.5 mg/m³: HiE/SA	Ing	pallor; pal eye, anor,	Skin:	Soap flush prompt	kidneys, blood,
Wash skin:	Daily	1.25 mg/m³: SA:CF/PAPRHiE	Con	low-wgt, malnut; constip,	Breath:	Resp support	gingival tissue
Remove:	When wet or contam	2.5 mg/m³: HiEF/SAT:CF/PAPRTHiE/		abdom pain, colic; anemia;	Swallow:	Medical attention	
Change:	Daily	SCBAF/SAF		gingival lead line;		immed	
		50 mg/m³: SA:PD,PP		tremor; para wrist, ankles;			
		100 mg/m³: SAF:PD,PP		encephalopathy; kidney			
		§: SCBAF:PD,PP/SAF:PD,PP:ASCBA		disease; irrit eyes;			
		Escape: HiEF/SCBAE		hypotension			
[Lead]							

REFERENCE: 10

POZOS EN OPERACION
Región Metro

Región	*Municipio*	*PWSID*	*Nombre del Pozo*	*Dirección*
Metropolitana	Hato Rey		Baldrich	Ext. Roosevelt, Hato Rey
Metropolitana	Toa Baja	2591	Campanilla 1	PR 865, Km. 4, Calle Principal Bo. Campanilla
Metropolitana	Toa Baja	2591	Campanilla 3	PR 865, Km. 0.8, Bo. Campanilla
Metropolitana	Toa Baja	2591	Campanilla 6	PR 865, Km. 2.2 (entrando lecheria), Sec. Mavi
Metropolitana	Toa Baja	2591	Campanilla 7	PR 865, Km. 2.2 (entrando lecheria), Sec. Mavi
Metropolitana	Toa Baja	2591	Campanilla 8	PR 865, Km. 2.2 Int. (entrando lecheria), Sec. Mavi
Metropolitana	Río Piedras	2591	Centro Médico	Centro Médico
Metropolitana	Bayamón	2591	Estancias de Cerro Gordo	Calle 8 (detrás Parque Pasivo), Ext. Cerro Gordo
Metropolitana	Río Piedras	2591	Gabriela Mistral	Ave. Piñeiro
Metropolitana	Río Piedras	2591	Hiram Bithorn	Ave. Domenech Final
Metropolitana	Río Piedras	2591	Las 400 (Cedro)	Carr. 185, Km. 12.5, Bo. Carraizo
Metropolitana	Hato Rey	2591	Las Américas	Urb. Las Américas
Metropolitana	Toa Baja	2591	Levittown 10	Calle Font Higuyot, Paseo Vecinal, Levittown
Metropolitana	Toa Baja	2591	Levittown 4	Calle Las Palmas, Esq. Progreso, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 5	Calle Progreso, Parcelas 94, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 6	Calle Crispé, Esq. Marginal Este, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 7	Calle Marginal Oeste, Esq. Parcelas Nuevas, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 9	Calle Font Higuyot, Paseo Vecinal, Levittown
Metropolitana	Río Piedras	2591	Manuel A. Pérez	Res. Manuel A. Pérez
Metropolitana	Toa Baja		Media Luna 1	Carr. 2, Intersección 165
Metropolitana	Toa Baja		Media Luna 2	Carr. 2, Intersección 165
Metropolitana	Toa Baja		Media Luna 3	Carr. 2, Km. 21
Metropolitana	Río Piedras		Miguel Such	Ave. Barbosa, Frente Esc. Vocacional
Metropolitana	Río Piedras	2591	Parque Escorial I	Ave. 65 Inf. Int., Antiguo Hipódromo
Metropolitana	Río Piedras	2591	Parque Escorial II	Ave. 65 Inf. Int. PR 8
Metropolitana	Bayamón		Río Bayamón	Planta Río Bayamón, Carr. 29 Int. 21
Metropolitana	Río Piedras	2591	Sabana LLana	
Metropolitana	Bayamón	2591	Santa Rosa	Carr. 174, Ave. Main, Urb Santa Rosa
Metropolitana	Río Piedras	2591	Sorbona	Calle Sorbona, University Gardens
Metropolitana	Hato Rey		Truman	Calle Pereira Leal 567, Urb. Valencia
Metropolitana	Río Piedras		UPR #1	Terrenos UPR, Ave. Barbosa
Metropolitana	Río Piedras		UPR #4	UPR, Ave. Barbosa
Metropolitana	Carolina	2591	Urrutia	PR 853, Km. 11.4, Bo. Masas
Metropolitana	Toa Baja	2591	Candelaria Arena	
Metropolitana	Toa Baja	2591	Levittown 8	
Metropolitana	Carolina	2591	Villa Fontana	
Metropolitana	Carolina	2591	Villa Fontana II	
Metropolitana	Loiza	2591	Loiza Valley	
Metropolitana	San Juan	2591	Dos Pinos	
Metropolitana	San Juan	2591	Ext. Roosevelt	
Metropolitana	San Juan	2591	Reparto Metropolitano	
Metropolitana	San Juan	2591	UPR - Ponce de León	

REFERENCE: 11

Pozos Inoperantes
Región Metro
Pozos Inoperantes

Región	Municipio	PWSID	Nombre del Pozo	Dirección	Status	Condición	Coordenadas Norte	Coordenadas Oe
Metropolitana	Bayamón		Río Plantation 1	PR 872, Km 1.6, Bo. Río Plantation	Cerrado/enereo, 1981/Cont. con mercurio			
Metropolitana	Bayamón		Río Partation 2	PR 872, Km 1.5, Bo. Río Plantation	Cerrado/enero, 1981	Inaccesible		
Metropolitana	Bayamón		Río Partation 3	PR 872 y Calle #2 Oeste, Km 1.5, Bo. Río Plantation	Cerrado/marzo,1981	Colapsado		
Metropolitana	San Juan		Pozo Truman	Calle Pereira Leal S67, Urb. Valencia, Hato Rey	Cerrado/1987/Contaminado con VOC	Completo (falta energizarlo)		
Metropolitana	San Juan		Trina Padilla	Ave. Piñero (terrenos Esc. Trina Padilla), Puerto Nuevo	Cerrado/1987/Problemas por influencia de quebrada aledaña	No tiene caseta/tanque solución, panel eléctrico		
Metropolitana	San Juan		Escorial	Calle Escorial (patio escuela)	Cerrado/octubre, 1994/Se derrumbó	Derrumbado/Bomba sepultada		
Metropolitana	San Juan		Los Pollitos	Calle 48 SE, Esq. Calle 27, Reparto Metropolitano	Cerrado/22 diciembre,1994/Contaminado con coliformes fecale	Completo		
Metropolitana	San Juan		Manuel A. Pérez II	Ave. Piñero (lado cementerio)	Cerrado/Eliminado por construcción de Ave. Piñero	Bomba y motor inoperantes		
Metropolitana	San Juan		Miguel Such	Ave. Barbosa (frente Esc. Vocacional Miguel Such)	Cerrado/1987/Contaminado con VOC	Completo		
Metropolitana	San Juan		Pozo Los Caobos	Ave. San Patricio (terrenos parque pasivo)	Cerrado/1994/Causó hundimiento en áreas aledañas	Solo muñeco		
Metropolitana	San Juan		University Gardens	Calle Forham (terrenos Esc. Sotero Figueroa)	Cerrado/1987	Sellado con cemento		
Metropolitana	San Juan		William D. Boyce	Calle 24 SO, Esq. 20 SO, Urb Las Lomas	Cerrado/1987/Baja producción	Tiene parte del muñeco		
Metropolitana	Toa Baja		Levittown 1	Se desconoce	Cerrado/Se desconoce			
Metropolitana	Toa Baja		Levittown 2	Carr. 866 Int. Calle C, Parc. Villa Marisol, Sabana Seca	Cerrado/1985/Alto cont. Sodio y cloruros			
Metropolitana	Toa Baja		Levittown 5	Calle Progreso, Parcela #94, Sabana Seca	Cerrado/20 julio, 1994/Colapso, core			
Metropolitana	Toa Baja		Campanilla 2	Carr. 865, Esq. Calle Principal, Res. Bo. Campanilla	Cerrado/octubre, 1983/Alto contenido sodio y cloruros			
Metropolitana	Toa Baja		Campanilla 4	Carr. 865, Km. 0.5, Bo. Campanilla	Cerrado/octubre, 1983/Alto contenido sodio y cloruros			
Metropolitana	Toa Baja		Campanilla 5	Carr. 865, Km. 0.2, Bo. Campanilla	Cerrado/octubre, 1983/Alto contenido sodio y cloruros	Se rehabilita		
Metropolitana	Toa Baja		Sabana Seca	Calle Acueducto, Esq. Higuero, Bo. Sabana Seca	Cerrado/abril,1984/Razón Desconocida			

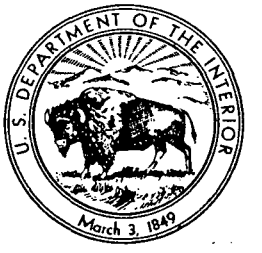
Región Metro
Pozos Inoperantes

REFERENCE: 12

Geology of the San Juan Metropolitan Area Puerto Rico

GEOLOGICAL SURVEY PROFESSIONAL PAPER 317-A

Prepared in cooperation with Puerto Rico Water Resources Authority, Puerto Rico Economic Development Administration, Puerto Rico Aqueduct and Sewer Authority, and Puerto Rico Department of the Interior



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By CLIFFORD A. KAYE

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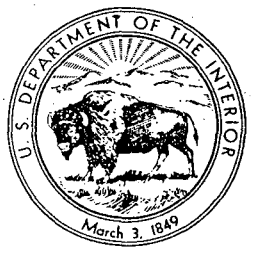

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1959

THE COASTAL GEOLOGY OF PUERTO RICO

GEOLOGY OF THE SAN JUAN METROPOLITAN AREA

By CLIFFORD A. KAYE

ABSTRACT

The San Juan area comprises about 80 square miles centered about the city of San Juan and includes the San Juan and the northern half of the Aguas Buenas topographic quadrangles. The area consists of a very gently sloping coastal plain in the northern part and a low to moderate hilly section on the south. The coast is marked mostly by sand beaches, but at the western end of the area eolianite crops out in the sea cliffs of San Juan and the adjoining low hills as well as in the chain of small rocks that rise offshore. Behind the coast occur several enclosed to nearly enclosed lagoons, including the admirably protected harbor of Bahía de San Juan. In the southern part of the coastal plain several hills and steep-sided rocky ridges of Miocene limestone rise abruptly from the featureless plain. To the south the uplands, which are underlain by rocks of Late Cretaceous to late Paleocene or early Eocene age, rise progressively and develop a rugged aspect only at the southern edge of the map area. The only sizeable river is the Río Grande de Loíza, the largest on the island, with almost 225 square miles of watershed. Its known rate of discharge varies from a minimum of 48 cubic feet per second to a maximum of 125,000 cubic feet per second. The river flows on rock and thin alluvial sand and gravel and has a valley over 650 feet deep in the southwestern corner of the area.

The uplands are underlain by a sequence of much-deformed rocks, the older complex, ranging in known age from Late Cretaceous to late Paleocene or early Eocene. It consists of volcanic, tuffaceous, and sedimentary rocks, of both marine and nonmarine facies, and shallow to hypabyssal intrusive rocks. The stratigraphic sequence, from oldest to youngest, is as follows: Hato Puerco tuff—prevailingly massive volcanics with some stratified ash. They show a somewhat higher grade of regional metamorphism than the younger rocks. Guaynabo formation—graywacke, conglomerate, and shale, which are probably nonmarine in origin. Tortugas andesite—augite andesite breccias and flows of local prominence. Frailes formation—a marine accumulation of shale, siltstone, and graywacke, with lenticular limestone in the lower part (La Muda limestone member), massive lapilli tuff in the middle, and well-bedded tuffaceous limestones (Leprocomio limestone member) in the upper part. Monacillo formation—predominantly graywacke and conglomerate, commonly red to purple in color and possibly nonmarine. Trujillo Alto limestone—medium-bedded to massive fossiliferous pure limestone. This formation probably marks the top of the Cretaceous section. Figuera volcanics—hornblende andesite breccia with minor flows. Tuffaceous limestone and derived limestone blocks occur in base. Fajardo formation—thin-bedded ashy siltstone and chert that grades laterally into coarse clastics.

Late Cretaceous marine fossils have been collected from the Frailes formation and the Trujillo Alto limestone. Although diagnostic fossils have not been found above the Trujillo Alto limestone, it is proposed that the Figuera volcanics correlate with the late Paleocene or early Eocene deposits of Loíza, to the east, and Corozal, to the west. It is estimated that the older complex in the San Juan area aggregates 16,000 feet or more in thickness.

Three types of intrusive rock are recognized in the older complex of the San Juan area. Biotite granodiorite porphyry, now albitized, crops out in the southern part of the area and seems to be the top of a large subjacent mass. Augite andesite porphyry occurs in tabular and irregular-shaped masses. This rock shows evidence of a certain amount of wallrock assimilation. Diabase dikes, sills, and pipes also occur fairly widely. From cross-cutting relations all three rock types are thought to be early Tertiary in age and to postdate the entire stratigraphic section.

Although megascopically none of the rocks of the San Juan area are metamorphic in aspect, all of them show secondary mineralogic changes indicative of low-grade regional metamorphism. This is more pronounced in some rocks than in others. Plagioclases, more often than not, have been partly or entirely altered to albite; and chlorite, epidote, clinozoisite, and calcite are common. Very fine grained amphibolites also occur. There is some basis for thinking, however, that the rocks have responded more to the introduction of new constituents and to heat than to pressure. The assimilation of wallrock by andesitic intrusion is indicated in many places by relict wallrock structures, textures, fragments, and the bulbous termination to andesitic dikes without the structural distortion of the surrounding wallrock (such as would result from dilation).

The middle Tertiary is separated from the older complex by an angular unconformity. Two formations, both probably early Miocene in age, are recognized in the San Juan area: the Aguada formation and the Aymamón limestone. The former consists principally of compact sand, silt, marl, and lenticular arenaceous limestone and is approximately 325 feet thick. The latter is medium- to thick-bedded, dense white to pink limestone with some interbedded marl and sand. The outcrops of the Aymamón limestone project through the coastal plain alluvium in steep-sided rocky hills. From surface evidence it is computed that roughly 950 feet of Aymamón limestone underlies San Juan, on the north

coast. Data from seismic work using reflection methods, however, indicate the occurrence of close to 3,000 feet of middle Tertiary sedimentary rocks and suggest a probable thickening of the middle Tertiary section to the north.

Older alluvium, consisting of thoroughly decomposed sands and gravels, blankets part of the upland and higher stream terraces and much of the coastal plain. Light gray and buff reticulations are rather characteristic and seem to be due to leaching by acidic subsurface water along fractures and roots. Littoral deposits of Pleistocene age, consisting of cemented dune sand (eolianite) with some interbedded shallow marine and beach deposits, crop out on Isla San Juan, Santurce, and the offshore islets. The Santurce sand is a medium-grained, well-sorted quartz sand and clayey sand that is particularly thick in Santurce and is widespread on the north coastal area of the island. The sand is probably mostly older alluvium that has been reworked by sheet erosion and then by wind. Much of the quartz was probably originally derived from the middle Tertiary limestones. The white coloration (lack of iron staining) that is rather characteristic of the deposit may again be due to leaching by acidic ground waters. Littoral deposits of Recent age consist of beach sands and associated dunes and sand aprons. The sand is generally medium to coarse grained and is made up of both mineral grains and shell fragments, in variable proportion. Bay mud, or muck, is the soft, highly organic clay that fringes San Juan Bay. It is 25 to 35 feet thick over most of this area. Alluvium of Recent age, consisting of gray to red clays, sands, and gravels occur on the poorly drained meadows flanking the bay and in the beds of the larger streams and rivers.

The rocks of the older complex are much deformed. In the San Juan area they have been folded into several large, fairly symmetrical flexures, which strike east for most of their length, and whose sides dip at moderate angles. High- and low-angle faults abound. A large thrust, which seems to vary along its strike from high to low angle and which dips north, crosses the entire area. Horizontal displacement along this fault is estimated to exceed 3 miles. The larger high-angle faults in the area form a conjugate pattern of two dominant trends: west-northwest and east-northeast. Some of these faults preceded the displacement of the large thrust and also the intrusion of the granodiorite porphyry. Others show later movement and a few were probably active in the late Tertiary or early Quaternary. Several eroded scarps may have been produced by this late movement. The middle Tertiary strata dip north at angles as large as 6°. Steplike structural undulations and possibly folds with very small closure occur. The middle Tertiary is broken by relatively few faults, which are mostly high-angle normal faults of small displacement.

At least the lower part of the older complex of the San Juan area probably represents accumulations on the flanks of a large volcanic cone. The Hato Puerco tuff is thought to have formed part of this cone. Higher stratigraphic units are either alluvial deposits on the flanks of the cone or their marine continuations. Interstratified volcanic rocks may have been derived from smaller local vents. The cone rested on a foundering crust, and so in time it was probably entirely overlapped by marine deposits. No evidence of an abyssal depositional environment for any of the rocks in the area has been recognized. The orogeny that deformed the older complex took place in the late Paleocene or the Eocene (probably the latter). The absence of signs of a dominant direction of tangential stress suggests deformation by sliding into a troughlike downwarp. The dominant northwest alinement of fold axes in the island points to a northwest orientation for this trough. The larger intrusive masses may have formed as a result of fusion of the roots of the downwarp followed by forceful injection of the magma into higher levels with continued foundering. The subsequent uplift of the downwarped rocks may have been chiefly an isostatic response to deeply infolded light crustal material. The coarse-grained alluvium of the basal middle Tertiary deposits show that Puerto Rico was characterized by a rugged topography in late Oligocene time. Downwarping on both the north and south of an east-west axis occurred at this time, and this broad geanticlinal structure has dominated the structural deformation of the island ever since. This east-west structural axis may be genetically related to the essentially east-west alinement of the Puerto Rican trough, the foredeep that lies north of the island. The island was apparently reduced to an old-age erosion surface by late Miocene or early Pliocene time. In late Pliocene or early Pleistocene time it was again re-arched along its east-west axis but mostly by the movement of fault blocks. Two such eroded scarps from this faulting occur in the San Juan area.

The engineering characteristics of the geologic materials of the area are briefly summarized. The older complex rocks are almost everywhere covered by a silty clay regolith of residual and alluvial origin. For most of the formational units, the physical properties of this clayey blanket seem to be much alike. Exceptions to this are the pure limestones, which are covered by clays of fairly high plasticity, and the graywackes of the Guaynabo formation, which yield a sandy regolith. Most of the heavy structures in the San Juan area are built on older alluvium, Santurce sand, the bay mud, and Recent alluvium. The Santurce sand has varied though generally low strength for footings. Construction on bay muds generally requires piles to the underlying older alluvium; undue settlement of roads has been eliminated in one instance by the use of vertical sand drains. The older alluvium is generally quite compact and has moderate bearing strength. Formations most used for crushed rock, building stone, and general fill are the Hato Puerco tuff, Tortugas andesite, the La Munda and Leprocomio limestone members of the Frailes formation, the Trujillo Alto limestone, the ashy siltstone of the Fajardo formation, and the Aymamón limestone. The Recent alluvium of the Río Grande de Loíza is the largest source of gravel for concrete aggregate. The site of the dam across this river is briefly described. The rock is a very fine grained amphibolite, a metavolcanic component of the Hato Puerco(?) tuff, hornblende diorite, and aplite. The rock was sound, massive, and unusually fresh close to the surface, so that very little stripping was required. The dam had a minimum of foundation problems.

INTRODUCTION

The geologist working in the older deformed rocks of Puerto Rico sooner or later comes to realize that the structural and stratigraphic complexities are too great to permit a satisfactory synthesis of the island's geologic history on the basis of reconnais-

sance, or small-scale, mapping. Stratigraphic ambiguities in particular seem at first an insurmountable barrier to a proper understanding of past events; in consequence, the need for detailed large-scale mapping becomes strongly manifest. It was with the purpose therefore of making such a map that the area about the capital city of San Juan was studied at irregular intervals during the period 1949–51.

The San Juan area is particularly well chosen for such a study. Although the area is small, it encompasses nearly the full range of geology known on Puerto Rico; and, owing mostly to man's engineering activities, it provides an exceptional wealth of rock exposures for a region generally characterized by thick soils and few outcrops. The many road cuts, quarries, and excavations for buildings and small houses provide the geologist with advantages not found in such profusion elsewhere in Puerto Rico.

Field mapping was done on the published topographic map (scale 1:10,000) and on aerial photographs (scale about 1:18,000). Geologic mapping was completed for the San Juan 7°30′ quadrangle, which includes all the San Juan metropolitan area, and the northwest and a part of the northeast quarters of the Aguas Buenas 7°30′ quadrangle, which adjoins on the south. The San Juan quadrangle and the northern half of Aguas Buenas quadrangle have been combined and printed as one sheet (scale 1:30,000) in this report for presentation of the geologic map (pl. 2).

LOCATION AND GEOGRAPHIC SETTING

The San Juan area includes the capital city of San Juan and its environs and encompasses a land area of about 80 square miles. The city of San Juan is located on the eastern part of the north coast of Puerto Rico, and the mapped area (pl. 2) is bounded by the geographic coordinates: latitude 18°18′45″ N. to latitude 18°30′ N.; longitude 66°00′ W. to longitude 66° 7′30″ W.

The northern part of the area is a very gently sloping coastal plain indented by several large lagoons and the semienclosed embayment of Bahía de San Juan. South of Río Piedras the land is hilly, becoming progressively more so as one penetrates deeper into the island interior.

The entire area is densely populated in both the urban and the rural sections, attaining a maximum concentration on the coastal plain in the city of San Juan (a political unification of now coalesced but formerly separate communities of San Juan, Santurce, Hato Rey, and Río Piedras). Surrounding the city itself are numerous suburbs, settlements, roadside communities, and hamlets that are all economic appendages to the city.

At the time the study was made, a building boom, unprecedented for the island, was spreading the edges of the urban area at a rapid rate, and in consequence the culture shown on the topographic base map of plate 2 is obsolete. The city has grown from its original site on the narrow island on the north side of the bay to encompass not only much of the better drained alluvial ground of the coastal plain but also to infringe on the extensive salt marshes surrounding the bay and the adjoining lagoons.

Where slopes are not too steep the rural areas are mainly given over to sugarcane cultivation. Steep slopes are used mostly for tobacco, small root crops, fruits, and minor coffee cultivation. Most of the original forest cover has been stripped, and such trees as one sees are generally flowering ornamental trees, the many tropical fruit-bearing species, and the shade trees of coffee plantations. The poorly drained alluvial land of the coastal plain is used almost exclusively for dairying.

PREVIOUS WORK

The area covered by this study lies within areas designated as the San Juan and the Fajardo districts in the "Scientific Survey of Porto Rico and the Virgin Islands," by the New York Academy of Science, a scientific survey of broad scope initiated in the early part of the twentieth century (fig. 2). Maps of both these districts were published in separate geologic reports (Semmes, 1919; Meyerhoff and Smith, 1931) of this early survey. The geologic map (scale 1:62,500) accompanying Semmes' report on the San Juan district includes a strip along the west margin of the present study, and Meyerhoff and Smith's map (scale 1 inch to 1 mile) includes the entire area of the present study.

A. K. Lobeck (1922) included the San Juan area in his study of the physiography of Puerto Rico, as did C. P. Berkey (1915) in his reconnaissance of Puerto Rican geology. Several of the formational names used by Meyerhoff and Smith and in this report were first proposed by Berkey.

It would be well at the outset to recall some of the conditions under which these earlier geologic studies were made in order to explain the basis for certain differences between the maps of Semmes (1919) and Meyerhoff and Smith (1931) and that

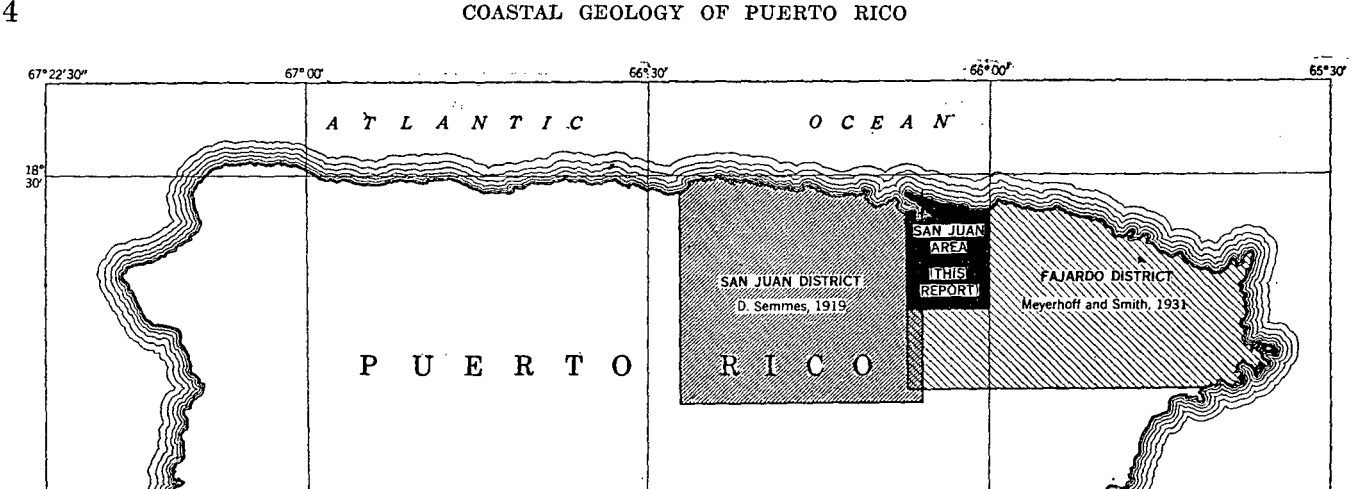

FIGURE 2.—Index map of Puerto Rico, showing the San Juan area of this report, and the San Juan and Fajardo districts of earlier authors.

which accompanies this report (pl. 2). The areas involved in both the San Juan and Fajardo districts of the New York Academy of Science reports were large, about 500 square miles each. The field work for both reports was of a reconnaissance nature and was done during the course of one or two summer seasons. The several authors were obliged to make their own base maps in addition to doing the geology of these broad tracts. Roads were fewer than they were in 1951 and many man-made exposures provided by the modern road net were not yet in existence. In the light of these handicaps, the quality of both reports is outstanding and differences between the earlier and the present map become understandable.

PHYSICAL FEATURES

The San Juan area lies on the north of Puerto Rico and includes parts of the low-lying coastal plain on the north and of the hilly uplands of the Puerto Rican interior on the south. Several topographic features, including the coastal plain and the uplands, merit separate descriptions. The shore is mostly low lying, with sandy beaches and, here and there, small rocky headlands. Off the coast there are small rocks and rock reefs, which are for the most part cemented sand dunes now partly or entirely inundated. Other cemented dunes form the hill of Santurce and the narrow island of the old city of San Juan. Behind the coastal strip with its belt of cemented dunes are two large lagoons, fringed by tracts of mangrove swamp; one of the lagoons, Bahía de San Juan, has a broad, deep-water mouth. Rising gently southward from the lagoons is a coastal plain made up of alluvial sediments, through which, at several places, project ridges and bosses of Miocene rock. The coastal plain terminates to the south against hills of the uplands, which tend to increase in altitude southward as one approches the interior of the island. The largest river in the area is the Río Grande de Loíza, which empties into the Atlantic Ocean east of the San Juan area.

OFFSHORE ROCKS

At several places off the north coast there are small rocky islets, notably: Isla Verde, off Punta el Medio; Isla Piedra, about a mile off Punta Las Marías; and three groups, including the large Peñon de San Jorge off the island of San Juan. The latter rocks exhibit very well the east-west alinement that is common to these features along much of the north coast of Puerto Rico. The rocks are small, generally considerably less than an acre in area, and consist of eolianite (cemented dune sand). Except for Isla Verde, which supports a lone coconut palm growing from a thin sandy cover, the islets are without soil. The rocks—again except for Isla Verde, which apparently is a fragment of a former shore isolated by beach erosion—are the tops of sand dunes, now cemented into a friable sandstone and partly inundated by the sea (see chapter B, "Shoreline Features and Quarternary Shoreline Changes"). They vary in form, some possessing a humped profile, relict of the original dune shape, whereas others, which have been reduced by pitting and wave erosion, are simply flat platforms at high-

tide level. These offshore rocks receive the full force of the Atlantic waves and even the highest of them, the Peñon de San Jorge, is more often than not completely bathed with spray.

REEF

A narrow belt of shoal water and reef extends westward, from the east edge of the map, through the offshore rocks. Although in places the reef is marked by growths of true reef organisms, the feature is interpreted as being primarily a line of submerged cemented sand dunes. The shallow bench formed by these submerged sand dunes form both a rocky barrier (a rock reef) and a platform on which reef corals are able to thrive.

SHORELINE

Except for the island of the old city of San Juan, the shoreline is low. Broad sandy beaches extend nearly the entire length of the shore east of Punta Piedrita. The beaches, with the exception of the lunate beach between Punta Las Marías and Punta El Medio, are characterized by an intermittent pavement of cemented beach sand, or beach rock, at intertidal levels. Behind most of the beaches are low sand ridges that generally rise no higher than 10 feet above sea level. Low ridges of eolianite crop out at several places on the shoreline between Punta Piedrita and the mouth of the Laguna del Condado.

Although the coast is ordinarily somewhat protected by the reef, large waves are able to carry much of their energy to the shore, and in recent decades beach erosion has been particularly severe between Punta Las Marías and Punta El Medio (U. S. Beach Erosion Board, 1948). Moreover, the width of the sand beaches is delicately adjusted to the size and character of the surf. During intervals of large waves, beaches not infrequently recede 100 or more feet in a few days, only to advance the same distance during the ensuing intervals of normal surf.

ISLA SAN JUAN

The old city of San Juan (or Puerto Rico, as it was first called) was established in 1521 on the elongated island forming the north side of Bahía de San Juan. The island is tied to the mainland by two short bridges and a causeway, in consequence of which some of its insular characteristics have been lost and local residents are inclined to think of it as a peninsula. The island extends to the west edge of the San Juan quadrangle. West of this is the narrow harbor mouth that connects the bay with the ocean.

Except at its eastern end, the ocean side of the island is a steep cliff that ranges from 30 feet to about 100 feet in height. From about the midpoint of the island, or at the old fortress of San Cristóbal, and continuing westward to the El Morro fortification at the harbor mouth, the cliff is cut mainly in eolianite and is encumbered by houses and colonial fortifications down to the water's edge. East of the San Cristóbal battlements, the cliff face is mostly very friable eolianite and uncemented sand, and the slope is not marred by manmade structures.

The highest point on the island lies in the western part and is shown on the topographic map as enclosed by the 35-meter contour line. The ridge drops off steeply to the south and is partly terminated by a high retaining wall built during colonial times.

The narrow port and warehousing area along the southern edge of the island is mostly reclaimed marshland.

SANTURCE

Physiographically, the broad low hill on which much of Santurce is built is a continuation of the eolianite ridge that forms Isla San Juan. In Santurce the ridge is about 2½ miles long and about three-fourths mile wide and trends west-northwest. The highest point is encircled by the 35-meter contour line. In places near the crest hard eolianite crops out, although for the most part the ridge is blanketed by loose sand and clayey sand. Because the entire area is heavily built up, the topographic form is somewhat obscured and altered by construction.

BAHÍA DE SAN JUAN AND LAGOONS

In the San Juan quadrangle a nearly continuous belt of salt marshes and lagoons separates the narrow coastal plain and the shoreline proper. The Laguna San José and its appendage, Laguna Los Corozos, have no direct outlet to the ocean; both are blocked at their seaward end by low beach ridges. They connect, however, with Bahía de San Juan (or, as it is called in this report, simply the bay) by means of the narrow overflow channel of Martín Peña. Circulation of water in the Laguna San José is sluggish, and there is little discharge when the water level of the bay is high for an extended period. The stagnation resulting from this impeded circulation has resulted in a considerable nuisance to the adjoining parts of the city, which are periodically bothered by strong miasmas.

The bay is fringed by a mangrove swamp, which is being rapidly reclaimed as the industrial hinterland of the city spreads. The low-lying peninsula

on the northeast side of the bay, which is occupied by the U. S. Naval Reservation and the Isla Grande International Airport, is mostly made-land and reclaimed marshland.

The bay itself has a central dredged channel leading to the harbor mouth west of San Juan, which, according to U. S. Coast and Geodetic Survey Chart 908 (San Juan Harbor), attains a maximum depth of 38 feet. Most of the bay, however, is less than 16 feet deep.

COASTAL PLAIN

This is a plain that slopes very gently from the lagoons to the hilly upland. Its southern limit is approximately an east-west line passing through the town of Río Piedras. The plain has been built up by the accumulation of alluvial and colluvial sediments derived from the uplands to the south; it is, in fact, a series of coalesced alluvial fans which is slightly dissected by small streams and broken at several places by isolated low hills of lower Miocene rock.

PROMINENT HILLS IN COASTAL PLAIN AND MANGROVE SWAMPS

Several very prominent hills rise abruptly from the featureless coastal plain and from the mangrove swamps at the west edge of the Laguna San José. The largest of these hills, the Montes de Caneja, in the western part of the San Juan quadrangle, extends as an east-west ridge for 1½ miles and rises with steep rocky flanks out of the flat alluvial coastal plain to a maximum altitude of 330 feet. Less than half a mile to the east is a similar east-west ridge, the Montes de San Patricio, that rises to an altitude of 270 feet. Several smaller knobs crop out on the west shore of the Laguna San José, although at the time the present study was being made these were being rapidly destroyed by quarrying. These conspicuous hills are composed chiefly of thick-bedded, light-colored limestones, with lesser quantities of marl and sand, all of early Miocene age. The peculiar steep-sided shape assumed by these hills is typical of the karst topography that characterizes the outcrop of these rocks along much of the Puerto Rican north coast.

In contrast to the haystack hills formed by the dense limestone, the rather rounded, soil-covered low hills between Suchville and the Montes de Caneja, as well as the five small conical hills between the Montes de San Patricio and the east edge of the quadrangle, consist principally of sand, clay, and marl that stratigraphically underlie the dense limestone.

UPLANDS

All the area south of the coastal plain is included under this heading, although some of the land is of low altitude and there is considerable diversity of topography. The essential factor of the uplands is that the topography has been eroded in the deformed rocks of the older complex (see under "General geology"), which crop out in the hilly to mountainous interior of the island. The upland topography, in a general way, increases in relief and ruggedness to the south toward the insular divide. This tendency is expressed in the small area of upland encompassed in the San Juan area, where the topography exhibits many of the land forms and the steplike discordances that are characteristic of the island's topography as a whole.

East of Río Piedras the upland rises conspicuously from the coastal plain with the Montes de Hatillo. This mile-wide ridge, which extends to the west for over 5 miles ending abruptly at Río Piedras, is a cuesta composed chiefly of well-bedded ashy and siliceous rocks. A similarly constituted but northeast-trending cuesta is found along the western margin of the mapped area. Between these two ridges an expanse of low-lying, gently dissected "upland" forms a transition between the coastal plain on the north and the more hilly land to the south.

To the east the general surface rises gradually from this low area, and hills and ridges formed of more durable rock rise here and there above the general level. To the south, however, the hills start rather abruptly with the well-defined scarp of the Guaynabo fault (pl. 3*A*, 7*A*). This is the northernmost of several northwest-trending fault scarps which raise the general upland level in progressive steps southward. The Guaynabo fault scarp, though much dissected, presents a conspicuous front some 225 feet to 320 feet high. The highest points on this fault block lie at altitudes of about 590 feet. The Guaynabo fault block is separated by the northwest-trending valley of the Río Guaynabo from the next scarp to the south, which raises the general level by another 320 feet to altitudes of about 915 feet. This scarp is much dissected, and it is in this block that the rugged terrain typical of much of the interior of Puerto Rico is encountered. The slopes and stream gradients are steep, and the thickness of soil cover is variable. In many places extensive rock outcrops occur only in stream beds (pl. 9*A*), though outcrops are also scattered here and there on slopes and divides.

The topography of the upland is partly adjusted to the varied erodibility of the many rocks that make up the older complex. Outcrops of the granodiorite porphyry and the Trujillo Alto limestone particularly show a tendency to be marked by valleys or areas of low, subdued relief. Fault lines and zones of dense jointing have also been etched out by selective stream erosion, and the prevailing northwest alinement of stream valleys in the southern part of the mapped area is attributed to this type of control.

VALLEY OF THE RÍO GRANDE DE LOÍZA

The Río Grande de Loíza, rising south of the San Juan area at the island divide, is the largest river of Puerto Rico. Its watershed, of about 225 square miles, receives an average annual rainfall of about 76 inches. The river flows north along the eastern edge of the mapped area and leaves the Aguas Buenas quadrangle at Trujillo Alto, where it makes a sharp bend toward the east.

The valley sides are 650 feet and more high at the southern end of the mapped area and decrease rapidly in height downstream. The river is flanked by a narrow, slightly terraced, gravelly flood plain that widens considerably where the river course bends sharply eastward at the town of Trujillo Alto. This alluvium provides the principal source of construction gravel in the area.

The minimum recorded flow of the river, as compiled in studies for the new Loíza dam (p. 44), is 48 cubic feet per second. The maximum recorded flow is estimated at 125,000 cubic feet per second. This was attained for half an hour during the near-hurricane storm of August 4, 1945. The average flow of the river is probably somewhat more than 500 cubic feet per second (Fox, 1951, p. 33). Foundation excavation for the Loíza dam of the Puerto Rico Aqueduct and Sewer Authority, located 1¾ miles south of Trujillo Alto, showed that in this stretch the river flows on both a rocky bed and a thin deposit of sand and gravel that undoubtedly is moved as bed load during periods of higher river stage and greater flow velocity.

GENERAL GEOLOGY

The San Juan area of this report, though small, contains rocks representative of nearly the full range of geologic ages known on Puerto Rico. The rocks are of Late Cretaceous(?), Late Cretaceous, Paleocene or early Eocene, early Miocene, possibly Pliocene, Pleistocene, and Recent ages, as shown in the stratigraphic summary given below.

Stratigraphic summary of the San Juan area, Puerto Rico

General designation	Stratigraphic unit	Brief description	Approx. thickness (feet)	Age
	Made-ground and fill.			Recent
	Beachrock pavement	Carbonate-cemented beach sand. Some iron-oxide cementation		
	Recent littoral deposits	Beach sand and associated sand aprons; foredunes		
	Floodplain alluvium	Mostly silt and clay		
	Bay mud	Soft black mucky silt and clay		
	Pleistocene littoral deposits	Reef rock, eolianite, and paleosols		Pleistocene
	Santurce sand	Quartz sand and white clayey sand		Pleistocene and Pliocene (?)
	Older alluvium	Red silty to sandy clay		
	Unconformity			
Middle Tertiary sequence.	Aymamón limestone	Thick-bedded, light-colored, dense limestone	950+	early Miocene
	Aguada formation	Friable sandstone, clay, and concretionary limestone	325	
	Unconformity			
	Intrusive igneous rocks	Diabase, granodiorite porphyry, and augite andesite porphyry		early Eocene (?) or late Paleocene (?).
	Fajardo formation	Light-colored ashy siltstone, siliceous siltstone and chert, interfingering graywacke, conglomerate, and impure limestone	3,000+	
	Figuera volcanics	Hornblende andesite breccia, minor flow, limestone member at base	>3,000	
	Local unconformity			
Older complex	Trujillo Alto limestone	Fossiliferous medium-bedded to massive limestone	900–	Late Cretaceous
	Monacillo formation	Graywacke and conglomerate; commonly red or purple	900	
	Frailes formation (Leprocomio limestone member and La Muda limestone member).	Massive lapilli tuff with some stratified shale, siltstone, and graywacke. Leprocomio limestone member at top and La Muda limestone member near base.	2,350	
	Tortugas andesite	Augite andesite breccia and flows	1,300	
	Guaynabo formation	Graywacke, conglomerate, and shale	4,500	Late Cretaceous (?)
	Hato Puerco tuff	Massive volcanics and metavolcanics and some stratified ash	(?)	

The older rocks, that is to say, those of Cretaceous and early Tertiary age, are highly deformed and faulted. They comprise a sequence of volcanic flows, pyroclastics, and sedimentary rocks, but many of the last consist largely of reworked volcanic material. Into these rocks have been intruded plugs, dikes, sills, and larger subjacent bodies that range in composition from granodiorite porphyry to diabase.

Unconformably overlying the Upper Cretaceous and lower Tertiary complex in the San Juan area is a sequence of sands, clays, marls, and limestones of early Miocene age, which have been tilted to the north and faulted on a small scale but which are otherwise undeformed. These rocks probably underlie most of the coastal plain alluvium.

Many of the events following the deposition of the early Miocene sediments are difficult to reconstruct, but certainly both deposition and erosion occurred, brought about by fault-block movement and crustal warping as well as by eustatic changes of sea level. Some of the sediments of the coastal plain and the old alluvial blanket of parts of the uplands were undoubtedly genetically associated with late Tertiary tectonic movements. The rocks of San Juan island and the Santurce hills probably owe their origin in part to higher sea levels, whereas lower sea levels probably account for the deep erosion and alluvium shown by borings about the bay, and for the ancient sand dunes now preserved as offshore rocks (see chap. B).

OLDER COMPLEX

The much deformed rocks that crop out widely in the hilly and mountainous parts of Puerto Rico constitute the most interesting and challenging geological element in Puerto Rico. These are the oldest rocks in the island and record the longest and most varied history of crustal disturbances. Their story, if it could be told with certainty, would explain much of the geologic history of this segment of the Antilles.

The works of the several authors of the New York Academy of Science's "Scientific Survey of Porto Rico and the Virgin Islands" (Berkey, 1915; Fettke, 1924; Hodge, 1920; Hubbard, 1923; Mitchell, 1922; Semmes, 1919; Meyerhoff and Smith, 1931) treat the older rocks at some length and from somewhat diverse points of view; and the geologic maps of these reports (later compiled into a single geologic map of Puerto Rico by Meyerhoff, 1933) convey a general picture of their natural classification, distribution, and structural trends.

C. P. Berkey (1915) first referred to this complex of rocks as the "Older Series," and Fettke (1924), Meyerhoff and Smith (1931), and Semmes (1919) continued this usage, finding it a convenient term to distinguish these rocks from the clearly younger and relatively undisturbed rocks of middle Tertiary age, which they referred to as the "Younger Series." Hubbard (1923), on the other hand, preferred the terms "Cretaceous formations" and "Tertiary formations" to distinguish the two rock sequences, while Hodge (1920) and Mitchell (1922) used no group terms to separate the two sequences. It is, however, both convenient and desirable to distinguish between the two groups of rocks. Unfortunately Berkey's term, "Older Series," cannot be used because of the special connotation the word "series" has in stratigraphic nomenclature, while Hubbard's simple Cretaceous and Tertiary classification no longer pertains, now that the early Tertiary is known to be included in his Cretaceous (Kaye, 1956). The term "older complex" is therefore used in this paper as a substitute for Berkey's "Older Series."

The nomenclature adopted for this report differs considerably from that used by earlier writers on the area. The geologic map of Semmes (1919) includes a strip 2 miles wide within the western border of the area mapped in this study. In this area Semmes shows the older complex as several northeast-trending belts which he classifies according to lithologic types but to which he does not assign formational names. Meyerhoff and Smith's (1931) map of the Fajardo district includes the entire area of the present study and overlaps the narrow strip of Semmes' map. Both Meyerhoff and Smith's and Semmes' maps are essentially in accord in the overlapped strip. Meyerhoff and Smith gave their map units formational names (fig. 3), including several that were first proposed by Berkey (1915).

A comparison of plate 2 and the Meyerhoff and Smith geologic map of the Fajardo district reveal several profound differences in structure and the distribution of lithologic types. These divergencies are of such weight that many of Meyerhoff and Smith's formational units could not be identified or applied in the field. The fact that the terrain is badly fragmented by faults prevented the writer from constructing a stratigraphic classification of his own until the rather complete and apparently undis-

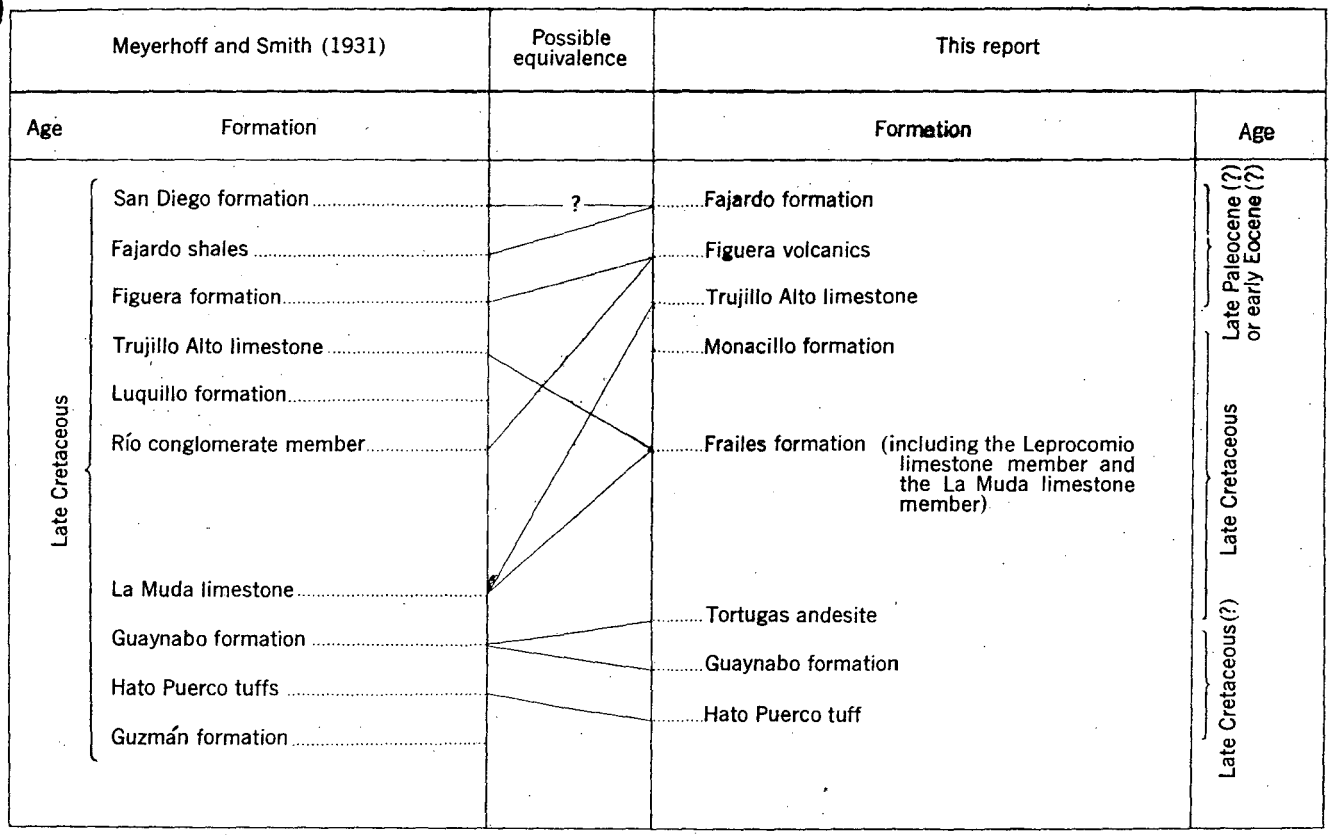

FIGURE 3.—Stratigraphic nomenclature of the older complex in the San Juan area.

turbed section in the eastern part of the area was studied. It is realized, however, that the formations finally adopted for use in this report, although considered valid for the San Juan area, may not apply in other sections of Puerto Rico.

The key to the stratigraphy of the older complex in the mapped area is considered to be the section exposed southeast of Río Piedras, in the Montes de Hatillo. Fortunately, this section is traversed by a road, the sides of which permit a fair picture to be had of the sequence of rock types. This road is Highway 181, which connects the town of Trujillo Alto and the eastern suburbs of Río Piedras, and Highway 175, which intersects Highway 181 on the north bank of the Río Grande de Loíza and follows the left bank of the river for several miles. Highway 181 crosses the cuesta of the Montes de Hatillo, and successively older rocks are exposed from north to south. In comparison with the terrain to the southwest, remarkably little faulting occurs along this traverse and the stratigraphic sequence is considered to be more or less intact.

The formational breakdown was made on the basis of (1) changes from continental to marine deposition or (2) marked lithologic breaks. The great variability in thickness and the similarities in lithologic types within the several formational units, however, often made their recognition in the field a matter of some uncertainty. The persistence of a rather monotonous suite of pyroclastic facies throughout the section and the difficulty of interpreting the nature of deeply weathered rocks proved particularly troublesome in mapping.

Before describing the individual map units a brief summary of the probable depositional history of the older complex in the San Juan area may be helpful in understanding the characteristics of the several formations and their stratigraphic relations. These rocks are thought (see p. 40 for discussion) to constitute an interfingering sequence of marine and nonmarine deposits such as would occur at the edge of a volcanic island that is undergoing subsidence. Such an island probably marked eastern Puerto Rico in Late Cretaceous time (see Meyerhoff, 1933, p. 43-53). It consisted of a central core made up entirely of pyroclastic and flow rocks that were extruded during an early period of cone construction. Its broad flanks in places were covered with alluvial

deposits and in others were dissected by erosion (fig. 4). Lapping onto the lower flanks of the cone were estuarine and marine sediments. Subsidence of the insular volcano, either steadily or sporadically, brought overlap of marine deposits onto the eroded and alluviated flanks of the cone, and for part of its history the entire cone may have foundered beneath the sea. Periodic eruptions furnished ash to the surrounding seas and built out the island's shores with new ejecta. Because of such a sequence of events an alternation of continental and marine deposits was produced. Moreover, occasional eruptions from submarine vents low on the flanks of the cone disrupted or shattered the blanket of marine sediments that had been quietly forming on the shallow sea floor, while farther away from the island, in deeper water, marine deposition may have continued uninterrupted during this long history of periodic eruption and quiescence that so effectively left their varied marks on the flanks of the cone.

Such a geological picture seems to explain best the older complex rocks in the San Juan area. The great thickness of volcanic rocks in the region about Caguas, well to the south of the San Juan area, may represent accumulation from a major vent and therefore the central part of the main cone. The rocks of the San Juan area give evidence of having been deposited approximately on the critical zone of marine and insular interfingering that possibly marked the oscillating edge of the "Caguas volcanic island". The thickening and thinning of the older complex deposits in the San Juan area and their rapid changes of facies can readily be explained by the presence of pronounced local erosional disconformities within the section and the instability of the depositional environment. The recurrence of lithologically similar rock types within the section is therefore possibly the expression of the recurrence of certain events and environments during the long history of the volcano and, more precisely, of

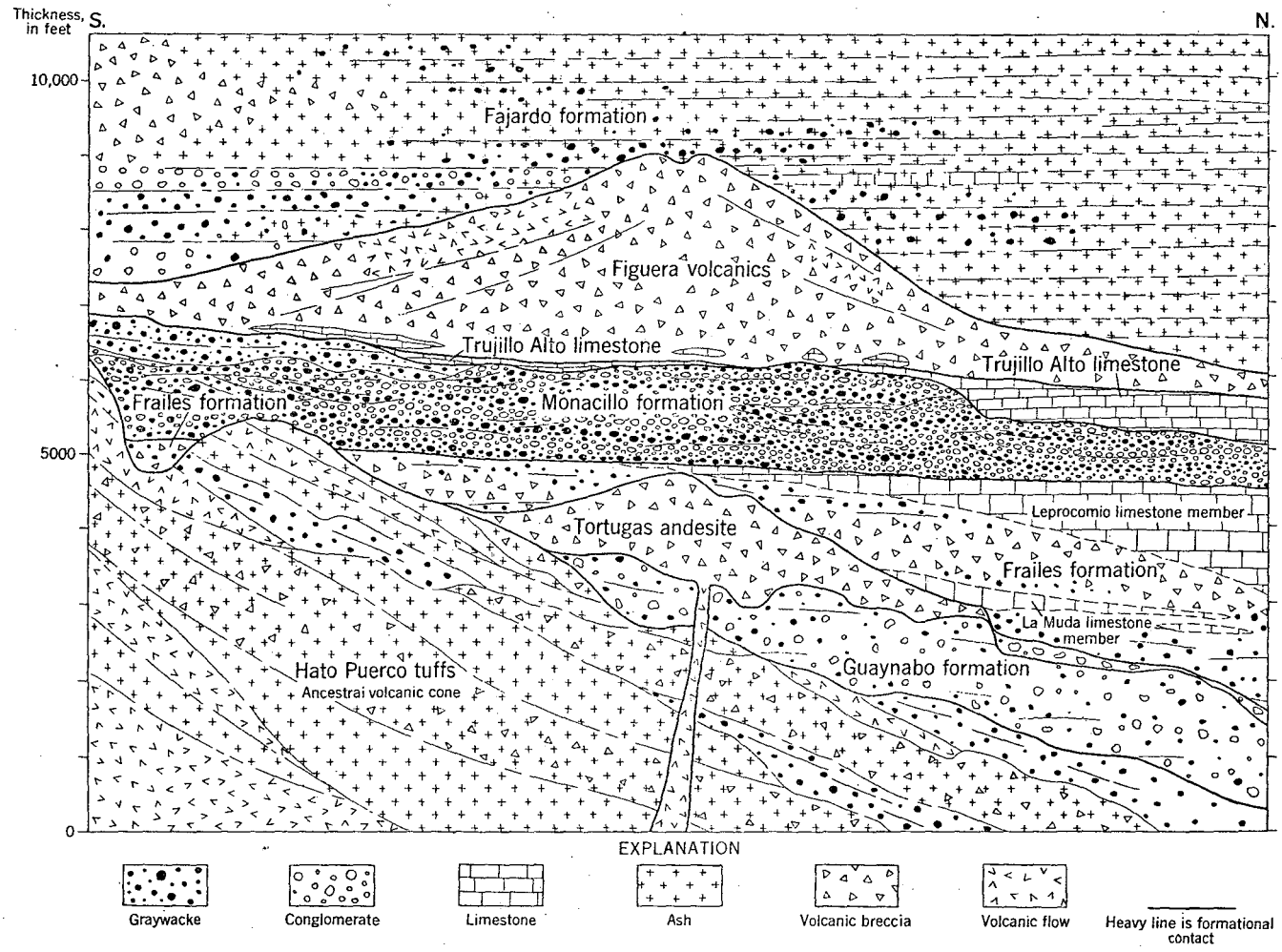

FIGURE 4.—Schematic reconstruction of depositional relations of the older complex in the San Juan area.

the periods of eruption and quiescence that characterize the later history of many volcanos.

HATO PUERCO TUFF

This formation was named by Meyerhoff and Smith (1931), who described it as a thick sequence of predominantly unstratified tuff and minor volcanic flows that lie between the Guzman formation and the Guaynabo formation in the western part of the Fajardo district. Although the Guzman formation does not crop out in the San Juan area and the Guaynabo formation is redefined in the present study, the identity of the Hato Puerco tuff was readily established in the area mapped.

The Hato Puerco tuff consists characteristically of massive pyroclastic rocks with some thick sections of flow rock. There are in addition some well-bedded to obscurely bedded tuffs. The whole section encompasses a very wide variety of rocks, although the general criteria for recognition are massiveness, a greater than usual density and toughness where not too greatly altered by weathering, a prevailing deep-green to dark-blue color, and a degree of regional metamorphism that is somewhat greater than that which characterizes most of the later rocks. The glasses seemed to have been entirely devitrified, the feldspars are invariably very much albitized or saussuritized, and the mineral components in general show various effects of low-grade regional metamorphism. The criterion of metamorphism in itself cannot be universally applied, for alteration similar to that of the Hato Puerco rocks can be found here and there throughout the section of the older complex.

The variability of the Hato Puerco tuff can be shown by a review of some of the types found in the San Juan area. Very dense, hard, dark blue-gray aphanitic to finely porphyritic rocks, which break into sharp angular fragments, occur in several places, perhaps most widely on the north side of the ridge that follows Highway 1 southeast of La Muda. Under the microscope this rock is seen to be a much altered tuff made up of both crystal and lithic fragments. It consists predominantly of angular broken crystals of chloritized andesine-laboradorite, scattered biotite and pyroxene, some nests and isolated grains of quartz, and a few subangular fragments of a much altered trachitic-textured rock. The interstitial material is a very fine aggregate of feldspar, quartz, and probably devitrified glass. Both the groundmass and the coarser fraction are much altered to chlorite. Clusters and randomly oriented needles of green clinoamphibole ($Z \wedge c$ 21°) are common in both the coarse fraction and the matrix.

An interesting altered tuff crops out southeast of La Muda (197,900 m, 54,430 m). This rock, a thin section of which was studied by Robert L. Smith of the U. S. Geological Survey, is a metamorphosed pumiceous tuff that was originally composed of small fragments of pumice, fragments of plagioclase crystals and scarce grains of pyroxene. According to Smith "the glass has been completely replaced by alkalic feldspar without loss of original pumiceous texture. The alkalic feldspar, as nearly as can be determined by optical and X-ray methods, is albite. The vesicles in the replaced glass are filled with chlorite. Chlorite also occurs, interstitial to the component fragments. The ubiquity of the chlorite together with the scarcity of relict ferromagnesian minerals or 'ghosts' of these minerals suggests that the original glass was rather basic in composition, and during its replacement by albite the ferromagnesian constituents went into chlorite. There are numerous tiny spherulitic grains of epidote scattered throughout the areas of chlorite. The plagioclase feldspar is partly altered to sericite mica and carbonate."

Stratified rocks of the Hato Puerco tuff are of a variety of types and in general seem to be relatively thin and nonpersistent. Laminated to thinly bedded light- and dark-gray tuff consisting of fine crystalline material, ranging in grain size from that of fine sand to silt (this textural classification is convenient for field description based on touch and hand-lens inspection), crop out widely in the southern part of the mapped area. Obscurely bedded ash that was weathered to a soft yellowish silty material wherever seen is another common type.

Coarse-grained volcanic breccias are common in the Hato Puerco tuff. Again, these rocks are dark green to blue gray, dense and tough. Matrix as well as fragments are equally indurated, and the rocks break across the constituent grain. Thin sections reveal that the more common lithic particles are subangular to subrounded fragments of dark-colored vitrophyres, now devitrified and variously altered to hematite. In addition there are fragments of very fine grained trachitic rocks and palagonite tuffs. The interstitial material contains broken albite crystals, quartz, and matter too finely comminuted to be identified under the petrographic microscope. Secondary zoisite and chlorite are common. Rocks of this type are found in several of the quarries along the valley of the Río Grande de Loíza south of Trujillo Alto.

Within the Hato Puerco tuff, thick sections of flow rock are not uncommon. The thickest development of these in the vicinity of San Juan occur along the valley of the Río Bayamón on the Naranjito quadrangle, just to the west of the southwestern part of the San Juan area. Here, several large quarries expose spilitic pillow lavas. In texture these rocks range from aphanitic to finely porphyritic amygdaloids, typically of a medium greenish-gray color (5*G* 5/1). A thin section of the porphyritic rock shows about 40 percent phenocrysts of zoned albite up to 3 mm in length and small stubby augite crystals. The groundmass consists of a felt of fine albite laths. Some glass may originally have been present in the groundmass, but it is now obscured by secondary chlorite and actinolite, which has replaced much of both the groundmass and the albite phenocrysts. Much ore dust is present throughout, as well as minute epidote clusters. The numerous vesicles in the thin sections studied are filled with chlorite, in radial arrangement, and prehnite.

Other metavolcanics of the Hato Puerco tuff are not too dissimilar in appearance and gross physical properties to these spilites. The tough, fine-grained dark-blue meta-andesites that crop out along the Río Grande de Loíza, about 1½ miles south of Trujillo Alto, are not, however, spilitic in composition. Here the phenocrysts are andesine, though the degree of alteration is so intense that the nature of the original groundmass is difficult to determine. The development of fine actinolite in this rock is particularly prominent. Samples of other dense, fine-grained dark bluish- to greenish-gray rocks of the Hato Puerco tuff show the same extensive development of green clinoamphibole ($Z \wedge c$ 15°–23°) of metamorphic origin.

In the San Juan area the Hato Puerco tuff occurs in the south and southeast, in the area of more hilly topography. The formation appears to crop out widely to the south and east of the mapped area, and in it may probably be included many of the massive rocks that make up much of the central interior of the eastern part of Puerto Rico.

No estimate is made of the thickness of the Hato Puerco tuff exposed in the San Juan area, owing to the prevailing massiveness of the formation. Such attitudes as can be determined in the stratified members are considered unreliable structural guides, particularly in the absence of information on faults and of their displacement.

The Hato Puerco tuff probably formed the main mass of the volcanic cone or cone complex ("Caguas island") which has been discussed above. The position and approximate size of this volcanic island is suggested in a diagrammatic reconstruction by Meyerhoff (1933, p. 50). The volcanic cone origin of the Hato Puerco tuff probably accounts for both the unconformable and the conformable relations with the overlying formation (Meyerhoff and Smith, 1931, p. 272) and also for the fact that it is overlapped by rocks higher in the sequence. On the lowermost and, presumably, the flattest slopes, the thick sections of alluvium which make up most of the overlying Guaynabo formation may well have ben conformable with the thick ash deposits. Alluvial and marine sediments deposited against the eroded slopes, on the other hand, would for the most part be strongly unconformable with the stratification of the composite cone (fig. 4).

Age.—No fossils have been found in the Hato Puerco tuff. The entire older complex of Puerto Rico was thought to fall within the Upper Cretaceous by Meyerhoff and Smith (1931). More recent work has revealed, however, that Paleocene or early Eocene faunas, as well as Late Cretaceous faunas, occur in the older complex (Kaye, 1956). The rational basis for confining all older complex rocks to the Upper Cretaceous is therefore destroyed in one time direction, which raises some question as to the necessity of assigning a Late Cretaceous age to the oldest rocks in the section, particularly since they are unfossiliferous. At the present time, for want of any evidence to the contrary, the Hato Puerco tuff is designated Late Cretaceous(?) in age. It is possible, however, that they are Lower Cretaceous.

GUAYNABO FORMATION

The Guaynabo formation consists of several thousand feet of stratified tuffaceous sandstone or graywacke,[1] conglomerate and shale. Meyerhoff and Smith (1931, p. 275) define the Guaynabo formation as a ". . .succession of sediments which lie below the La Muda limestone and above the Hato Puerco tuffs in the northwestern part of the Fajardo district. The town of Guaynabo lies near the southwestern edge of the broad formational outcrop. . . ." This formation

[1] The term "graywacke" is used in this report to denote arenites that are of a rather varied mineralogic composition and that are generally shades of gray when unweathered. They may be marine or nonmarine in origin. For the most part the mineral components give evidence of volcanic origin. In some places these rocks could more aptly be called bedded tuffs. The term "graywacke," however, is preferred as a field term, because without the examination of thin sections it is difficult to assess the relative importance of the tuffaceous component.

is here redefined, however, inasmuch as the study of the section in the Trujillo Alto road and the distribution of rocks elsewhere in the San Juan area indicates: (1) that in several places these sediments are sharply terminated above by volcanic rocks (the Tortugas andesite); (2) that in the several places where it is recognized, the La Muda limestone, as defined on page 18, rests either on this volcanic sequence or is separated from the volcanic horizon by a varied thickness of noncarbonate beds (the Frailes formation); and (3) that the beds cropping out in the vicinity of the town of Guaynabo do not include sedimentary rocks having the stratigraphic position given by Meyerhoff and Smith. The limits of the Guaynabo formation are therefore drawn to include only the section of noncarbonate sediments overlying the Hato Puerco tuff and underlying the Tortugas andesite or, where this latter horizon is missing, the Frailes formation. The upper part of the Guaynabo formation is well exposed in the sides of Highway 175, across the Río Grande de Loíza from the town of Trujillo Alto. Here at least 550 feet of medium- to thick-bedded, gritty graywacke and intercalated gray shales and conglomerate are exposed.

The same beds crop out broadly in Barrio [2] Caimito and Barrio Cupey, northeast and west of the Escuela Segunda Unidad de Caimito, and are particularly well exposed in a deep road cut on the new Highway 1, a little more than half a mile south of El Minao. The road cut shows a plunging anticline in well-bedded, gritty graywacke with minor intercalated shale and fine-grained conglomerate. Flecks of carbonized plant remains are rather common throughout and locally are very abundant. In the creek bed close to the road cut where the graywacke is relatively fresh and unweathered, it is a tough rock, light to medium blue-gray in color; but in the road cut nearby, it is weathered to a brown very friable sandstone and even a loose sand.

In other places, the Guaynabo formation contains beds of very fine ash or siltstone, which break down on weathering to a yellowish soft punky silt. In fact, the rocks of this formation weather rather readily, the shales becoming light-gray to white clays and the sandstones becoming exceedingly friable. Bleached biotite flakes and flecks of carbonized wood are generally conspicuous in the weathered rock and in recognition of the formation.

A certain amount of current-bedding is noticeable in some exposures. Graded bedding is absent or not marked.

The contact of the Guaynabo formation with the Hato Puerco tuff was not knowingly observed by the writer; but this contact, where it occurs in the San Juan area, was inferred to be faulted. It is reported, however, by James P. Owens (written communication) to be exposed along the new section of the Caguas Highway (No. 1) where it is seen to be gradational.

The upper contact of the tuffaceous sandstone of the Guaynabo formation is variable. In the section along Highway 175, west of Trujillo Alto, the formation is overlain conformably by about 10 feet of andesitic conglomerate that is thought to represent the Tortugas andesite. A much thicker section of Tortugas andesite is found overlying the sedimentary rocks of the Guaynabo formation in the southern part of the mapped area, although in places the Tortugas andesite is replaced by an andesite porphyry sill. North of El Minao, the Tortugas andesite is either very thin or absent; and in places the Guaynabo formation is overlain by the Frailes formation.

The Guaynabo formation is possibly nonmarine in origin. Both in its somewhat irregular stratification and prevailingly coarse-grained composition it resembles an alluvial deposit, although, admittedly, the evidence is not conclusive.

The Guaynabo formation may attain a thickness of 4,500 feet in Barrio Cupey, although the lower contact of the formation is an inferred fault. Because the poor exposures in this area do not permit determination of the details of faulting, this thickness is only a rough estimate and may be excessive. It seems likely, however, that the Guaynabo formation partakes of the same variability in thickness as that which characterizes almost all of the formations of the older complex.

Age.—No identifiable fossils have been found in the Guaynabo formation. Since the formation in places seems to be conformable with the younger Frailes formation, which contains a late Upper Cretaceous fauna, it is probably not very much older than the latter rocks and is, therefore, designated as Late Cretaceous(?) in age.

TORTUGAS ANDESITE

The Tortugas andesite is named after Barrio Tortugas, lying north and east of La Muda, where it is well exposed. The formation consists of a nonper-

[2] *Barrio* is the smallest of the Puerto Rican political units. It may be considered a district, ward, or precinct of a municipality (municipio).

sistent horizon of flow rock, breccia, and, in places, conglomerate—all of a characteristic augite-andesite composition—lying between the Guaynabo formation, herein redefined, and the Frailes formation. The formation varies in thickness very rapidly, as for example at El Laberinto where probably over 1,300 feet of volcanic rocks of the Tortugas disappear almost abruptly along the strike and suggests a local vent accumulation at this place.

This stratigraphic unit was not recognized by Meyerhoff and Smith (1931). Its prominent outcrop in the vicinity of La Muda and Trujillo Alto are included in their Guaynabo, Luquillo, and Fajardo formations.

Blocks of sedimentary rock have been noted in the Tortugas andesite at two places southeast of La Muda. High on the side of the quarry, one-fourth mile north of the intersection of the Aguas Buenas road (Highway 173) and the Caguas road (Highway 1), is a large lens of sandstone and conglomerate entirely enclosed by massive andesite. At the road intersection itself (188,790 m, 53,410 m) there are many large and small blocks of a massive, finely crystalline limestone, which seem to be embedded in the andesite but which may possibly belong to a fault zone, as suggested by Mr. Owens (oral communication). These limestone blocks, which do not resemble the La Muda limestone member that crops out nearby just north of the Caguas road, contain abundant rudist fragments and provide the only known occurrence of rudists in the San Juan area. In addition, several mollusks were collected from these blocks. They were examined by John B. Reeside, Jr., who identified *Nerinea* (*Plesioptygmatis*) *burckhardti* Böse, *Trochactaeon* aff. *T. planilateris* Böse, and *Nerita* sp.. According to Mr. Reeside this fauna is certainly of Late Cretaceous age and appears to be close to that from Cardenas, Mexico, which Böse assigned to the lower Senonian (Santonian or Campanian). If the blocks are not due to fault displacement, they may represent ejected blocks of an older limestone; or they may represent limestones, more or less contemporary in age with the eruptions of the Tortugas andesite, that became incorporated in a flow.

The Tortugas andesite is particularly well exposed in several of the quarries that lie north of Highway 1 about a mile southeast of La Muda (189,000 m, 53,750 m) and in a quarry and a road cut about 1¼ miles north of La Muda (188,100 m, 56,800 m). The rocks are somewhat varied in texture and to a certain extent in composition; but they are almost always porphyritic, having small light-colored feldspar phenocrysts in a dark aphanitic groundmass. Mafic minerals, when visible in hand specimen, are generally augite, a feature which makes it possible to distinguish the rocks of this formation from the hornblende-bearing Figuera volcanics.

Fine-grained porphyries, which megascopically are similar to the volcanic rocks of the Tortugas andesite, are common in the conglomerates throughout the section of the older complex rocks in the San Juan area and occur widely throughout Puerto Rico. Whether this indicates that there was a long history of eruption of this type of lava throughout the course of deposition of the older complex, or whether the lavas represent a relatively short-lived, though widespread, eruptive cycle that provided sediment for all later deposition, is not known. In the San Juan area, however, there is evidence that a well-defined single interval of volcanic outpouring from several local vents accounted for the accumulation of the volcanics of the Tortugas andesite.

In the area to the north and east of El Laberinto, the Tortugas andesite is particularly thick and varied. In the several quarries north of Highway 1, two rocks of somewhat different textures occur. One is a light- to medium-gray porphyritic andesite in which nearly white plagioclase phenocrysts, ranging in size from 1 mm to 0.5 mm, make up about 30 percent of the rock, embedded in a gray finely crystalline groundmass. The other textural type is a somewhat denser andesite, in which the plagioclase phenocrysts are sparser and, because of their transparency, not readily discernible to the eye. The groundmass is a dark-bluish gray (5*B* 4/1). A thin section of the latter rocks shows that the feldspar phenocrysts, comprising about 25 percent of the rock, are calcic labradorite (An_{68}). Other phenocrysts are euhedral augite, making up about 5 percent of the rock and averaging 0.3 mm in size, and small euhedral grains of ore. The groundmass consists of minute oligoclase-andesine needles fluidly arranged in a glassy matrix containing abundant small zircons and much ore dust.

In cuts along the road to El Laberinto are exposed the same andesitic rocks as in the quarries to the north and east. Here interbedded breccias, conglomerates, and flow rocks, all of the same finely porphyritic augite andesite, crop out.

particularly prominent development of the Tortugas andesite, including a thick section of conglomerate, occurs in an east-west belt over two miles in length and terminates about one-half mile southeast of Guaynabo. Judging from several thin sections, the rocks in this belt are variable in composition and are much altered. They are, however, fairly consistently dark gray with small white feldspar phenocrysts generally up to 2 mm in length. Variations include a somewhat coarser porphyry with labradorite (An_{66}) phenocrysts 3 mm in length in a grayish-purple (5*P* 4/2) groundmass that contains small crystals of copper-colored biotite. In thin sections the phenocrysts are seen to include, besides labradorite (An_{66}) phenocrysts 3 mm in length in small shreds, and olivine(?) in small crystals up to 0.01 mm in length. The groundmass consists of very fine needles of sodic andesine and a mesostasis of very low birefringence that possibly is a partly devitrified glass. Alteration of this rock is advanced, such that labradorite and augite are altered to very fine-grained chlorite and carbonate, and the olivine-(?) is altered to chlorite and to carbonate with heavy rims of magnetite and goethite.

Another sample of flow rock showed 10 percent of zoned and twinned andesine-labradorite phenocrysts (An_{40}–An_{50}) up to 3 mm in length that were much altered to sericite, and about 3 percent of augite up to 0.7 mm in length, almost entirely replaced by quartz in aggregates of small crystals. Crystals of magnetite are plentiful and in places are large enough to be considered phenocrysts. The groundmass, which makes up about 80 percent of the rock, is a fine xenomorphic granular aggregate of albite and (or) orthoclase, and perhaps quartz with much ore dust. Very small crystals of apatite are abundant in both groundmass and phenocrysts.

A chemical analysis (given below) of a sample of Tortugas andesite from the quarry southeast of La Muda indicates that the composition of the rock is andesitic, although the low K_2O and MgO and the high CaO are all unusual for rocks with a comparable SiO_2 content. The composition, however, is not too dissimilar to Daly's (1933, p. 16) averages for both augite andesite and hypersthene andesite. It does not, however, accord too closely with the average andesite composition compiled more recently by Nockolds (1954).

Chemical analysis and parameters of Tortugas andesite, Puerto Rico, and related rocks

	Tortugas augite andersite from quarry 1 mile SE of La Muda [1] (weight percent)	Augite andesite; an average of 33 analyses [2] (weight percent)
A. Chemical analysis		
SiO_2	57.6	57.50
Al_2O_3	16.0	17.33
FeO	2.3	3.62
Fe_2O_3	4.3	3.78
MgO	3.2	3.28
CaO	7.2	5.83
Na_2O	3.0	3.53
K_2O	.94	2.36
TiO_2	.65	.79
P_2O_5	.29	.30
MnO	.17	.22
Ignition	[3] 3.4	(H_2O) 1.88
Total	99.05	100.42
B. CIPW norm		
Quartz	20.04	
Orthoclase	5.56	
Albite	25.10	
Anorthite	27.52	
Diopside	4.97	
Hypersthene	5.70	
Ilmenite	1.22	
Magnetite	6.03	
Hematite	.16	
Apatite	.67	
Total	96.97	
C. Mode		
Groundmass	55	
Plagioclase (An_{55})	33	
Augite	5	
Serpentine (ex-hypersthene?)	3	
Hornblende	Trace	
Ore	2	
Secondary chalcedony in shear zone	2	
Total	100	

[1] Chemical analysis by rapid methods; analysts, Frank S. Borris, Harry F. Phillips, and Katrine White.
[2] From Daly (1933).
[3] Includes gain due to oxidation of FeO.

Perhaps the closest norm in Nockolds' tables is that for dacites and dacite obsidians (combined). The high normative quartz (20.04 percent) indicates the bulk composition of a quartz andesite, although this is not reflected in the mode. Two thin sections of the analyzed sample failed to reveal any recognizable quartz, tridymite, or cristobalite except for a thin shear zone filled with minute chalcedonic spherulites. Most of the free silica indicated by the norm probably resides in the groundmass, which is too finely crystalline to permit mineral identification. The serpentine pseudomorphs reported in the mode are, from their outline, possibly alteration of hypersthene.

REFERENCE: 13

GROUND WATER IN THE SAN JUAN METROPOLITAN AREA, PUERTO RICO

By Henry R. Anderson

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16. Abstracts Ground water has played a declining role in water supply since the completion of the Loíza reservoir project in the early 1950's. Ground-water potential is limited because of the small size of the aquifers and susceptibility to seawater intrusion. Of the 30 million gallons per day (1.3 cubic metres per second) about half is being used currently. Two water-bearing zones are present: an artesian aquifer, composed of the San Sebastián Formation and the lower Cibao Formation that yields an average of 244 gallons per minute (15 litres per second) to wells; and, a water-table aquifer composed of the upper Cibao Formation and the Aguada and Aymamón Limestones that yields an average of 515 gallons per minute (32 litres per second) to wells. Ground water is less mineralized inland and in the artesian aquifer. Mean concentrations of dissolved solids are 363 milligrams per litre for the artesian aquifer and 525 milligrams per litre for the water-table aquifer.

17. Key Words and Document Analysis. 17a. Descriptors

*Ground water, *aquifers, *water supply, Puerto Rico, safe yield, transmissivity, specific capacity.

17b. Identifiers/Open-Ended Terms

Surface- and ground-water relationship, natural recharge.

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GROUND WATER IN THE SAN JUAN METROPOLITAN AREA, PUERTO RICO

by Henry R. Anderson

ABSTRACT

San Juan is on the north coast of Puerto Rico, a coastal lowland of seaward dipping Tertiary formations which lap up on Cretaceous volcanic mountain core.

Ground water in San Juan has played a declining role in water supply since the completion of the Loíza reservoir project in the early 1950's. Ground-water yield is limited because the aquifers are small and susceptible to seawater intrusion.

Wells tapping the more permeable weathered zone in the volcanics may obtain as much as 300 gal/min (19 l/s) but specific capacities of wells are low, 1.4 (gal/min)/ft of drawdown [0.29 (l/s)/m]. The volcanic rocks contain the least mineralized ground water in San Juan, averaging about 250 mg/l dissolved solids.

The basal Tertiary formation, the San Sebastián Formation, together with the lower part of the Cibao Formation, is a confined aquifer made up mostly of sand and marly limestone less than 330 ft (100 m) thick. Average yields are 240 gal/min (15 l/s), with specific capacities of wells of 3.1 (gal/min)/ft of drawdown [0.64 (l/s)/m] and transmissivities of 1,000 ft^2/day (93 m^2/day). Recharge is estimated to be 0.7 (10^6 gal/day)/mi^2 [12 (l/s)/km^2].

The Cibao Formation in general, and clay beds in particular, make up the semi-impermeable zone between the confined sand and the limestone that forms the unconfined aquifer.

Yields in Aguada Limestone of the unconfined aquifer are as much as 2,500 gal/min

(160 l/s) and average 540 gal/min (34 l/s). Average specific capacity of wells is 41 (gal/min)/ft [8.5 (l/s)/m]. The freshwater lens along the coast is less than a mile wide in San Juan. Consequently seawater intrusion is a threat. The Aymamón Limestone, which overlies the Aguada Limestone, is highly permeable but for the most part contains salt water. In Sabana Seca, a freshwater-bearing zone has transmissivity of 200,000 ft^2/day (1.86×10^4 m^2/day).

Ground-water recharge to the limestone unconfined aquifer is on the order of 1 (10^6 gal/day)/mi^2 [17 (l/s)/km^2]. Coastal discharge to the sea is about 4.5 (10^6 gal/day)/linear mi [0.20 (m^3/s)/linear km] of coast.

Ground water becomes less mineralized inland from the ocean. Median concentrations of dissoved solids, hardness, and bicarbonate are 525, 295, and 300 mg/l for the Aguada and Aymamón Limestones, which are nearest the sea; and 363, 195, and 226 mg/l for the San Sebastián and Cibao Formations, which lie farther inland.

A summary of the water budget for the Río de Bayamón shows that for a typical average rainfall of 64 in (1,625 mm) about 28 in (710 mm) is runoff, and 36 in (915 mm) evapotranspiration, assuming storage in a basin is constant. Ground-water flow from weathered volcanic rocks to streams and the sedimentary rock aquifers is about 15 in (380 mm) annually, about half the total runoff.

Ground water continues to play a small role for water supply in the San Juan area. The limited quantity available, perhaps 30×10^6 gal/day (1.3 m^3/s), is currently about half used. Nevertheless, ground water is important for use in special situations such as backup supply for droughts and special industrial uses.

Studies could be carried out to evaluate the practicability of artificial recharge, urbanization effects on ground water, and disposal wells in the saline aquifers. Construction and use of analog, digital, or hybrid models would facilitate these studies and additional water-related stresses on the system.

INTRODUCTION

Ground water once supplied much of the water requirements of the San Juan area. With the completion of the Lago Loíza reservoir in 1953, surface water gradually replaced ground water as a source of supply. It was not until the severe droughts of the mid-1960's when inflow to the Lago Loíza declined to near zero that the vulnerability of surface-water sources was realized. An emergency drilling program developed sufficient ground-water supplies to supplement surface-water supplies and meet the needs of the metropolitan area.

A post-drought analysis of the sources of water supply for the metropolitan area indicated a need for better knowledge of the ground-water resources. A study was implemented through the cooperative water-resources investigation program between Commonwealth agencies of Puerto Rico and the U.S. Geological Survey.

The metropolitan area (fig. 1) includes the capital city of San Juan and all or part of the municipalities of Carolina, Bayamón, Cataño, Guaynabo, Dorado, Río Piedras, and Toa Alta. The study area extends from the Río Grande de Loíza on the east to the Río de la Plata on the west, and from lat 18°22' N, which approximately parallels the volcanic-sedimentary rock contact, north to the Océano Atlántico. For purpose of reference, the metropolitan area has been arbitrarily divided into three units--Bayamón, San Juan, and Carolina (as shown in fig. 1).

GEOGRAPHY

Physical Setting

The metropolitan San Juan area lies in the Northern Coastal Lowland and Northern Foothills physiographic regions (Picó, 1950). The Northern Coastal Lowland is a plain about 5 mi (8 km) in width, that slopes gently from the sea to the foothills. The plain has been built up by surficial deposits consisting of sand, silt, clay, and muck overlying a dissected older surface, the remnants of which stand above the plain as isolated mogotes or hills. Many of the mogotes rise more than 300 ft (90 m) above sea level and 200 ft (60 m) or more above the coastal plain.

A nearly continuous line of marshes, mangrove swamps, and lagoons lie just inland of the shoreline. The lagoons, including Bahía de San Juan, are joined by channels. Direct access of the lagoons to the sea is poor and circulation of water is sluggish.

The Northern Foothills characteristically are rounded hills, many attaining an altitude of 1,000 ft (300 m) and some as much as 2,000 ft (600 m). The hills are composed chiefly of sandstone and siltstone, associated volcanic and intrusive rocks, and some limestone. Streams rising in the interior uplands pass through the foothills in narrow valleys whose flood plains are flanked by alluvial terraces.

Major rivers bounding or passing through the study area are, from east to west; the Río Grande de Loíza, Río Piedras, Río de Bayamón, and Río de la Plata. The Río Piedras empties into Bahía de San Juan; whereas, the other rivers discharge directly to the sea.

Population and Economic Situation

Puerto Rico in general, and San Juan in particular, have experienced probably one of the

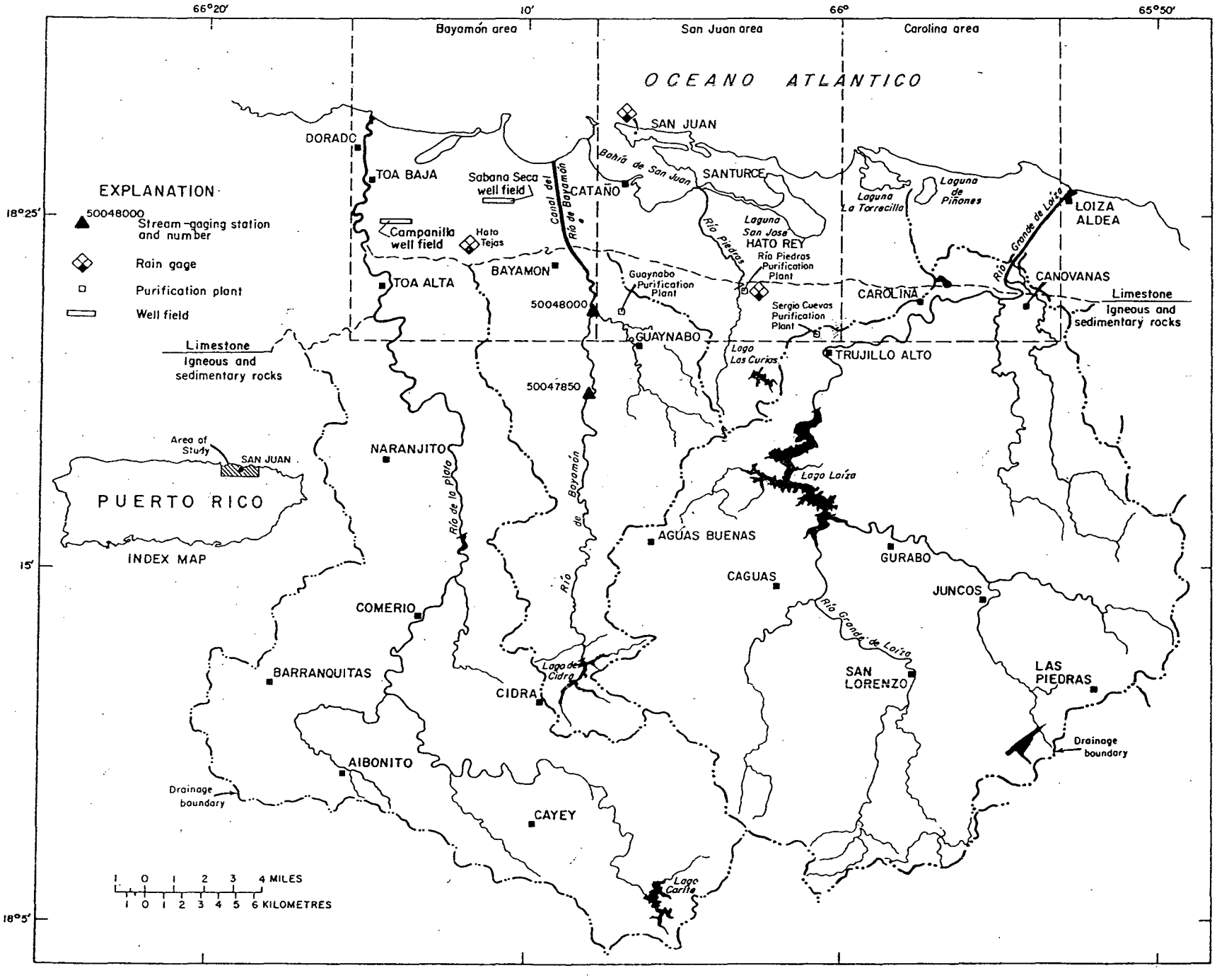


Figure 1.--The San Juan project area: contributing drainage basins and principal features.

fastest economic growth rates in the world in the past 25 years. The Commonwealth has grown at a rate comparable to Israel and Japan and about twice that of the continental United States--more than 10 percent per annum.

The population of the San Juan metropolitan area has grown 26 percent from 1950 to 1960 to 647,979 inhabitants; and 31 percent from 1960 to 1970 to 851,247 inhabitants. Almost one third of all the inhabitants on the island live in the San Juan metropolitan area. The trend in population is outward to the suburban areas as transportation, housing, and living standards improve, and as the urban center becomes more commercialized.

The industries in and around San Juan are similar to those of other large cities. The leading types of commercial establishments are food products, tobaccos, textiles and clothing, furniture and wood products, printing, chemicals, cement, metal fabrication, machinery and electrical equipment, glass, petroleum refineries, rum distilleries and breweries. Although the island's rate of unemployment is high, more than 12 percent (1970) the rate in San Juan is comparable to the continental United States average of 6 percent.

Climate

The climate in San Juan is tropical marine. Air temperature at the National Weather Service station, in Old San Juan, ranges from an average of 27.2° C in August to 23.9° C in January.

Throughout Puerto Rico rainfall increases inland toward the mountains. In the San Juan metropolitan area, the average annual rainfall ranges from 60 in (1,520 mm) on the coast to 80 in (2,030 mm) 5 mi (8 km) inland. Rainfall is seasonal with a rainy period from July through October (the hurricane season) and a secondary wet period in May. The dry season occurs between January and April. In an average year, there are 209 days of measurable precipitation in Old San Juan.

Figure 2 shows the long-term annual rainfall at Río Piedras and Old San Juan. Wet and dry periods are evident from the 5-year moving average. Of particular prominence are the severe droughts of the 1920's, 1930's and 1960's.

Pan evaporation measured at the Old San Juan weather station exceeds rainfall by about 20 in (508 mm) a year. The average annual evaporation measured over 4 decades is 82 in (2,080 mm) with an average monthly high of 8.04 in (204 mm) in March and a low of 4.48 in (114 mm) in December. A short distance inland at Río Piedras, however, the rainfall, 74.2 in (1,880 mm), exceeds the pan evaporation, 72.4 in (1,840 mm).

In Puerto Rico the prevailing trade wind is from the east or the north-northeast; however from September to November there is an alternating of wind currents from the south and the southeast. In addition, there are breezes caused by the differential heating of the land and the sea--during the day the breeze is from the sea to land, but at night it is reversed.

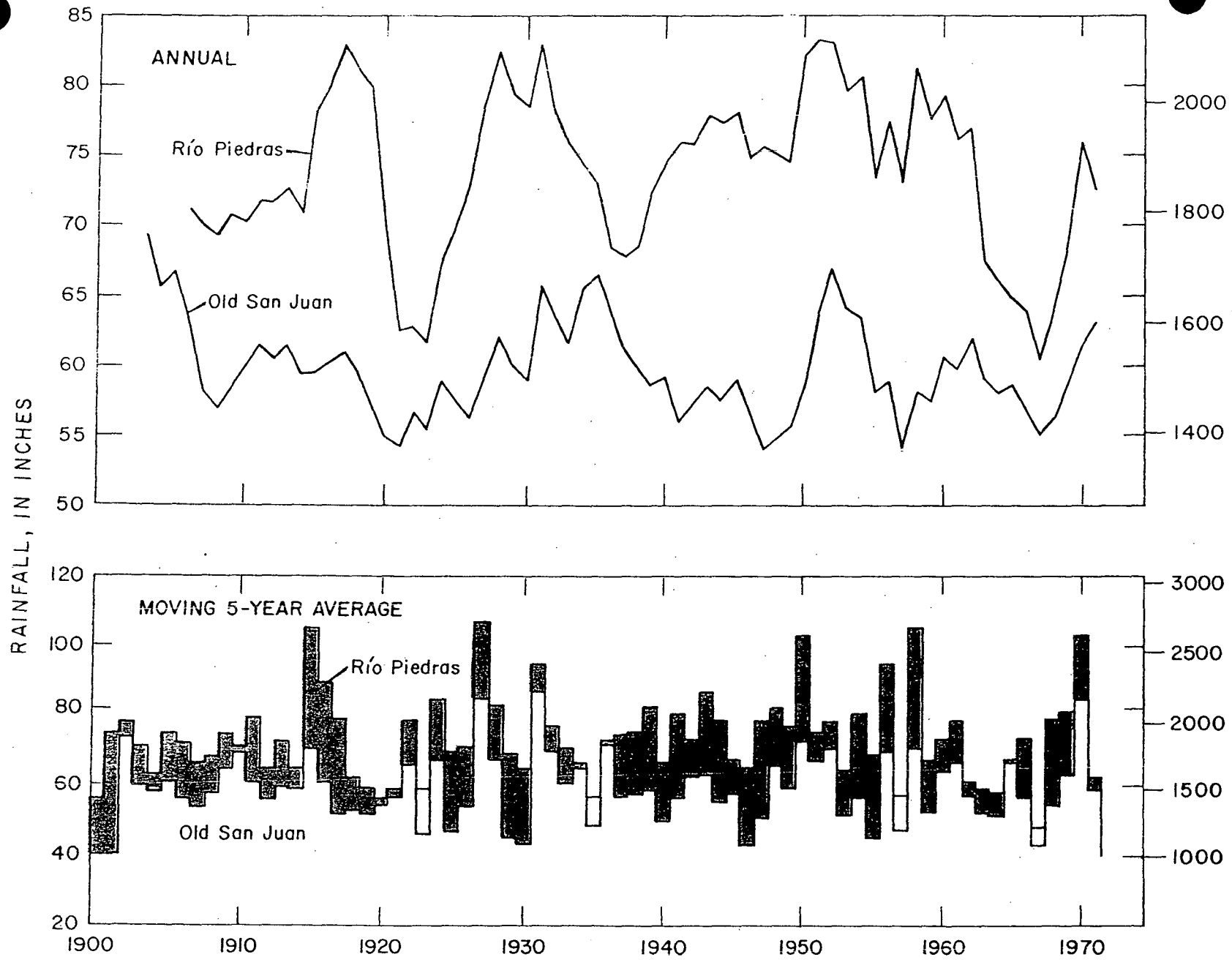


Figure 2.--Annual and moving 5-year average rainfall of Río Piedras and Old San Juan rain gages, 1900-71 (data from U.S. National Oceanic and Atmospheric Administration).

Hurricanes commonly originate in the Caribbean but only six storms of hurricane intensity have affected San Juan in the past 60 years.

Water Use and Municipal Supply

Before 1953, San Juan obtained its water supply from a combination of surface water from the Río Piedras and the Río de Bayamón, and ground water from several high-yield wells. Apart from the municipal supply, many installations in San Juan, such as the Ft. Buchanan military complex, maintained their own wells. With the completion of the Lago Loíza reservoir in 1953, many of the well systems were abandoned and water was obtained from the municipal supply system. Ground-water pumpage declined from 5×10^6 gal/day (0.22 m^3/s) in 1945 to 3×10^6 gal/day (0.13 m^3/s) in 1960.

In fiscal year 1971 (July 1970-June 1971), the output of municipal water supply in metropolitan San Juan averaged about 108×10^6 gal/day (4.7 m^3/s), double the 54×10^6 gal/day (2.4 m^3/s) in fiscal year 1959. The water consumed or paid for in fiscal year 1971 was about 80×10^6 gal/day (3.5 m^3/s) indicating a water loss, apparently through leaky mains, of about 25 percent.

GEOLOGY

The rocks of the San Juan area are classified for the purpose of convenience as volcanic rocks, sedimentary rocks, and surficial deposits. Needless to say, there are large variations in rock type in each group. The areal extent of these rocks in the San Juan area is shown in the hydrogeologic map (fig. 3).

Volcanic Rocks

Volcanic tuff, breccia and lava; associated sandstone, siltstone and limestone; and some intrusive rocks of Cretaceous and Tertiary age are found in the Northern Foothill region south of San Juan. Folding, faulting and metamorphism have destroyed many of the original physical characteristics of these rocks, such as solution limestone, porous tops in lava flows, and open-pore space in sandstones. Common to these rocks is a general lack of permeability, except in a weathered and fractured surficial zone as much as several hundred feet thick that follows the general topography.

Sedimentary Rocks

Sedimentary rocks of Tertiary age underlie the Northern Coastal Lowland region. The formations are composed of consolidated gravel, sand, and clay and calcareous rocks ranging from marl to indurated limestones. They have a roughly east-west strike and dip 4 to 6 degrees seaward. Some high-angle normal faulting is evident; however, displacement is small and does not seem to be significant.

Production, distribution, capacity, plant, system, and source of water supply in fiscal year 1971

Plant 1/	Capacity million gal per day (cubic metres per second)	Production	Source	Distribution	System
Sergio Cuevas	60 (2.6)	67.5 (3.0)	Lago Loíza 2/	Carolina-San Juan area and 10×10^6 gal (38,000 m^3) underground storage tank	Loíza
Guaynabo	26 (1.1)	29.7 (1.3)	Lago de Cidra 3/ Río de Bayamón Río Guaynabo	Guaynabo-Bayamón area and 2 storage tanks 10×10^6 gal (38,000 m^3)	Bayamón
Univ. of P.R. Experiment Station, Río Piedras	2.5 (0.11)	2.2 (0.10)	Lago Las Curias 4/	Río Piedras-San Juan area	Río Piedras
San Juan	10.7 (0.47)	0.2 (0.01)	18 wells	San Juan area	Hato Rey
Campanilla-Sabana Seca	15.6 (0.68)	8.88 (0.39)	16 wells	Levittown area	Levittown

1/ See figure 1 for location.

2/ 6.5 billion gal (24.6 hm^3) storage reservoir.

3/ 1.7 billion gal (6.43 hm^3) storage reservoir.

4/ 367 million gal (1.39 hm^3) storage reservoir.

These formations are best exposed in the west and inland parts of the study area. They are overlain by surficial deposits near the sea and in the eastern part of the study area.

The rocks can be separated into four recognizable formations. In order from oldest to youngest, they are: San Sebastián Formation, Cibao Formation, Aguada Limestone, and Aymamón Limestone.

San Sebastián Formation

The San Sebastián Formation of Oligocene age is composed of crossbedded to massive beds of sand, sand and gravel, and sandy clay; with some thin beds of sandstone and sandy limestone. The formation can be considered to be consolidated but is essentially uncemented. The outcrop area and the configuration of the top of the San Sebastián are shown in figure 4. The formation attains its maximum thickness of about 500 ft (150 m) in the western part of the study area, but Pease (1968) attributes 150 ft (45 m) of this thickness to the Mucarabones Sand, a formation overlying the San Sebastián and grading into the Cibao. In this report the Mucarabones Sand, as mapped by Pease (1968), is included in the San Sebastián. However, recent work in the Bayamón quadrangle by Monroe (1973) indicates that the Mucarabones Sand intertongues eastward with the entire lower part of the overlying Cibao Formation; so that the age of the Mucarabones Sand is Oligocene and Miocene. The San Sebastián Formation commonly is 165 to 330 ft (50 to 100 m) thick, becoming progressively thinner to the east.

In the vicinity of Carolina, the San Sebastián either pinches out or the remnants become indistinguishable from the overlying Cibao Formation.

Cibao Formation

The Cibao Formation (fig. 3) is of Oligocene and Miocene age and conformably overlies the San Sebastián Formation. The Cibao is composed of interbedded marl, limestone, clay, sand and gravel. It attains its maximum thickness of 380 ft (115 m) in the westernmost part of the study area, thinning eastward to about 130 ft (40 m) thick in the vicinity of Carolina.

In the westernmost part of the study area, the Cibao has been divided into five members (Monroe and Pease, 1962):

1. Upper member--chalk, sandy limestone and sandy marl; 100 to 160 ft (30 to 50 m) thick.

2. Miranda Sand Member--sand and gravel, filling channels cut into the underlying limestone; 0 to 60 ft (0 to 20 m) thick.

3. Quebrada Arenas Limestone Member--consists of alternating beds less than 3 ft (1 m) thick, of dense crystalline limestone and soft marly limestone; 0 to 70 ft (0 to 20 m) thick.

4. Río Indio Limestone Member--a yellowish-orange earthly limestone that grades into a sandy marl toward the east; reported to be 230 ft (70 m) maximum thickness.

5. Lowermost member (unnamed)--consists of sandy limestone and marl facies transitional with the San Sebastián; 100 to 230 ft (30 to 70 m) thick.

The three middle members apparently crop out only in the Río Bucarabones Valley (section A-A', fig. 3). The upper and lowermost members are identifiable in the vicinity of the Río de Bayamón (section B-B', fig. 3).

In the San Juan and Carolina areas, the Cibao has not been officially divided into members; consequently, the formation is described as one geologic unit (section C-C' and D-D", fig. 3).

In the Carolina area, the Cibao overlaps the San Sebastián and is believed to rest directly on the bedrock formations of tuff and volcanic rocks. Here the formation is about 130 ft (40 m) thick.

In places the Cibao forms topographic ridges but more commonly makes up the lower slopes of hills and mogotes capped by the more resistant Aguada and Aymamón Limestones. In the San Juan area exposures of the Cibao are evident at the base of Montes San Patricio, Montes de Canejas, and the smaller hills south of the San José Lagoon. Figure 5 is an outcrop map of the Cibao Formation showing structure contours on the top of the formation.

Aguada Limestone

The Aguada Limestone of Miocene age is a transitional formation between the Cibao marl and the relatively pure crystalline limestone of the overlying Aymamón Limestone (fig. 3). Briggs and Akers (1965) described the Aguada on the north coast as "hard, thick-bedded to massive calcarenite and dense limestone interbedded with chalky limestone and marl; commonly containing some quartz grains and locally thin-bedded near top." It ranges in thickness from 100 to 250 ft (30 to 75 m) in outcrop in the study area. South of the Bahía de San Juan, the hard crystalline beds occur in the upper part while the softer and marly beds predominate in the lower part (Gelabert, 1964).

The Aguada is a ridge former and together with the Aymamón Limestone makes up most of the mogotes in the San Juan area. Except for these last remaining vestiges of the great karst region to the west, the limestones in San Juan have been largely eroded away and covered with alluvial clay, sand, and beach deposits.

Aymamón Limestone

The uppermost limestone, the Aymamón of Miocene age, is exposed as case-hardened caps on a few hilltops in Montes de Canejas and in the small hills around the juncture of

Caño Martín Peña and the Laguna San José (fig. 3). Elsewhere it lies beneath a mantle of alluvium and other surficial deposits. The following description of the formation is given by Zapp, Bergquist, and Thomas (1948), "It consists almost entirely of very dense conchoidally fracturing limestone of white, light gray, buff and rose colors; unit is quite uniform over its entire outcrop and throughout its entire thickness." The map by Monroe and Pease (1962) of the Bayamón quadrangle shows the limestone outcrops, both of the Aguada and Aymamón to be quite extensive, forming the tops of many of the haystack hills. In the Bayamón area the Aymamón is either pink or white, well indurated, usually dense limestone, 215 ft (65 m) thick were exposed. Kaye (1959) estimates the thickness of the Aymamón to be as much as 2,000 ft (600 m) at the coastline. Geophysical studies at Palo Seco indicate an aggregate thickness of middle Tertiary limestones (Aguada and Aymamón) to be about 3,000 ft (900 m).

Surficial Deposits

A variety of alluvial, terrace, blanket sand, beach, and dune deposits ranging in age from Miocene to Holocene mantles the bedrock over much of the study area. Terrace and blanket sand deposits are sometimes referred to as old alluvium, and form a veneer of red to white silty clay, sand and clay, and sand over the older formations. The thickness of these deposits may be more than 100 ft (30 m) in San Juan (fig. 6).

A blanket of loosely cemented dune sand of Pleistocene age overlie the Santurce and Old San Juan areas. The dune sand is composed of quartz and calcite grains, cemented in a calcite matrix. The Holocene deposits include beach sand, swamp and lagoon mud, and recent alluvium or flood-plain deposits of the existing river systems.

HYDROLOGY

Rainfall on the inland mountain slopes drains into four main catchment areas--Río Grande de Loíza, Río Piedras, Río de Bayamón, and Río de la Plata (fig. 1). For the most part, these basins lie on relatively impervious volcanic rock; runoff is rapid, commonly resulting in flash flooding in the lower urbanized reaches of the streams.

Water infiltrating the volcanic rock flows largely through the weathered zone and then into stream valleys. Some ground-water flow through the volcanic rock may ultimately recharge the Tertiary sand and limestone aquifers.

The sand and limestone aquifers of the coastal plain are the principal water-bearing formations in the San Juan area. Recharge to these formations is principally on their outcrops by rainfall and infiltration of streamflow, and discharge is principally into swamps and lagoons along the coastline. Discharge from the confined zones of these aquifers probably is by vertical leakage to the overlying formations.

A possible secondary source of recharge to the aquifer in urbanized areas is leaky water and sewer lines.

In the following section of the report, the terms specific capacity, transmissivity, and hydraulic conductivity will be used in reference to the hydraulic properties of the aquifers. Specific capacity, expressed in gallons per minute per foot of drawdown or cubic metres per second per metre of drawdown is, as the units indicate, the yield of a well divided by the difference between the nonpumping and pumping water level (drawdown) in a well for a time period. The duration of discharge in this report is for a period of 8 hours. Hydraulic conductivity (formerly referred to as coefficient of permeability) is the volume of water that will pass through 1 ft^2 (1 m^2) of an aquifer in 1 day; whereas, transmissivity is the volume of water that will pass through a 1-ft (1-m) wide vertical section, the full thickness of an aquifer in 1 day. Hydraulic conductivity is expressed in $(ft^3/day)/ft^2$ [cubic feet per day per square foot] or ft/day [feet per day]. Transmissivity is expressed as $(ft^3/day)/ft$ [cubic feet per day per foot] or ft^2/day [feet squared per day]. In metric terms, hydraulic conductivity is expressed as $(m^3/day)/m^2$ [cubic metres per day per square metre] or m/day [metres per day], and transmissivity is $(m^3/day)/m$ [cubic metres per day per metre] or m^2/day [square metres per day].

Wells in the metropolitan area are often perforated the entire length of their casings. Consequently, wells starting in the unconfined aquifers may be completed in the confined aquifers and tap both zones. Composite yields and water levels commonly result. Often the yield of a well is controlled to a large degree by the most permeable aquifer tapped, and the water level in a well may be higher or lower than that in the unconfined aquifer owing to the head effects of the lower confined aquifer. Consequently, direct use of well data to describe well performance and aquifer characteristics can be misleading. Variations in transmissivity of the coastal aquifers shown in figure 3 are primarily a composite of the transmissivity of the various water-bearing units.

Ground-Water Levels

Altitudes of the water surface in the volcanic and sedimentary rock unconfined aquifers and of the potentiometric surface of the confined zones of the sedimentary rock aquifers are shown in figure 7. The water surface in the volcanic rocks reflects the control exerted by surface drainage features with ground-water discharge being primarily to streams. But it also shows that in interbasin areas there is some ground-water discharge from the volcanic rocks directly to the sedimentary rocks as indicated in the Montes de Hatillo area, south of Hato Rey. Ground-water levels in the unconfined aquifers of the sedimentary rock also show control exerted by surface-drainage features along the major rivers. The potentiometric surface of the confined zones of the aquifer, in contrast, reflects the head created by the ground-water levels in the recharge area and friction losses in the aquifer.

Observations of the ground-water levels (fig. 8) show that recharge generally occurs during the rainy season from August through November, with a secondary recharge period in April or May. Recharge, however, can occur at any time of the year as the result of major rainstorms.

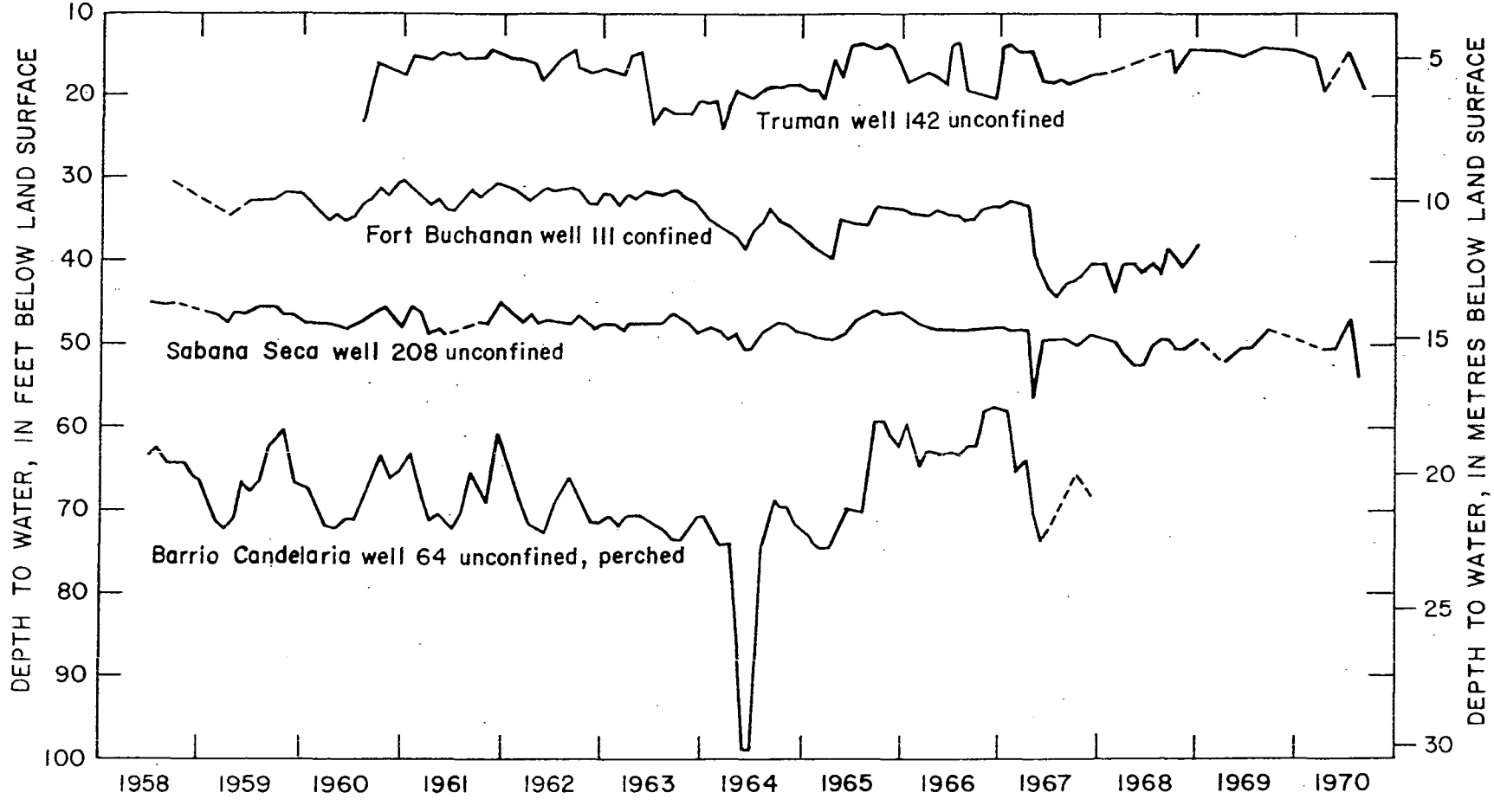


Figure 8.--Hydrographs of selected wells in the San Juan area.

Water-level fluctuations reflect the hydraulic characteristics of the aquifers. The Candelaria well 64 (fig. 8) is situated on the high plateau west of Bayamón, the recharge area for Tertiary formations in the Bayamón area. The wide fluctuation of the water levels in the well indicates the generally low permeability and porosity of the Cibao Formation. A water-level high of 58 ft (18 m) below land surface was reached in late 1966, following several successive wet years. The low water level of record was 99 ft (30 m) below land surface in mid-1964, in response to the dry years of 1963-64. Ordinarily there is about a 10-ft (3-m) variation between the high-water levels in the rainy season and the low levels in the dry season in this well.

The Truman well 142 (fig. 8), along with a number of other Puerto Rico Aqueduct and Sewer Authority wells in San Juan, is used to supplement municipal supply during dry periods when surface-water storage is low. Measurements were taken in the Truman well, both under nonpumping and pumping conditions. The well shows only very modest changes in water level from a high of 13 ft (4.0 m) to a low of 24 ft (7.3 m) below land surface. The low level was primarily a reaction to the drought of 1963-64, when the well was being pumped continuously. Because of the high permeability and storage of the limestone, a more constant water level is sustained during adverse conditions than in the less permeable Cibao and San Sebastián Formations.

Recharge

The average annual recharge to an aquifer or aquifer system determines the long-term yield that can be obtained without depletion or other damage to the aquifer. Recharge usually occurs on the outcrop surface of the aquifer either from the infiltration of rainfall or from surface water from streams that flow across the outcrop. Occasionally recharge will be from underlying or overlying water-bearing formations.

Rainfall is usually the principal source of recharge. Even then a combination of certain conditions must occur before recharge will result. Rainfall must be sufficient to overcome soil moisture demands and yet be of low intensity for maximum infiltration to occur. As these conditions are usually reached only during the rainy season, recharge is cyclic.

The condition of the outcrop area that receives recharge is also critical--the surface must be permeable. Throughout metropolitan San Juan, the recharge areas of the aquifers are being urbanized. High-density housing, streets, and other impervious surfaces are or will greatly impair the receptivity of the recharge areas of the aquifers.

The principal recharge areas in the Bayamón area are the high plateau or ridge of Aguada and Aymamón Limestones lying on top of the Cibao Formation and the outcrop area of the Cibao and San Sebastián Formations to the south (figs. 3, 4, and 5). Important to the recharge on the plateau and the area to the south are the large areas of blanket sand forming an absorbent surface through which rainfall can percolate to the underlying limestone and sandstone. Water infiltrating the ridge flows either northward through the Aguada Limestone or downward through the Cibao Formation and south to the San Sebastián Formation (see fig. 3, section A-A').

In the San Juan-Carolina area, recharge to the San Sebastián Formation is derived from rainfall on the outcrop area, in places mantled by alluvium, from flow losses from the Río Piedras in the intake area, and from underflow through the weathered zone in the volcanic rocks of Montes de Hatillo. Recharge to the Cibao Formation, to the Aguada Limestone, and to Aymamón Limestone is primarily from rainfall on the outcrop area of the Cibao, by percolation through the alluvium mantling these formations, and to a lesser extent through isolated limestone mogotes.

Within the Carolina area, a mogote ridge, Cerro San José (fig. 3, section D-D') is a source of recharge to the limestone and possibly to the underlying sand aquifer of the Cibao Formation. The water-table map (fig. 7) indicates a low swell in this area that may indicate the contribution of local recharge.

Recharge to the aquifers of the metropolitan area is undoubtedly being reduced by extensive urbanization of the intake areas. It is possible that much of the natural recharge that has been lost because of roads, housing, and other impervious structures is being made up by leakage from water and sewage mains. The 28 x 10^6 gal/day (1.2 m^3/s) unaccounted loss from the metropolitan distribution system lends credence to this possibility.

Volcanic Rocks

The bedrock aquifer consists of consolidated rocks principally of marine volcanic origin. These include siltstone, tuff, breccia, andesite, and limestone of Cretaceous and early Tertiary age. Usually these rocks are fine grained and tightly compacted and do not yield water freely to wells. Water that is available flows through cracks, fractures, and bedding planes in the weathered zone of the bedrock. In general, the water-bearing zone is a surficial mantle as much as 300 ft (90 m) thick.

Wells producing from the bedrock aquifer are chiefly in the eastern half of the metropolitan area tapping Tertiary-Cretaceous siltstone underlying the Montes de Hatillo and the Carolina area. The average yield of 25 wells is 52 gal/min (3.3 l/s) with a maximum yield of 300 gal/min (19 l/s). Specific capacities of wells averaged 1.4 (gal/min)/ft [2.9 (l/s)/m] of drawdown. No wells are known to tap the Cretaceous limestone in the Carolina area; however, modest yields possibly could be derived from this formation if metamorphism has not destroyed the original porosity or if secondary solution openings have developed.

Sedimentary Rocks and Surficial Deposits

The Tertiary sedimentary rocks comprise the principal aquifers of the coastal lowlands. Water-bearing units in these rocks range in composition from sand and gravel to nearly pure limestone.

Quaternary sediments predominately of alluvial origin, mantle the Tertiary rocks throughout much of the area. Clay and silt are the principal constituents of these deposits in the coastal areas, but inland in association with the mogotes of Tertiary rocks are high-level

terrace deposits commonly referred to as blanket sands. Water-bearing sand and gravel lenses are often found in the valley alluvium deposited by present-day rivers.

The water-bearing units of all the formations are hydraulically interconnected to some degree. The San Sebastián Formation and the lower part of the Cibao Formation are water-table aquifers in their recharge areas but become artesian seaward. The upper part of the Cibao Formation, the Aguada and Aymamón Limestones, and the Quaternary sediments are water-table aquifers.

San Sebastián Formation

In the past years, the San Sebastián Formation was not recognized as a major aquifer in the metropolitan area. Reexamination of well records, however, shows that many wells formerly assigned to the alluvial aquifer actually tap the San Sebastián Formation. In the metropolitan area, the San Sebastián is comprised predominantly of sand and some gravel with local limestone lenses--a sharp contrast to the typical gravelly clay that comprises the formation farther to the west.

In the outcrop area, ground water in the San Sebastián and basal Cibao is unconfined. Downdip (seaward), however, clay zones in the middle part of the Cibao form a confining layer creating confined conditions in the underlying rocks. From the vicinity of the Río de Bayamón east, it is possible that the clayey alluvium overlying the San Sebastián and Cibao Formations also acts as a confining layer. That this is the case becomes more plausible when it is considered that the Cibao Formation is predominantly a sand in the San Juan-Carolina area and the confining clay zone in the middle of the Cibao is generally missing.

Yield of wells tapping the San Sebastián Formation-Mucarabones Sand is low to moderate. Well yields range from 13 to 800 gal/min (0.8 to 50 l/s), with an average of 244 gal/min (15.4 l/s). Many wells have been abandoned because of low yield, particularly those located near the featheredge of the formation's southernmost outcrop. The specific capacities of wells are modest and average 3.1 (gal/min)/ft [0.64 (l/s)/m] of drawdown.

Cibao Formation

Of the formations containing fresh water in the western part of the metropolitan area, the Cibao is the thickest; yet it has the least favorable water-bearing properties largely because of the clayey nature of the formation. There are, however, horizons of limestone and sand that contribute appreciable quantities of water to wells. The limestone horizons in the upper part of the Cibao Formation merge with the unconfined aquifer of the San Sebastián Formation. Between these water-bearing units is an ill-defined section of clay or clay lenses that acts as a confining layer.

The Cibao Formation thins in the eastern part of the metropolitan area and the clay confining layer between the upper and lower members of the formation essentially disappears.

The Cibao Formation can be considered to be a transition formation between the sandy San Sebastián Formation and the relatively pure Aguada and Aymamón Limestones. As such it is part of both water-bearing units.

Throughout much of the metropolitan area, it is often difficult to determine from which unit a well in the Cibao is obtaining its water.

In the Bayamón area, wells in the Cibao Formation are located along Highway 2 on the plateau-like ridge which is also a major recharge area for this formation. Practically all the wells have low yields, low specific capacities, and a diversity of water levels. Wells along the ridge often tap the shallow water-bearing zones perched in limestone overlying the clay horizon and a deeper water-bearing zone in the lower marl of the Cibao. For example, in well 118 (fig. 3) water cascaded from the perched zone to lower levels of the ground-water surface 280 ft (85 m) below. To make the well useful, it was backfilled to within 80 ft (24 m) of the surface to tap the perched water.

Other examples of the water levels in wells becoming lower with depth are evident on the Bayamón ridge. Well 87 (fig. 3), a shallow well, has a water level of 5 ft (1.5 m) below land surface, and a deep well nearby (well 91) has a water level of nearly 100 ft (30 m) below land surface. In the same general area an 80-ft (24-m) well (well 66) has a water level of 56 ft (17 m) and a 130-ft (40-m) well (well 75) has a water level of 126 ft (38 m). The differences can be explained in section A-A' (fig. 3) by imagining that the deeper wells intersect surfaces of lower head that emerge on the sides of the water-table mound. Shallow wells, on the other hand, intersect potential lines of higher head found near the top of the mound.

Wells in the report area tapping the Cibao Formation give a wide range in yield: 0 to 510 gal/min (0 to 32 l/s), but average only 120 gal/min (8 l/s). Specific capacities of wells are low, averaging 3.1 (gal/min)/ft [0.64 (l/s)/m] of drawdown for 24 wells. A water-level recovery test run on a well in San Juan gave a transmissivity of 160 ft^2/day (15 m^2/day) indicating properties of a confining bed rather than an aquifer.

Aguada Limestone

The Aguada Limestone attains its permeability and porosity from solution openings in the rock. In the course of geologic time, percolating ground water has dissolved the soluble material leaving openings from the size of capillaries to huge caverns, often crosscut by solution pipes or fracture crevices. Generally the average texture of these solution openings in the Aguada is from finger to fist size, not large enough for subterranean rivers but capable of supporting large yields to wells. Many large caverns and vertical pipes, carved during and before the Pleistocene age, are now filled with clay and sand plugs which actually tend to reduce porosity. Most of these plugs appear to be above the water table and may not affect the water-bearing capacity of the saturated zone. The average yield from 50 wells is 540 gal/min (34 l/s).

Aymamón Limestone

The Aymamón Limestone is similar to the Aguada Limestone but contains salt water throughout most of the metropolitan area. The lower part of the Aymamón is slightly less permeable than the Aguada, but scattered well data indicate the upper part of the Aymamón is more permeable. The average yield of the Aymamón to 21 wells is 455 gal/min (29 l/s). The upper part of the Aymamón along the coast yields as much as 2,000 gal/min (130 l/s) of salt water.

Artesian Aquifer

The San Sebastián Formation and the basal part of the Cibao Formation comprise a single water-bearing unit that in much of the metropolitan area is a confined aquifer. These formations are distinctive in the Bayamón area but tend to grade into each other to the east.

Aquifer Hydraulics

The transmissivity of the aquifer, largely computed from specific-capacity data, varies from less than 150 to 2,000 ft^2/day (14 to 185 m^2/day). The transmissivity and storage coefficient from well 89 at the foot of Montes de San Patricio are typical of the aquifer. An aquifer test (Unklesbay, 1945) yielded a transmissivity of 1,000 ft^2/day (93 m^2/day) and a storage coefficient of 1.3×10^{-4} indicative of confined conditions. The well was pumped for 26 hours at an average rate of 400 gal/min (25 l/s).

An estimate of ground-water flow through the aquifer can be made using the formula

$$Q = TIL$$

where: Q = quantity in cubic feet per day (cubic metres per second)
T = transmissivity in square feet per day (square metres per day)
I = gradient of potentiometric surface in feet per foot (metres per metre)
L = width of aquifer under consideration in feet (metres).

Using the data from the above aquifer test as representative of the transmissivity of the confined aquifer and the potentiometric gradient in the vicinity of Montes de San Patricio, then

$$Q = 1{,}000\ ft^2/day \times \frac{43\ ft}{5{,}280\ ft} \times 5{,}280\ ft$$

$Q = 43{,}000\ ft^3/day$ [322,000 gal/day] flow per mile width of aquifer parallel to the coast, or in metric terms 760 $(m^3/day)/km$.

The intake area of the artesian aquifer covers approximately 15 mi^2 (39 km^2). Average daily recharge derived principally from rainfall is estimated at 0.75 (10^6 gal/day)/mi^2 [1,100 $(m^3/day)/km^2$] of outcrop area--a total of about 11×10^6 gal/day (42,000 m^3/day) or 20 percent of the average rainfall, 52×10^6 gal/day (197,000 m^3/day). If recharge is

evenly distributed over the 38 mi^2 (98 km^2) of the coastal plain believed to be underlain by the aquifer, an estimated yield of 0.30 (10^6 gal/day)/mi^2 [440 (m^3/day)/km^2] is available.

The potentiometric surface of the confined zone is above land surface in much of the low-lying coastal plain (fig. 7). Wells in those areas that tap this unit often flow. Known flowing wells occur in the lower valleys of the Río de Bayamón and the Río Piedras and the coastal plain south of San José Lagoon. The largest of these has a flow of 275 gal/min (17 l/s). The head in the aquifer at the well is 15 ft (5 m) above land surface. It is likely that many other wells in the low-lying areas that tap the confined zone would also flow were their castings not perforated in the overlying limestones, thus permitting water from the artesian zone to flow into the limestone.

Water-Table Aquifer

The upper part of the Cibao Formation and the Aguada and Aymamón Limestones forms a prolific unconfined aquifer. The freshwater part of the aquifer ranges from about 2 mi (3 km) in width in the Bayamón area to less than 1/2 mi (1 km) in width in the Carolina area.

Yields of 71 wells in the unconfined aquifer range from 30 to 2,500 gal/min (2 to 160 l/s) and average 510 gal/min (32 l/s). Specific capacities of wells are high, averaging 41 (gal/min)/ft [8.5 (l/s)/m] for 42 wells. In an earlier study, Bogart and others (1964) indicated an average yield of 400 gal/min (25 l/s) from 29 wells, and an average specific capacity of 53 (gal/min)/ft [1.1 (l/s)/m] from 20 wells, for the limestone aquifer. In the present study, transmissivities computed from specific-capacity data showed a range of from 7,000 to 135,000 ft^2/day (650 to 12,500 m^2/day) indicating the high conductivity of the aquifer. The average transmissivity computed from specific-capacity data is 13,000 ft^2/day (1,200 m^2/day).

The greatest production potential of the unconfined aquifer is in the Bayamón area (fig. 9) where the freshwater zone of the aquifer not only has its greatest extent but the recharge area is extensive in comparision with the areas to the east.

Two major well fields operated by the Puerto Rico Aqueduct and Sewer Authority are located in the Bayamón area (fig. 1). The Campanilla field tapping the Aguada Limestone has wells yielding as much as 1,000 gal/min (63 l/s). Average specific capacity of five wells is 63 (gal/min)/ft [13 (l/s)/m].

The Sabana Seca field taps the Aymamón Limestone and the upper part of the Aguada Limestone. Yields range from 500 to 1,000 gal/min (32 to 63 l/s) in the 10 wells in the field. During summer and fall of 1968, production from the field was 4.3×10^6 gal/day (0.19 m^3/s). Water quality, however, was affected by salt-water encroachment from the Río de Bayamón estuary. The wells, in an east-west line on the west bank of the estuary, showed a declining chloride concentration away from the estuary. The well nearest to the estuary had a chloride concentration of 360 mg/l (milligrams per litre). The chloride concentration of the next six wells in line progressively decreased with distance from the estuary, but all exceeded 100 mg/l.

During an aquifer test in the Sabana Seca well field, the production well (well 220, fig. 3) was pumped for 4 days at a rate of 615 gal/min (39 l/s), with a drawdown of 12.5 ft (3.8 m) and a specific capacity of 49 (gal/min)/ft [10 (l/s)/m]. Measurements made during the test showed drawdowns of less than 0.5 ft (0.15 m) in observation wells 1,000 ft (300 m) from the pumped well.

Computed transmissivity was 160,000 to 240,000 ft^2/day (14,900 to 22,300 m^2/day) and coefficient of storage was 0.001 (Leggette, Brashears and Graham, 1969).

Transmissivities computed from specific-capacity data on individual wells in the field are much less, 4,500 to 27,000 ft^2/day (420 to 2,500 m^2/day) than those computed utilizing the aquifer test. The discrepancies are attributed to well entrance losses which tend to reduce the specific-capacity values and the corresponding transmissivities. Use of properly designed wire-wound or shutter-type screens, in places of perforated casing could reduce entrance losses and thereby improve specific capacities to several hundred gallons per minute per foot of drawdown.

Static water levels in the Sabana Seca well field are from 2.9 to 5.6 ft (0.9 to 1.7 m) above sea level. Accordingly, at these levels the fresh water-salt water interface should lie at depths of 120 to 225 ft (37 to 69 m) below sea level (the depth to salt water below sea level increases approximately 40 ft [12 m] for each 1-ft [0.3-m] increase in water-table altitude above sea level). Consequently any stress put on the well field in a sustained long-term pumping effort could readily lead to a salt-water intrusion problem.

The ground-water flow through the aquifer can be estimated from the aquifer-test data computed at Sabana Seca. Using the formula: $Q = TIL$, it is found that about 600,000 ft^3/day (4.5×10^6 gal/day) of ground water is moving through a 1-mi (1.6-km) wide strip of aquifer to a seaward discharge area or about 25×10^6 gal/day (1.1 m^3/s) in the area between the Río de la Plata and the Río de Bayamón. Large variations in this discharge can occur when the ground-water gradient, normally about 3 ft/mi (0.6 m/km), is changed owing to tidal effects, seasonal changes in rainfall, droughts, and pumpage.

The limestone area between the Río de Bayamón and the Río de la Plata and to the divide south of Highway 2 includes about 28 mi^2 (73 km^2). The principal drainage from the limestone is ground-water flow toward the sea and, to a lesser extent, to the main stream systems of the Río de Bayamón or the Río de la Plata. An estimated 20 mi^2 (52 km^2) of limestone terrane containing fresh water drains toward the coast. Water-budget studies made in the Tortuguero area to the west (Bennett and Giusti, 1972) show the approximate recharge to the karst limestone, which is on the order of 1 (10^6 gal/day)/mi^2 [0.02 (m^3/s)/km^2]. Applying this magnitude of recharge to the coastal drainage between the Río de la Plata and the Río de Bayamón, an estimated 20×10^6 gal/day (0.9 m^3/s) is recharge to the aquifer as compared with approximately 25×10^6 gal/day (1.1 m^3/s) discharge

computed above. At the present time, about 10 x 10^6 gal/day (0.44 m^3/s) is pumped by wells from the aquifer, mainly in Campanilla and Sabana Seca. The current artificial draft on the aquifer is roughly half the estimated recharge rate.

In the San Juan-Carolina area, fresh water in the unconfined aquifer is found only in the upper part of the Cibao Formation and the Aguada Limestone. Well yields of more than 2,000 gal/min (130 l/s) can be obtained from the fresh-water part of the aquifer in the San Juan area; although, the yields usually are restricted to less than 200 gal/min (13 l/s) depending upon the proximity of the salt-water front. Data are too few to give a valid evaluation of the unconfined aquifer in the Carolina area. Akers (written commun., 1965) reported a well yielding 2,500 gal/min (158 l/s) of marginal-quality water (350 mg/l chloride) in the limestone, east of the Río Grande de Loíza.

Estimates of transmissivity and ground-water gradients in San Juan indicate that seaward ground-water discharge through the aquifer is on the order of 1 (10^6 gal/day)/linear mi [27 (l/s)/linear km], approximately, along the fresh-water contact. The apparent recharge area for the unconfined aquifer, however, does not appear to be extensive enough to supply the required volume of water. Recharge to the unconfined aquifer could be augmented by lateral flow from the unconfined part of vertical flow from the confined part of the San Sebastian Formation and lower part of the Cibao Formation and leaky water or sewer mains.

The Aymamón Limestone is part of the unconfined aquifer and in the San Juan-Carolina area it contains mostly salt water. Wells tapping the Aymamón near the sea yield as much as 2,000 gal/min (130 l/s) of salty water.

Surficial Deposits

The surficial deposits are not an important source of water in the San Juan area, though they do serve as a conduit for recharge to underlying aquifers. The Pleistocene eolianite deposits along the coast yield water high in chloride concentration, mainly to shallow wells. Locally, in Carolina, a few wells tap abundant supplies from Holocene alluvial deposits. Sources of fresh water, formerly described as recent alluvial deposits, are often sand and gravel deposits of the San Sebastián Formation. Examination of more than 100 driller's logs from wells in the San Juan area show the alluvial deposits to be highly clayey and relatively unfavorable for the development of wells; except possibly in some stream valleys.

Yields from several industrial wells tapping the alluvium of the Río Grande de Loíza on the eastern edge of the study area are as much as 700 gal/min (44 l/s), but they are not typical of well yields from the alluvium in the metropolitan area. Records available for 17 wells in surficial deposits show a median yield of 60 gal/min (3.8 l/s).

Surface Water-Ground Water Relationship, Río de Bayamón Basin

The base flow of streams is ground-water discharge from the adjacent aquifers. Base

flow, therefore, can be an indication of the long-term yield of an aquifer and also of the long-term average recharge to the aquifer.

An analysis of the total and base flow of the Río de Bayamón was made for different time periods, to verify, where possible, estimates of recharge and ground-water discharge determined by analyses of hydraulic data obtained from the performance of wells tapping the aquifers in the San Juan area.

The Río de Bayamón basin encompasses an area of about 95 mi^2 (246 km^2). The river rises in the mountains about 20 mi (32 km) inland and flows northward to the sea. The upper two-thirds of its course is incised in a complex of Cretaceous age volcanic rocks, whereas the lower third flows over Tertiary age sediments and younger, predominantly Holocene age surficial deposits. The gradient of the channel changes abruptly from 95 ft/mi (18 m/km) on the volcanics to 11 ft/mi (2 m/km) on the sedimentary rocks and surficial deposits of the coastal plain.

The Río de Bayamón, as mentioned earlier, is a highly regulated stream. In August 1970, diversions from the Bayamón system were 5.56×10^6 gal/day (0.24 m^3/s) from the Lago de Cidra, 15.32×10^6 gal/day (0.67 m^3/s) from Old San Juan Dam, and 7.42×10^6 gal/day (0.33 m^3/s) from Santa Rosa--a total of about 28×10^6 gal/day or 43 ft^3/s (1.2 m^3/s).

Streamflow is augmented by industrial and municipal sewage effluent discharge to the Río de Bayamón and its tributaries. In August 1970, the Guaynabo sewage treatment plant discharged an average of 2.5×10^6 gal/day (0.11 m^3/s) of secondary-treated sewage to the Río Guaynabo. An industrial plant on the Río Minillas and two plants on the Río Hondo had a combined disposal capacity of 1.14×10^6 gal/day (0.05 m^3/s). A fourth industrial plant, north of Bayamón, contributed 1.04×10^6 gal/day (0.046 m^3/s) of sewage to the Río de Bayamón. The total recorded contribution of sewage effluent to the Río de Bayamón in August 1970 was about 6×10^6 gal/day or 9 ft^3/s (0.26 m^3/s).

Figure 10 shows the relationship of rainfall at Hato Tejas to discharge at the Río de Bayamón at Bayamón (station 50 0480 00) corrected for diversions. Runoff is approximately 35 percent of precipitation for the 4 years of record. Giusti and López (1967) calculated runoff as 33 percent of precipitation for 8 years of record on the adjacent Río de la Plata basin. Figure 10 also shows that evapotranspiration for a 70-in (1,780-mm) annual rainfall would be about 52 in (1,320 mm), or about double the runoff.

Figure 11 shows a series of curves corresponding to a given chance, or probability, that a certain daily discharge will be equaled or exceeded in a given month. Mean daily discharges are plotted on the vertical axis and months are represented along the horizontal axis. The curves show, in a qualitative way, the behaviour of the stream regimen in the basin and the role of ground water to streamflow.

The 90-percent curve corresponds in general to base flow and has the same variation as the seasonal fluctuation of the ground-water surface. The 1-percent curve, on the other

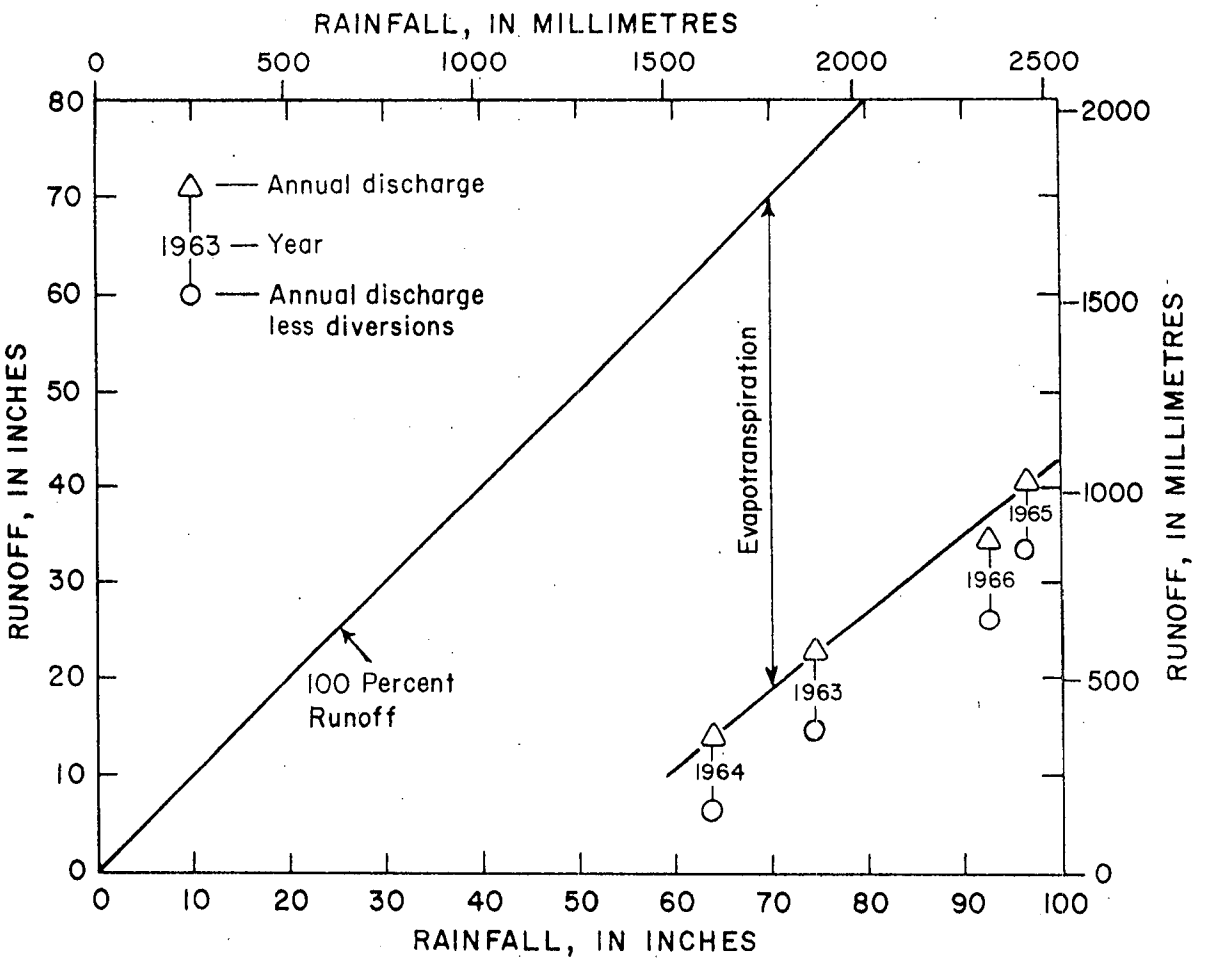


Figure 10.--Relationship of rainfall at Hato Tejas to discharge of Río de Bayamón at Bayamón (station 50 0480 00).

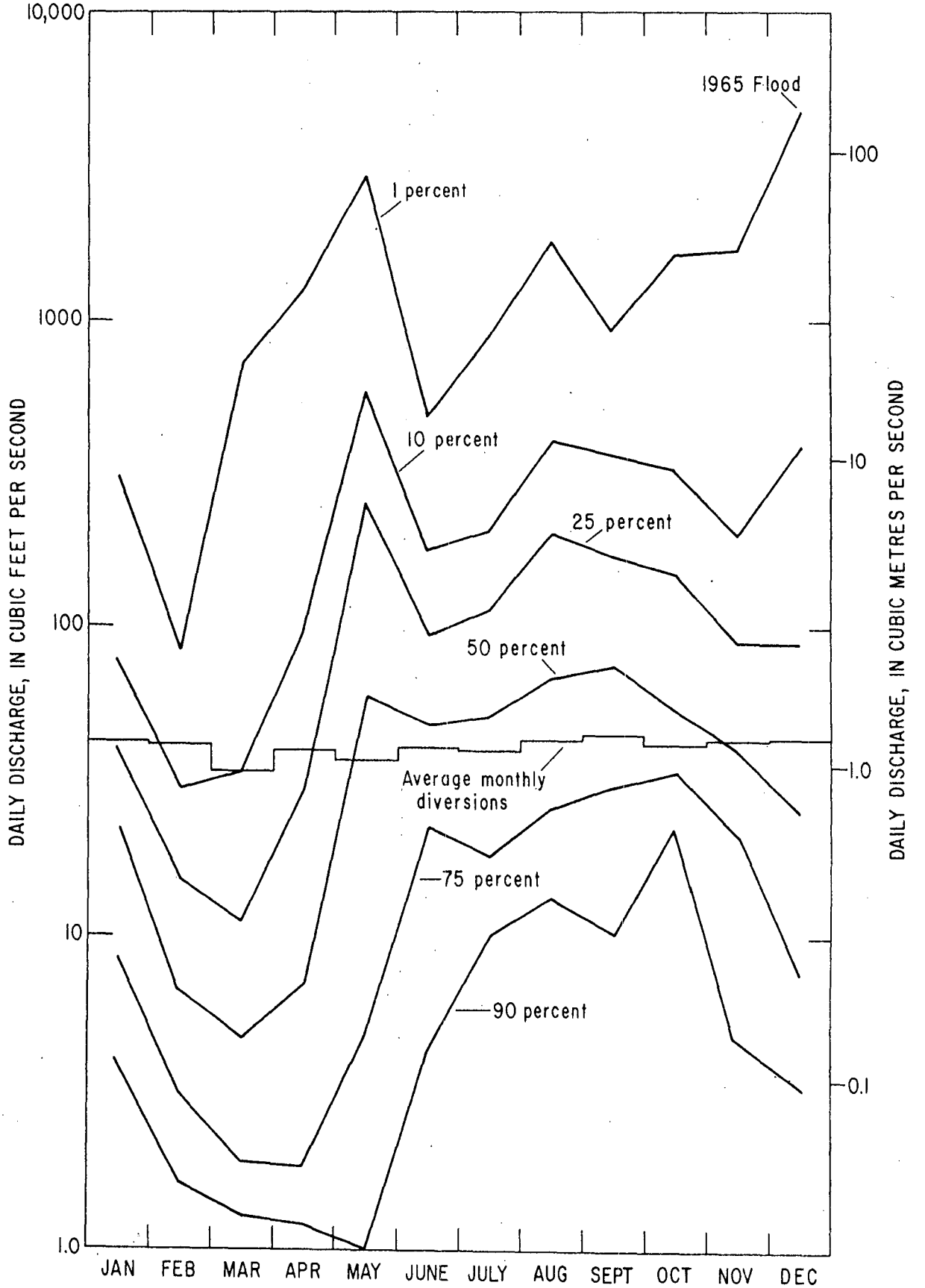


Figure 11.--Percentage of time that a certain mean-daily discharge was equaled or exceeded in any 1 month, January 1963 to December 1966, Río de Bayamón at Bayamón (station 50 0480 00).

hand, follows a pattern similar to the monthly rainfall in the basin, as high, infrequent flows or floods are in direct response to intense rains.

The minimum flow in the 10-percent curve is in February, when storm runoff is least; whereas, the minimum in the 90-percent curve is in May, when the ground-water surface and base flow are lowest. The 10-percent curve shows highs in May and August, when rainfall and runoff are greatest; while, the 90-percent curve shows a high in October, when the ground-water surface is high and base flow is greatest.

Figure 12 shows the discharge, diversions, and sewage inflow of Río de Bayamón near Bayamón (station 50 0478 50) and Río de Bayamón at Bayamón (station 50 0480 00) for the first 4 months of 1966. The basin above both stations overlie volcanic rocks. The sites differ geologically only in the valley floor; for about 2 mi (3 km) above Río de Bayamón at Bayamón, the valley is filled with alluvium.

Base flow at the two stations, shown by the depletion curves, was high in early January; as the result of extremely heavy rainfall in the latter part of 1965. The first 3 months of 1966, however, were very dry with little rainfall, and the base flow reflects the depletion of ground water in storage in the volcanic rocks due to the lack of recharge. The steeper slope of the depletion curve of Río de Bayamón at Bayamón is attributed to losses of base flow to the alluvium in the riverbed.

Table 1 gives the average daily base flow per unit area for January, February and March 1966, at each station and also for that part of the basin between the stations. In January base flow was essentially the same at both stations. It can be concluded that the alluvium above the lower station was saturated and that ground-water discharge from the volcanic rock was at or near maximum. The following months show a steady decline in base flow at the upper station from a maximum of 1.28 to 0.73 $(ft^3/s)/mi^2$ [14.0 to 8.0 $(l/s)/km^2$]. Short-term data for drought periods indicated the ground-water contribution to streamflow from the volcanic rocks may be as small as 0.5 $(ft^3/s)/mi^2$ [5 $(l/s)/km^2$].

In February and March, the area between the two gaging stations showed a major decline in flow per unit area that is attributed to infiltration of streamflow into the alluvium. In both months, the apparent daily loss was about 0.3 $(ft^3/s)/mi^2$ [3 $(l/s)/km^2$] or about 6×10^6 gal/day (0.26 m^3/s) in 2 mi (3 km) of stream channel.

Downstream from the gaging station Río de Bayamón at Bayamón (station 50 0480 00) the river flows on alluvium across the outcrop of the San Sebastián Formation. Measurements, corrected for sewage inflow, made upstream and downstream of the outcrop of the San Sebastián Formation (area 1.3 mi^2 or 3.4 km^2) on February 19, 1962, when base flow was high, showed a ground-water contribution of about 0.3 $(ft^3/s)/mi^2$ [3 $(l/s)/km^2$] to the stream. On March 4, 1963, at a low base flow a net loss of about 0.6 $(ft^3/s)/mi^2$ [7 $(l/s)/km^2$] was computed.

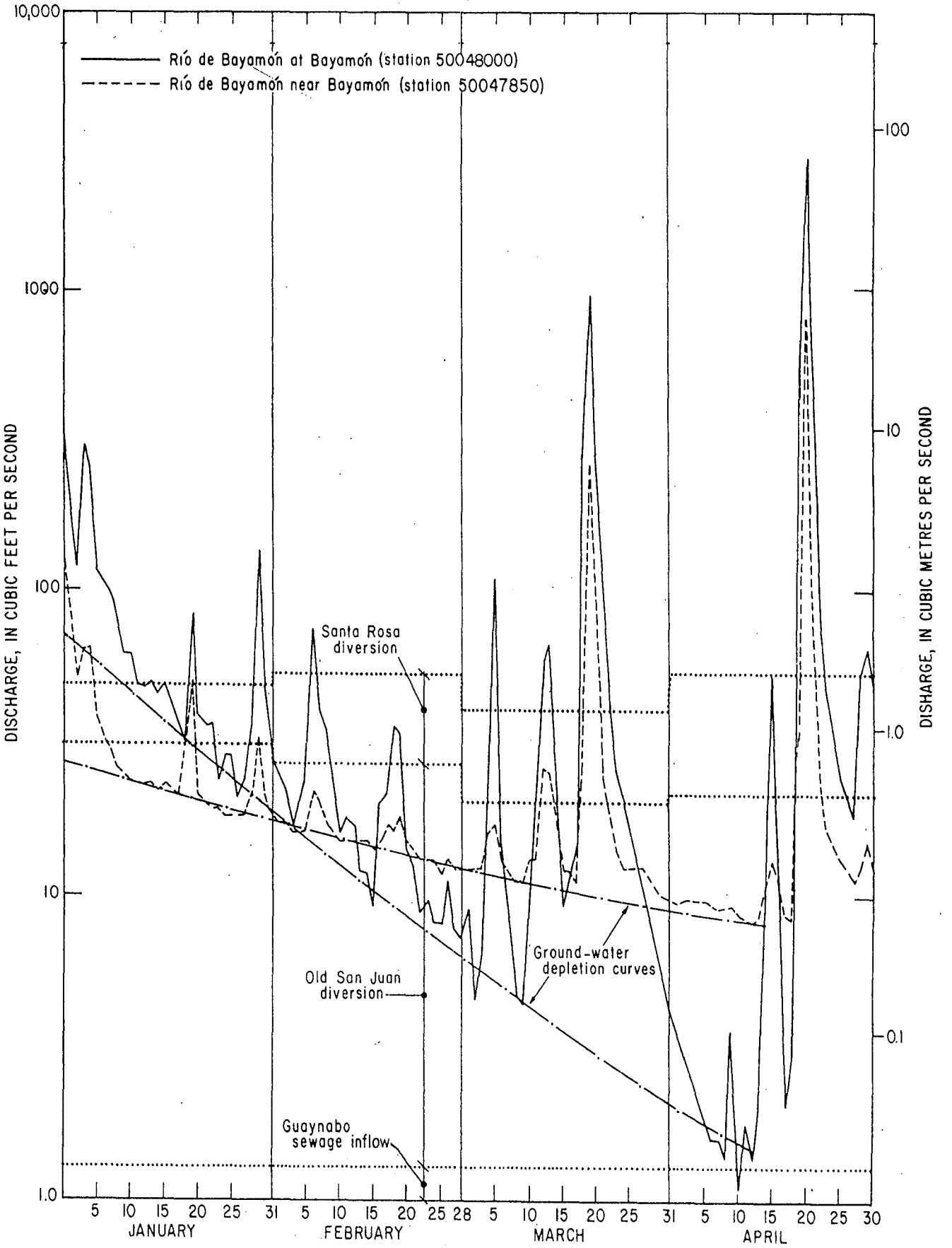


Figure 12.--Diversions of and sewage inflow to Río de Bayamón and discharge at Río de Bayamón near Bayamón (station 50 0478 50) and Río de Bayamón at Bayamón (station 50 0480 00), 1966.

Table 1.--Base flow of the Río de Bayamón, January–March 1966 (Discharge is in cubic feet per second)

Station	Drainage, square mile (km^2)	Date	Base flow, daily average	Diversions, daily average	Sewage, daily average	Total base flow, Daily average	Total base flow, $(ft^3/s)/mi^2$
50 0478 50 (volcanic rock only)	41.8 (108)	Jan.	22	31.5	0	53.5	1.28
		Feb.	15.5	27.0	0	42.5	1.01
		Mar.	10.4	20.0	0	30.4	.73
50 0480 00 (alluvium over volcanic rock)	71.9 (186)	Jan.	44	48	1	91	1.27
		Feb.	12	52	1	63	.88
		Mar.	4	40	1	43	.60
50 0480 00 minus 50 0478 50	30.1 (78.0)	Jan.				37.5	1.25
		Feb.				20.5	.68
		Mar.				12.6	.42

Gain or loss in flow of the Río de Bayamón, as it traverses the Aguada and Aymamón Limestones, is not known. In the basins west of the San Juan area, ground water from the limestone contributes from 21 to 50 percent of the runoff for seven major streams (Giusti and Bennett, in preparation). Because of the small areal extent of the limestones in the Bayamón area, the ground-water contribution probably is considerably less, and it may be that there is a net loss from the Río de Bayamón to the limestone.

The average precipitation (computed by the Thiessen method) for the Río de Bayamón basin in 1963-66 was 64 in (1,625 mm). Streamflow at Río de Bayamón at Bayamón station averages 28 in (710 mm) annually, including 8 in (205 mm) of diversions. Ground-water flow to the Río de Bayamón, but not accounting for losses to the alluvium upstream of the station, is largely from Cretaceous volcanic rocks and is estimated to be 15 in (380 mm) per year. The daily ground-water contribution to the river of 1.1 $(ft^3/s)/mi^2$ [12 $(l/s)/km^2$] was more than 50 percent of the total streamflow.

When ground-water levels are low, generally in the months of January through April, the alluvium and likely the Tertiary rock aquifers receive recharge from the river. In the upper 2 mi (3 km) of the alluviated valley, maximum stream loss is about 3 (10^6 gal/day)/linear mi [0.08 (m^3/s)/linear km] of channel. Downstream loss may be as great as 6 (10^6 gal/day)/linear mi [0.16 (m^3/s)/linear km] where the river crosses the outcrop of the limestones. On the coastal plain proper, the alluvium in and adjacent to the river channel is very fine to

clayey and the infiltration rate is probably much less than upstream. Hydrographs of wells and water quality of the Sabana Seca well field indicate some hydraulic connection between the limestone aquifer and the river.

If streamflow is available, an estimated 20×10^6 gal/day (0.9 m^3/s) probably is recharged to the aquifers during the dry months. During the rest of the year, the aquifers either are in balance with the stream system or contribute water to the stream.

CHEMICAL QUALITY OF WATER

Ground Water

The chemical differences of ground water in the aquifers in the San Juan area are very slight. The predominant ground water is a calcium bicarbonate type. Some ground water is a sodium sulfate type; however, water of this type does not conform to any recognizable pattern of distribution.

Ground water generally becomes more mineralized from the mountain region toward the coast (fig. 13) where the occurrence of the more soluble limestone formations and seawater contribute to the mineralization of ground water.

A summary of analyses of water samples from the unconfined aquifer, principally the Aguada Limestone, shows the water to be alkaline (pH 7.7 to 8.3), moderately high in dissolved-solids concentration (293 to 4,550 mg/l) and very hard (110 to 1,100 mg/l) but otherwise of good quality (table 2). The aquifer is susceptible to salt-water intrusion and the uppermost formation, the Aymamón Limestone, contains brackish or seawater along much of the coastline.

Ground water from the Cibao and San Sebastián Formations in both the unconfined and confined parts of the aquifer is considerably less mineralized than the water from the limestone aquifer. A summary of analyses of water from these formations is given in table 3.

For comparison, the median concentrations of dissolved solids, hardness and bicarbonate for the Cibao and San Sebastián Formations are 363, 195, and 226 mg/l, respectively; whereas, the median concentrations for the limestone formations are 525, 295, and 300 mg/l, respectively.

Figures 14 and 15 show the generalized distribution of chloride concentration and hardness in the unconfined aquifers in the metropolitan area.

Table 2.--Summary of chemical analyses of water from wells in limestone of the unconfined aquifer (15 samples)

Parameter	Concentration mg/l			
	Minimum	Maximum	Average	Median
Silica	9.5	52	29	30
Calcium	23	190	93	77
Magnesium	5.4	160	28	18
Sodium	20	1,570	205	83
Potassium	.6	17	3.7	2.2
Bicarbonate	160	396	285	300
Sulfate	3.8	330	56	24
Chloride	22	2,400	330	120
Fluoride	.0	.9	.2	.15
Nitrate	.0	12	2.6	.9
Dissolved solids	293	4,550	867	525
Hardness	110	1,100	344	295
Conductance (umhos)	517	7,680	1,500	920
pH	7.7	8.3	--	7.8
Temperature °C	25	27.8	26.1	26

Table 3.--Summary of chemical analyses of water from wells in sand of the confined aquifer (17 samples)

Parameter	Concentration, mg/l			
	Minimum	Maximum	Average	Median
Silica	9.6	56	38	43
Calcium	14	92	57	58
Magnesium	2.3	20	12.9	11
Sodium	10	120	57.5	46
Potassium	1.2	46	5.8	3
Bicarbonate	120	364	230	226
Sulfate	6	170	47	23
Chloride	17	190	57	34
Fluoride	.0	.4	.14	.1
Nitrate	.0	85	7.5	.6
Dissolved solids	253	619	400	363
Hardness	45	290	195	195
Conductance (umhos)	361	1,070	645	625
pH	7.3	8.5	--	8.0
Temperature °C	24.5	27.5	25.7	25.5

POSSIBILITIES FOR FURTHER INVESTIGATION

Deep Test Well

In metropolitan San Juan, a deep test well could be drilled to explore the geologic and hydrologic environment below 300 ft (90 m). In the present state of knowledge, the geologic composition and structure beneath San Juan is largely unknown. The specific objectives of a deep-well program would be threefold: 1) to test the sand and marl aquifer for artesian water at depth; 2) to determine the aquifer's hydraulic characteristics and extent of salt-water intrusion; and 3) to determine the feasibility of recharging aquifers through wells or subsurface storage of liquid wastes through wells.

Artificial Recharge

Further investigation could reveal if artificial recharge may have practical application in San Juan. Surplus runoff from upland streams might be used to recharge aquifers through wells or pits. The additional head might tend to move the salt-water front seaward, thereby safeguarding existing aquifers or possibly reclaiming a contaminated aquifer. The sand and marl aquifer possibly could be recharged through injection wells to create a reservoir to be tapped during drought.

Specific sites that might be suitable for recharge include: 1) the foothills of Montes de Hatillo on the San Sebastián Formation intake area; 2) the Sabana Seca Naval Station between the mogotes of the Aguada-Aymamón Limestone and in conjunction with this, the level of Caño El Hato could be raised, thereby creating a hydraulic barrier to seawater encroachment; and 3) a recharge pit in the intermogote valley, bottomed by the Cibao Formation and surrounded by Aguada Limestone hills, at Ft. Buchanan. The pit could recharge and freshen aquifers presently used in Las Palmas industrial area to the north. In addition, recharge wells installed north of the industrial area could act as a hydraulic barrier to seawater intrusion.

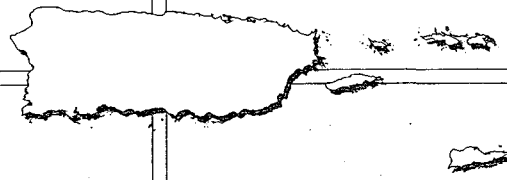
A collapsible dam or a tidal gate on the Río de Bayamón floodway, to prevent salt water from moving up the channel from the sea, has been considered by planners. Consideration might be given to an investigation of the effect on the aquifer with and without a control.

Effect of Urbanization on Recharge Areas

If runoff due to urbanization increases, there should be concomitant decreases in ground-water recharge to the aquifers. Investigation could determine the effects of urbanization on the ground-water reservoir and the extent of seawater intrusion. Some recharge areas have been cemented over or otherwise destroyed by construction.

REFERENCE: 14

Superfund PA/SI



ATLAS OF GROUND-WATER RESOURCES IN PUERTO RICO AND THE U.S. VIRGIN ISLANDS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 94-4198

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2.1.4 BAYAMÓN-LOÍZA REGION

By José M. Rodríguez and Thalia D. Veve

2.1.4.A Location and Major Geographic Features

The Bayamón-Loíza region covers about 280 mi^2 in the eastern North Coast area. It is bounded to the north by the Atlantic Ocean, to the west and south by the drainage basin divide of the Río de Bayamón, and to the east and south by the drainage basin divide of the lower Río Grande de Loíza (below Lago Loíza). Included in the Bayamón-Loíza region are the Río Bayamón, Río Piedras, and lower Río Grande de Loíza drainage basins (fig. 2.1.4.A-1). The San Juan metropolitan area is not only the principal population center of the Bayamón-Loíza region, but also of all Puerto Rico.

The northern section of the Bayamón-Loíza region consists of a coastal plain composed of deposits of sand, silt, clay, and sand muck overlying limestone formations, which form the principal aquifer. The elevation of the land surface in the coastal plain ranges from mean sea level to about 100 feet above mean sea level. An almost continuous strip of swamps and lagoons lies near the coast. The principal coastal lagoons are Laguna San José, Laguna La Torrecilla, and Laguna de Piñones. The southern part of the region is comprised mostly of the foothills of the inner uplands, which range in elevation from about 100 to 1,300 feet above mean sea level.

The principal streams flowing through the region are the Río Bayamón and Río Piedras which flow north, and the Río Grande de Loíza which flows northeast. The Río Bayamón has its headwaters in the mountainous interior of the island and flows across a wide alluvial valley surrounded by swamp deposits near the coast. The Río Piedras, a relatively short river that has its headwaters in the foothills, flows across a wide alluvial plain and discharges into Bahía de San Juan. The Río Grande de Loíza, with headwaters in the interior of the island (section 2.5), is the primary source of water filling Lago Loíza (the principal water-supply reservoir for the San Juan metropolitan area), on its course to the Atlantic Ocean.

2.1.4.B Population and Estimated Ground-Water Use

The Bayamón-Loíza region includes the San Juan metropolitan area, which is comprised of the capital city of San Juan, and the municipios of Bayamón, Guaynabo, Carolina, and Cataño (fig. 2.1.4.B-1). It also includes the municipios of Trujillo Alto, Loíza, and Canóvanas. A small area of the municipio of Cidra falls within the southern limits of the Bayamón-Loíza region. The population of the region was about one million in 1980 (table 2.1.4.B-1), which represented 26 percent of the population of Puerto Rico. In 1990, there was a slight increase in population of 7 percent to a total of about 1.1 million. About 89 percent of the total population of the Bayamón-Loíza region live in urban areas, and the remaining 11 percent live in rural areas. The municipios with the greatest percentage of rural population are Loíza and Canóvanas.

Estimated total ground-water withdrawals of 0.94 Mgal/d (table 2.1.4.B-2), were a small fraction of the total of about 158 Mgal/d of surface water distributed for public-water supply in the Bayamón-Loíza region in 1987 (Puerto Rico Aqueduct and Sewer Authority, 1988). Ground-water withdrawals for public use accounted for 0.17 Mgal/d during 1987. Public-water supply wells located throughout the San Juan metropolitan area were in stand-by status most of the time, and were activated only during emergency situations (fig. 2.1.4.B-1).

Table 2.1.4.B-1 Population for the Bayamón-Loíza region, Puerto Rico (U.S. Department of Commerce, 1982, table 1; U.S. Department of Commerce, 1991, table 1)

MUNICIPIO	1980 population			1990 population
	TOTAL	URBAN	RURAL	TOTAL
Bayamón	196,206	185,087	11,119	220,262
Canóvanas	31,880	7,260	24,620	36,816
Carolina	165,954	147,835	18,119	177,806
Cataño	26,243	26,243	0	34,587
Cidra	28,365	6,069	22,296	35,601
Guaynabo	80,740	60,706	20,036	92,886
Loíza	20,867	3,932	16,935	29,307
San Juan	434,849	424,600	10,249	437,745
Trujillo Alto	51,389	41,141	10,248	437,745
Total	1,036,493	902,873	133,622	1,126,130

Estimated ground-water withdrawals for industrial, agricultural, and domestic use were 0.59, 0.14, and 0.04 Mgal/d, respectively. Industrial wells are located principally in the coastal plain, but most agricultural and domestic wells are located south of Trujillo Alto and Carolina.

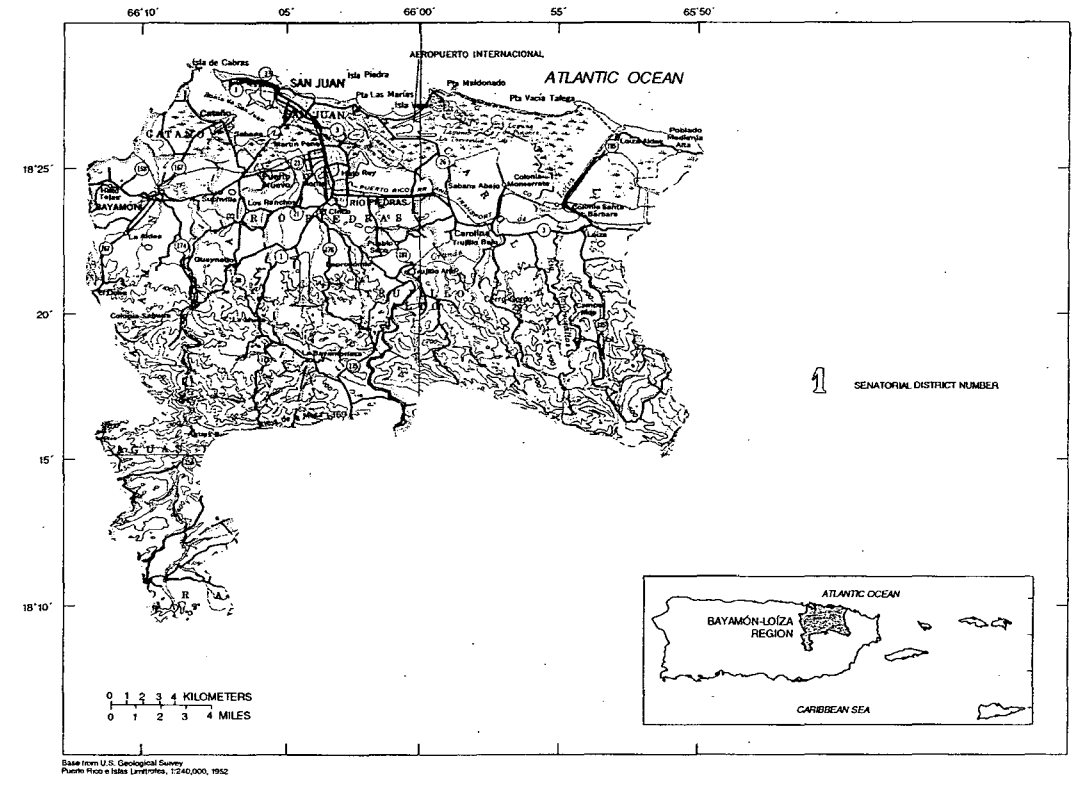


Figure 2.1.4.A-1 Location and major geographic features in the Bayamón-Loíza region, Puerto Rico.

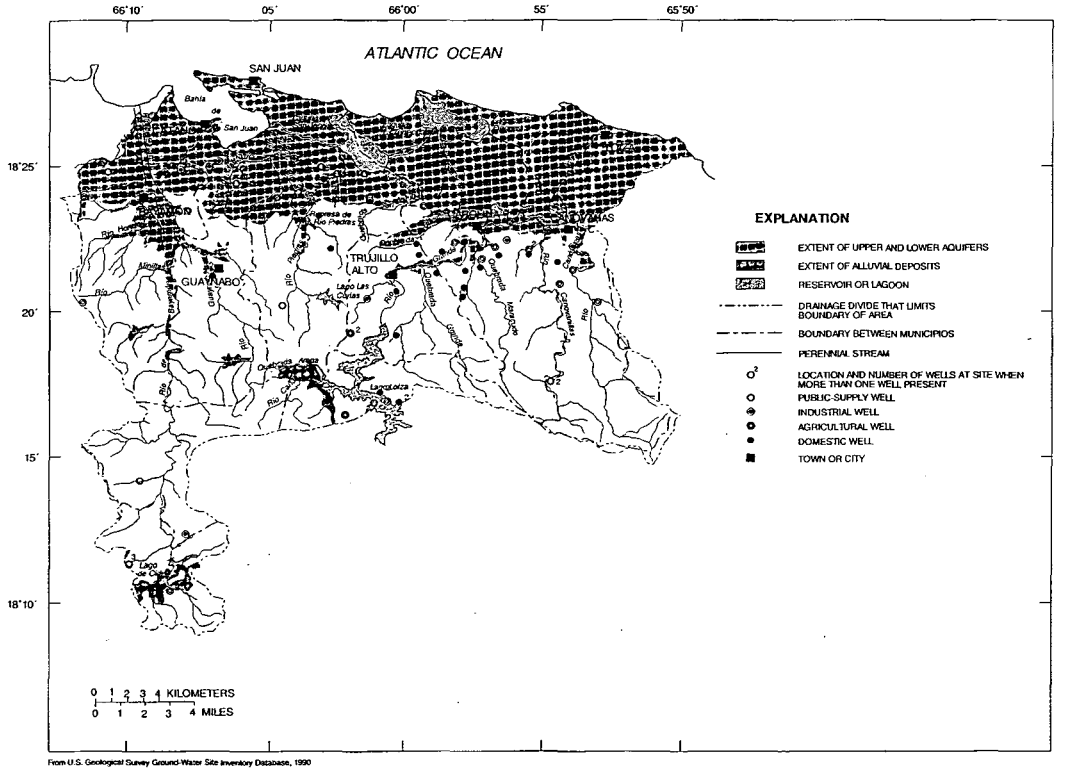
Table 2.1.4.B-2 Ground-water withdrawals and estimated population served during 1987 for the Bayamón-Loíza region, Puerto Rico

[Mgal/d, million gallons per day; ---, no data available]

[1] Use and supplier		[2]Estimated population served	Average ground-water withdrawals (Mgal/d)
I. Public Use			
1. San Juan		529	0.03
2. Bayamón		1,692	0.11
3. Carolina		529	0.03
	Subtotal	2,750	0.17
II. Industrial Use			
1. San Juan		---	0.22
2. Bayamón		---	0.25
3. Carolina		---	0.12
	Subtotal	---	0.59
[2]II. Agricultural Use			
1. Carolina		---	0.08
2. Trujillo Alto		---	0.03
3. Canóvanas		---	0.03
	Subtotal	---	0.14
IV. Domestic Use			
1. Carolina		---	0.01
2. Trujillo Alto		---	0.03
	Subtotal	---	0.04
	Total	2,750	0.94

[1] Municipios not listed under some specific use do not withdraw ground water for the subject use.

[2] Based on a water consumption of 63 gallons per person per day.



From U.S. Geological Survey Ground-Water Site Inventory Database, 1990

Figure 2.1.4.B-1 Approximate well locations in the Bayamón-Loíza region, Puerto Rico.

2.1.4.C Geologic Setting

Volcanic rocks, consolidated sedimentary rocks, and unconsolidated Quaternary surficial deposits are the three major rock types that occur within the Bayamón-Loíza region (fig. 2.1.4.C-1). Volcanic rocks of Cretaceous age are the most abundant rock type, and are exposed in more than half the region. They are composed of volcanic tuff, breccia and lava, associated sandstone, siltstone and limestone, and some intrusive igneous rocks. These volcanic rocks contain little water except in weathered and fractured zones. Consolidated sedimentary rocks of Tertiary age overlie the volcanic rocks in the northern part of the Bayamón-Loíza region. They are composed of consolidated gravel, sand and clay, and calcareous rocks ranging from marl to indurated limestone. The sedimentary rock formations have a seaward dip of four to six degrees, and are mostly exposed near Bayamón. Unconsolidated surficial deposits overlie the sedimentary rocks in the San Juan to Carolina area.

The consolidated sedimentary rocks have been differentiated into five formations in the Bayamón-Loíza region. In ascending order these formations are: the San Sebastián Formation of Oligocene age, the Mucarabones Sand and Cibao Formation of Oligocene to Miocene age, and the Aguada Limestone and Aymamón Limestone of Miocene age (Monroe, 1980a, p. 9).

The San Sebastián Formation is composed of cross-bedded to massive beds of sand, sand and gravel, and sandy clay, with some thin beds of sandstone and sandy limestone (Anderson, 1976, p. 9). The thickness of the San Sebastián Formation ranges from 165 to 330 feet, attaining its maximum thickness in the western part of the area and becoming thinner to the east. In the San Juan area, the San Sebastián Formation becomes indistinguishable from the overlying Mucarabones Sand and Quaternary deposits.

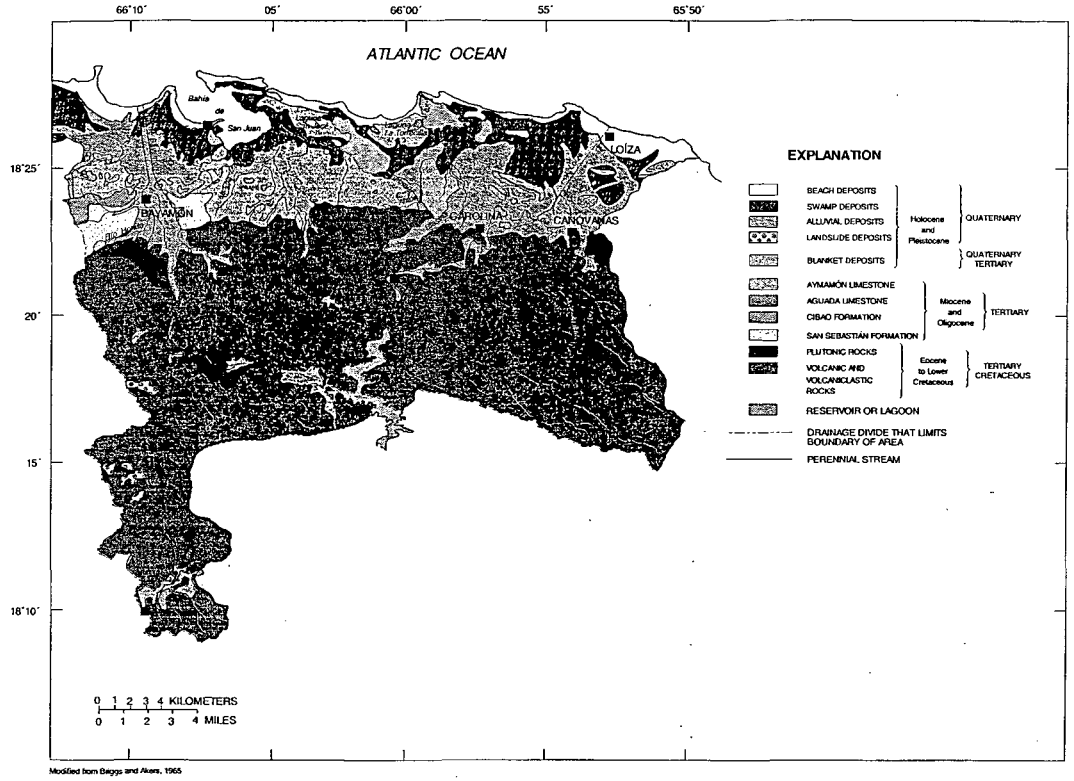


Figure 2.1.4.C-1 Generalized surficial geology in the Bayamón-Loíza region, Puerto Rico.

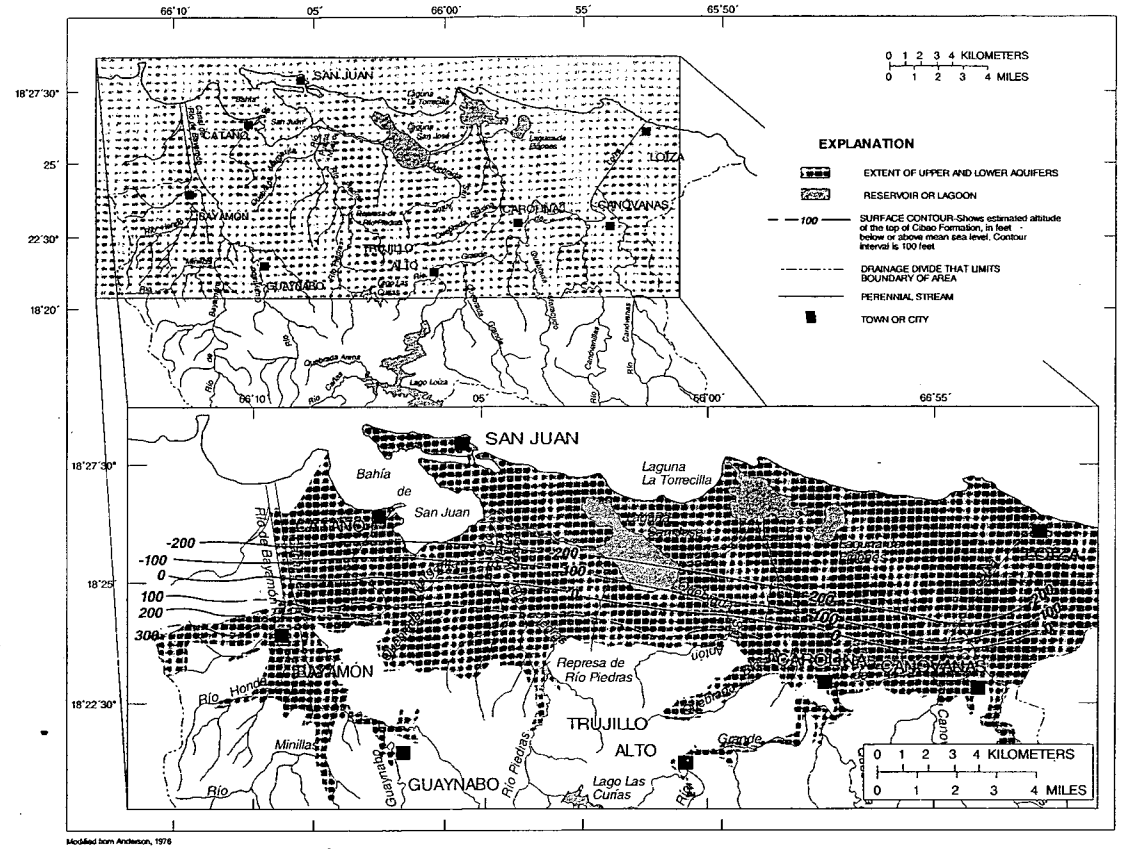
The Mucarabones Sand overlies the San Sebastián Formation and interfingers eastward with the lower part of the overlying Cibao Formation. East of the Río Bayamón, the Mucarabones Sand is composed of coarse sand interbedded with sandy limestone, coarse sandy clay, and lenses of gravel (Monroe, 1980a, p. 27). Near San Juan, the Mucarabones Sand appears to thin to less than 300 feet, from a maximum thickness of about 400 feet near Bayamón (Monroe, 1980a, p. 27).

The Cibao Formation overlies the Mucarabones Sand and is composed of interlensing beds of calcareous clay, limestone, sandy clay, sand, and gravel (Monroe, 1980a, p. 29). The thickness of the Cibao Formation in the city of Bayamón is about 160 feet.

The Aguada Limestone overlies the Cibao Formation and is a hard thick-bedded to massive calcarenite, and dense limestone interbedded with chalky limestone and marl (Briggs and Akers, 1965). Studies by Monroe (1973) indicate that the lower part of the Aguada Limestone intertingers with the upper part of the Cibao Formation eastward from the city of Bayamón. The thickness of the Aguada Limestone seems to range from about 80 to 260 feet in most of the area.

The Aymamón Limestone overlies the Aguada Limestone and consists mainly of thick-bedded to massive, commonly quartz free, very pure limestone (Monroe, 1980a, p. 53). This formation is largely covered throughout the area by unconsolidated surficial deposits. The thickness of the Aymamón Limestone is estimated to be as much as 2,000 feet at the coastline (Kaye, 1959).

The surficial deposits of Quaternary age cover the Tertiary age formations in the northern part of the region. These surficial deposits consist of alluvial deposits, blanket sands, beach and dune sands, and swamp deposits. The thickness of the surficial deposits is about 100 feet in the San Juan coastal areas.



Modified from Anderson, 1976

Figure 2.1.4.D-1 Altitude of the top of the Cibao Formation in the Bayamón-Loíza region, Puerto Rico.

2.1.4.D Hydrogeology

Two principal water-bearing units are present in the Bayamón-Loíza region: an upper water-table aquifer comprised of sedimentary rocks of Tertiary age and surficial deposits of Quaternary age; and a lower confined aquifer comprised mainly of sedimentary rocks of Tertiary age. The two units are separated by the upper member of the Cibao Formation, which acts as a confining unit.

The upper aquifer occurs in the uppermost rocks overlying the upper member of the Cibao Formation, the Aguada and Aymamón Limestones, and alluvial deposits. The Aguada and Aymamón Limestones are eroded and covered with alluvial deposits, and the upper part of the Cibao Formation becomes thinner near San Juan. As a consequence, the available freshwater in the upper aquifer around San Juan largely resides in surficial deposits. For the most part, according to Rodríguez-Martínez (1991, p. 12), the upper aquifer is absent in the San Juan metropolitan area, and where present, is thin and contains brackish water. The thickness of the upper aquifer is limited by the location of the saline-freshwater interface and the top of the Cibao Formation (fig. 2.1.4.D-1).

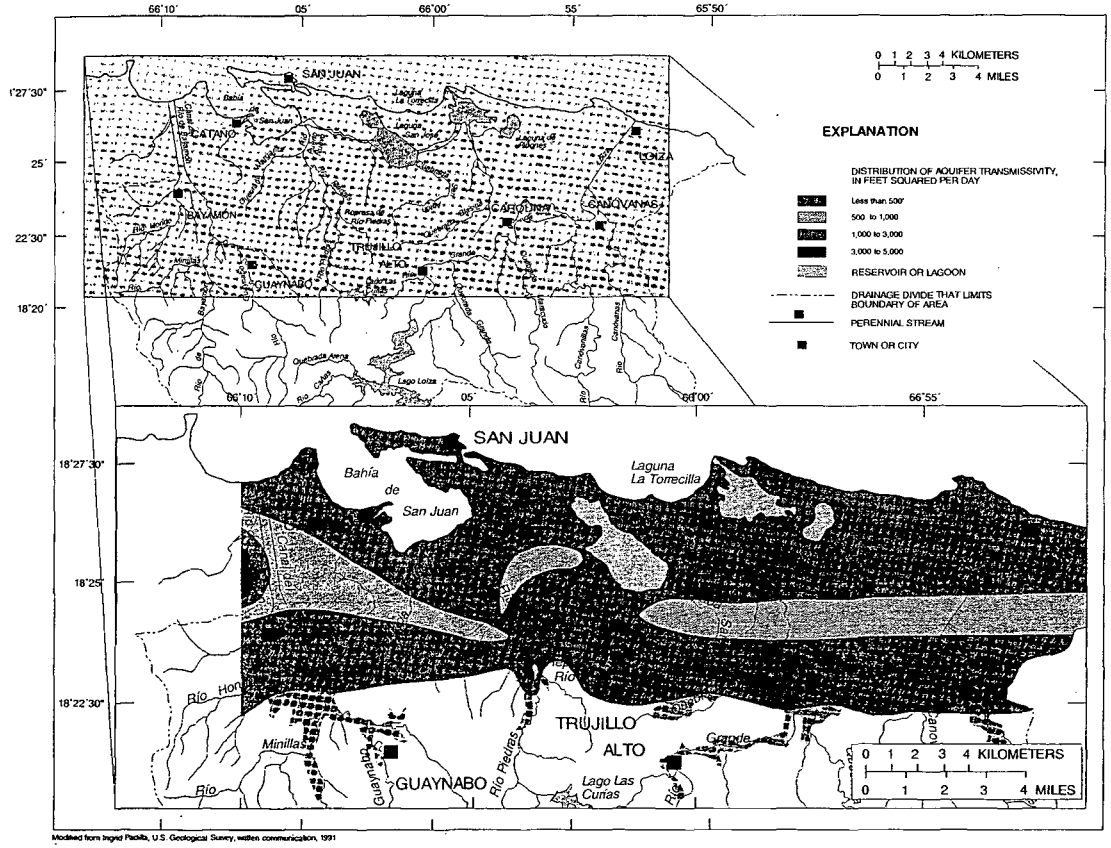


Figure 2.1.4.D-2 Transmissivity in the northern Bayamón-Loíza region, Puerto Rico.

The transmissivity of the upper aquifer ranges from less than 500 to more than 3,000 ft^2/d (Ingrid Padilla, U.S. Geological Survey, written communication,1991; fig. 2.1.4.D-2). Higher transmissivity values are measured west of the Canal del Río de Bayamón in the Toa Baja-Vega Baja region.

The lower aquifer occurs in the Mucarabones Sand and minor limestone lenses within the Cibao Formation (Rodríguez-Martínez, 1991, p.15). The lower aquifer is confined from Bayamón to San Juan, but east of Río Piedras, the formations that comprise this hydrologic unit pinch out. The transmissivity of the lower aquifer ranges from less than 150 to 2,000 ft^2/d (Anderson, 1976, p. 18). The quality of water in the lower aquifer ranges between fresh to brackish in the San Juan metropolitan area (Rodríguez-Martínez, 1991, p.15).

Some wells south of Trujillo Alto and Carolina yield water from the volcanic rocks in small quantities. The water that may be available in the volcanic bedrock flows through cracks and fissures in the weathered zones.

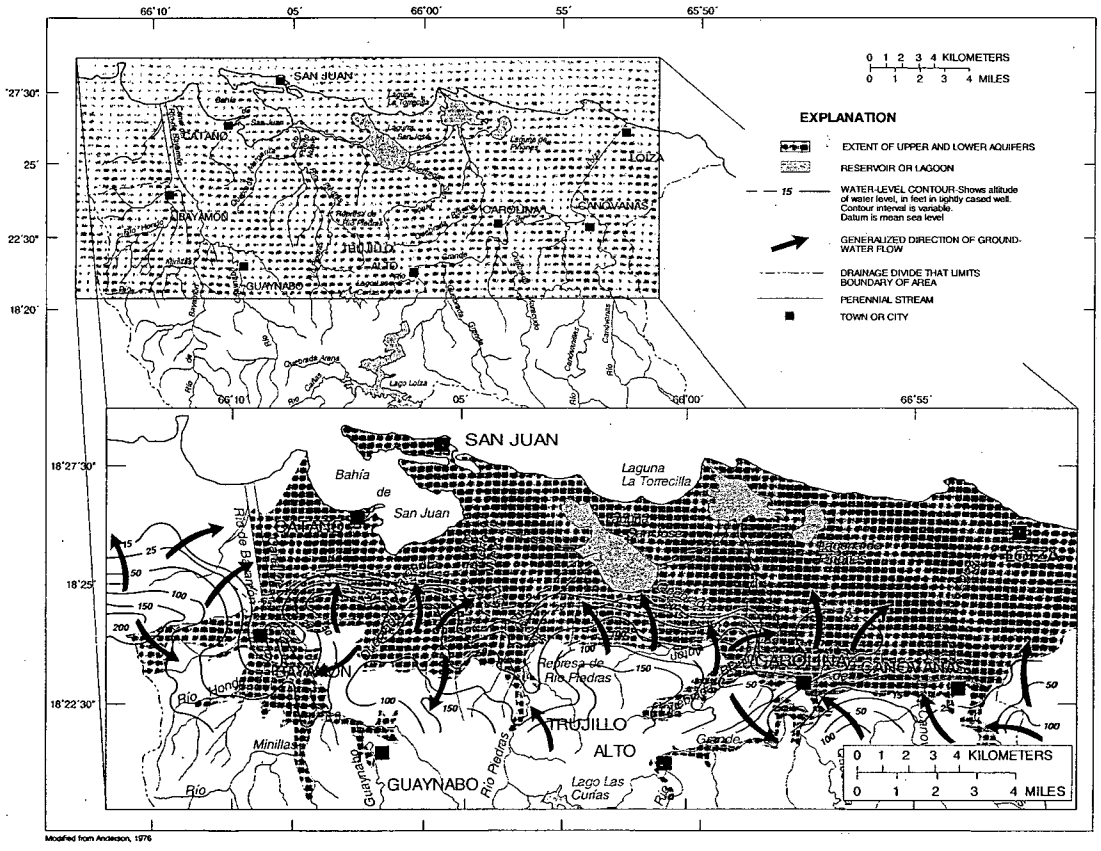


Figure 2.1.4.E-1 Altitude of water-level surface and direction of ground-water flow during 1971 in the Bayamón-Loíza region, Puerto Rico.

2.1.4.E Ground-Water Levels and Movement

Regional ground-water flow in the upper and lower aquifers within the Bayamón-Loíza region is northward from surficial exposures of the formations of Tertiary age, where the recharge occurs, to eventually discharge into swamps and lagoons along the coast (fig. 2.1.4.E-1). Ground water also moves locally towards the main stream systems of the Río Bayamón, Río Piedras, and Río Grande de Loíza.

Higher ground-water levels are observed during the rainy season, which occurs from August through November and from April to May, than during the dry season. The difference between the highest and the lowest water-level altitude during 1987 in one observation well near Cataño and another near San Juan was about 4 and 9 feet, respectively.

Recharge to the water-bearing formations in the area is primarily from rainfall, but also from infiltration of streamflow. In the highly urbanized San Juan metropolitan area another possible source of recharge to the aquifer is leakage from water and sewer lines (Anderson, 1976, p.15). According to Anderson (1976, p. 27), the Río Bayamón recharges the alluvium and the Tertiary age aquifers when ground-water levels are low, generally from January to April. During the rest of the year the aquifer either is in balance with the stream or contributes water to it.

2.1.4.F Soil Permeability

The soil associations overlying the aquifers in the Bayamón-Loíza region belong to the humid coastal plains group (fig. 2.1.4.F-1). These soil associations are Cataño-Aguadilla, Almirante-Vega Alta-Matanzas, Martín Peña-Saladar-Hydraquents, Swamps-Marshes, Coloso-Toa-Bajura, and Toa-Coloso-Bajura.

The dominant soil association in the Bayamón-Loíza region is the Almirante-Vega Alta-Matanzas, which covers most of the west and west central parts of the aquifer area. The soils of this association are described by Boccheciamp (1978, p. 5) as deep, gently sloping, well drained soils of clayey texture on terraces and alluvial fans of the coastal plain. The Almirante-Vega Alta-Matanzas association ranges in thickness from near zero to 84 inches and has a permeability of 0.60 to 2.00 in/hr.

The second important soil association is the Coloso-Toa-Bajura, which covers most of the eastern part of the aquifer. This association is composed of deep, moderately well- to poorly-drained, nearly level soils on flood plains (Boccheciamp, 1977, p. 3). The Coloso-Toa-Bajura association is derived from fine- to moderately-fine textured sediment of mixed origin. The dominant permeability values in this association range from 0.06 to 0.20 in/hr, although the Toa series within the Coloso-Toa-Bajura association has a permeability of 0.60 to 2.00 in/hr. Thickness of soils in the Coloso-Toa-Bajura association ranges from near zero to 70 inches.

Other soil associations are not extensive in the region. The Swamps-Marshes association covers the northeast, in areas adjacent to the San José, La Torrecilla, and Piñones lagoons. These are deep, very poorly drained soils in the coastal plains, whose characteristics are too variable to be estimated. The Martín Peña-Saladar-Hydraquents association occupies the area surrounding the Bahía de San Juan. These soils are deep, nearly level, and very poorly drained. They are located in low depressions and lagoons of the coastal plains, and permeability generally ranges from 0.60 to 2.00 in/hr. In the Martín Peña series, a permeability at a depth of 18 inches decreases to less than 0.06 in/hr. Thickness of soils in the Martín Peña-Saladar-Hydraquents association ranges from near zero to 63 inches. The Toa-Coloso-Bajura soil association overlies the alluvial deposits located along the Río de Bayamón in the northwestern part of the upper aquifer. This association has a dominant permeability of 0.06 to 0.20 in/hr, although the upper 16 inches in the Coloso series has a permeability of 0.20 to 0.60 in/hr, and the Toa series has a permeability of 0.60 to 2.00 in/hr. Thickness of soils in the Toa-Coloso-Bajura association range from near zero to 70 inches. The Cataño-Aguadilla soil association is present in a fringe bordering the coast in the northeastern part. This soil association has the greatest permeability of any within the region (>20 in/hr); however, the upper 8 inches in the Aguadilla series have a permeability of 6 to 20 in/hr. Thickness of these soils ranges from near zero to 64 inches.

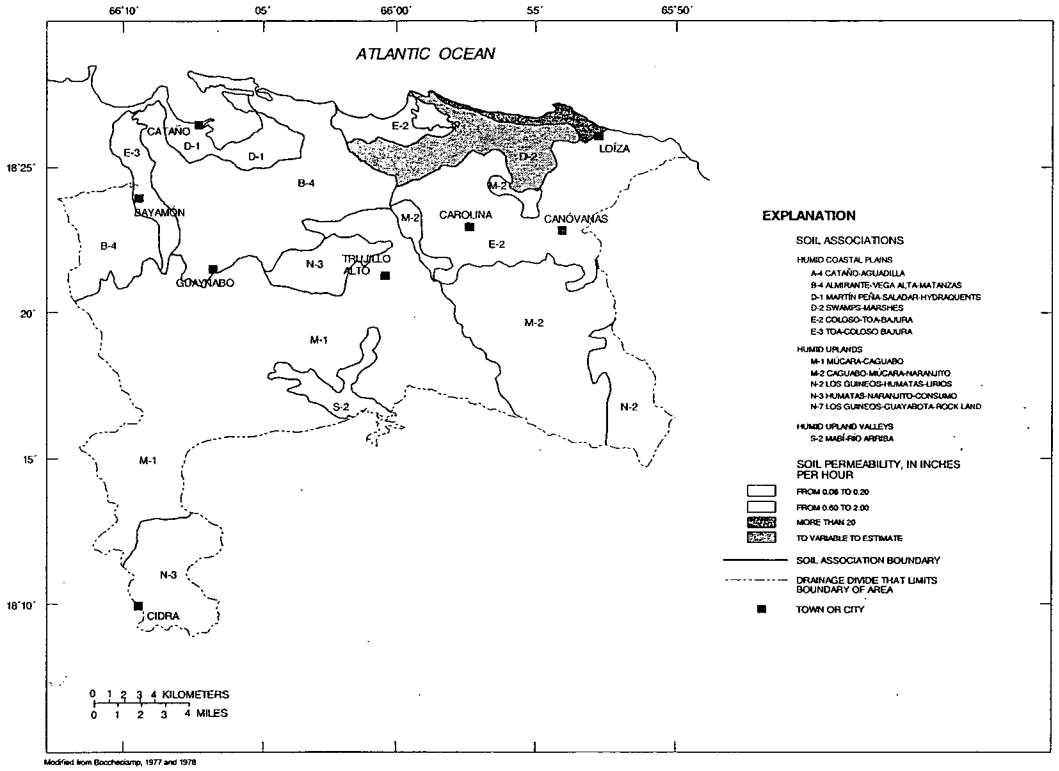
Thickness, permeability, and available water-capacity values are listed for all the soil associations present within the Bayamón-Loíza region (table 2.1.4.F-1). Soil associations present in the upland areas south of the coastal aquifer areas and their characteristics are included in table 2.1.4.F-1.

Table 2.1.4.F-1 Thickness, permeability, and available water capacity for the soil associations in the Bayamón-Loíza region, Puerto Rico (Modified from Boccheciamp, 1977 and 1978)

[>, more than]

Area and soil association	Thickness (inches)	Permeability (inch per hour)	Available water capacity (inch per inch)
Humid Coastal Plains			
Cataño-Aguadilla	0 to 64	>20.00	0.03 to 0.05
Almirante-Vega Alta-Matanzas	0 to 84	0.60 to 2.00	0.10 to 0.20
[1]Martín Peña-Saladar-Hydraquents	0 to 63	0.60 to 2.00	0.12 to 0.20
[1]Swamps-Marshes		too variable to estimate	
Coloso-Toa-Bajura	0 to 70	0.06 to 0.20	0.12 to 0.20
Toa-Coloso-Bajura	0 to 70	0.06 to 0.20	0.12 to 0.20
Humid Upland Valleys			
Mabí-Río Arriba	0 to 60	0.06 to 0.20	0.15 to 0.20
Humid Uplands			
Múcara-Caguabo	0 to 30	0.63 to 2.00	0.05 to 0.17
Caguabo-Múcara-Naranjito	0 to 40	0.60 to 2.00	0.05 to 0.19
Los Guineos-Humatas-Lirios	0 to 60	0.60 to 2.00	0.10 to 0.20
Humatas-Naranjito-Consumo	0 to 60	0.60 to 2.00	0.10 to 0.20
Los Guineos-Guayabota-Rock Land	0 to 60	0.06 to 0.20	0.15 to 0.20

[1] High water table



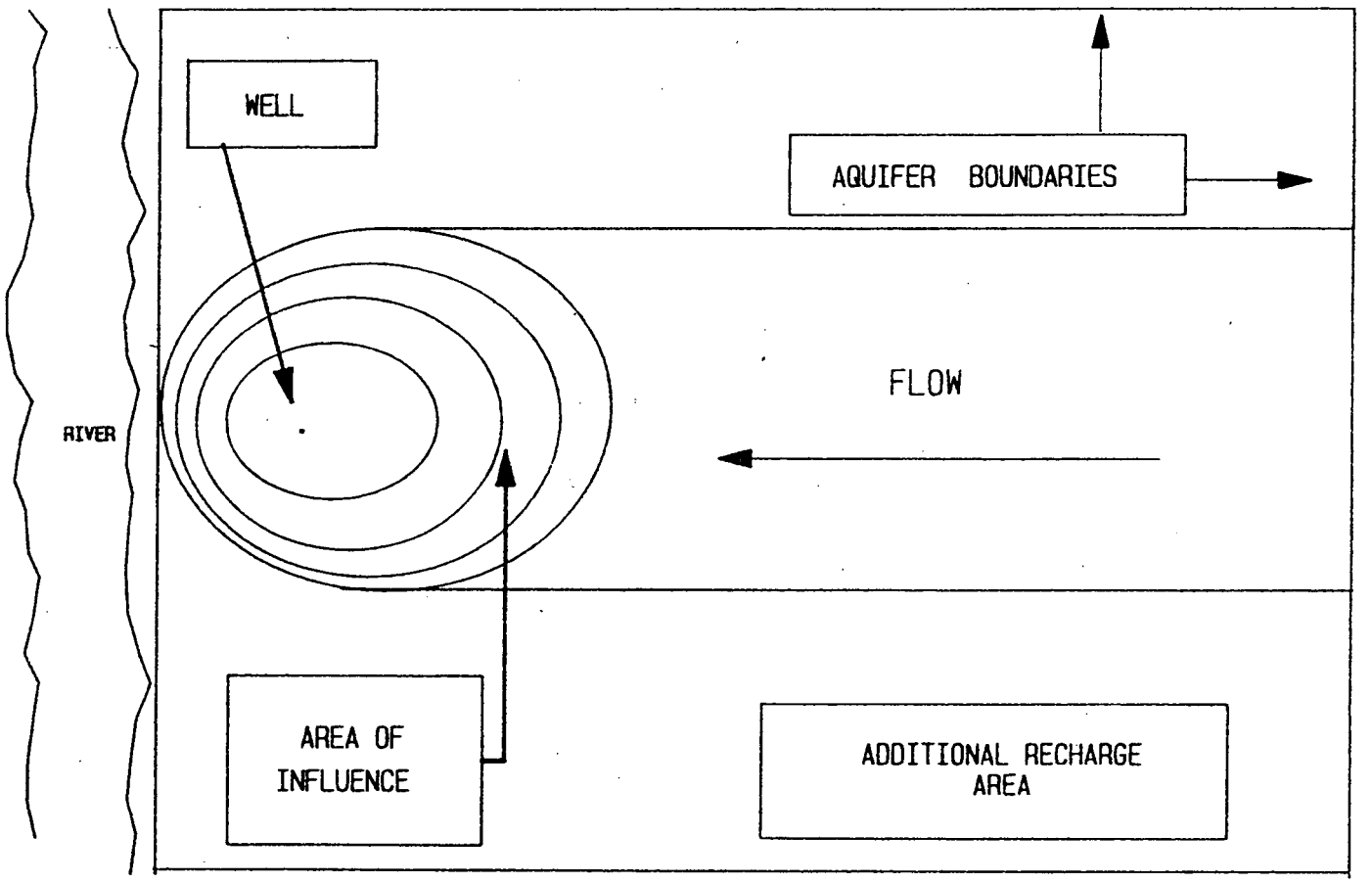
Modified from Boccheciamp, 1977 and 1978

Figure 2.1.4-F-1 Soil associations and permeability in the Bayamón-Loíza region, Puerto Rico.

REFERENCE: 15

169
5-15

COMMONWEALTH OF PUERTO RICO
OFFICE OF THE GOVERNOR
ENVIRONMENTAL QUALITY BOARD



FINAL

WELLHEAD PROTECTION PROGRAM

APRIL 1991

Chapter 3: Wellhead Protection Area Delineation

EQB, as lead agency is responsible for the development and implementation of the WHP Program, and will develop a method to delineate WHPA's for wells that are used as sources of drinking water. The Groundwater Pollution Control Project, under the Water Quality Area of EQB is currently developing a program for the protection of groundwater in Puerto Rico from contamination of different sources. This program has developed the "Groundwater Quality Management and Protection Strategy for Puerto Rico", with the supervision of EPA, and with the cooperation and assistance of other related state and federal agencies that deal with groundwater in Puerto Rico.

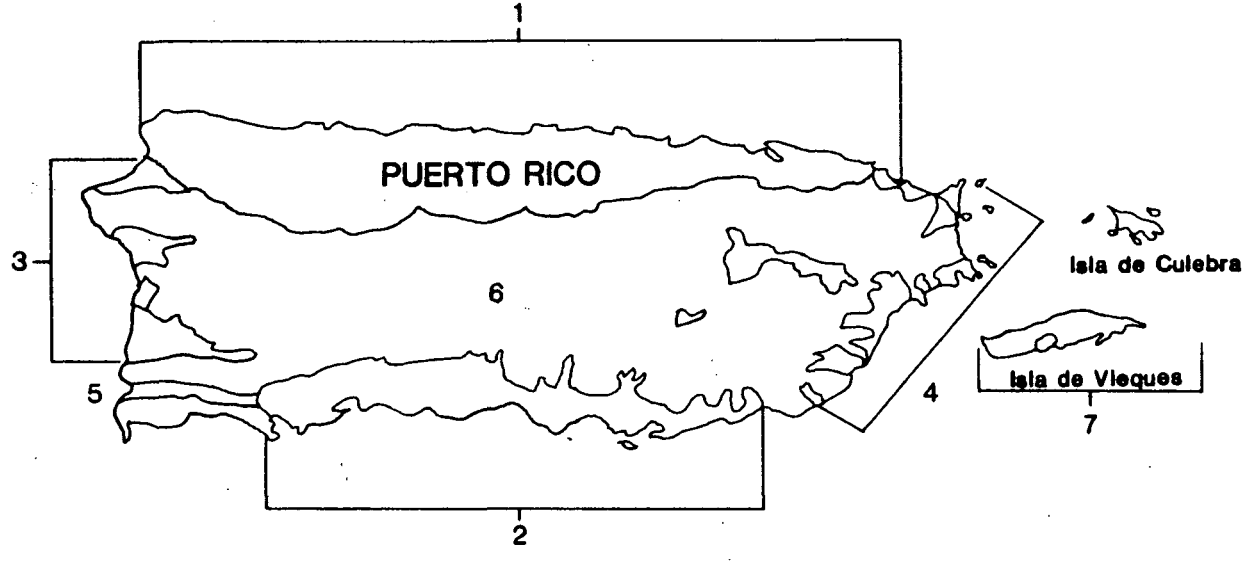
This strategy is aimed at establishing a coordinated effort for the protection of groundwater resources in Puerto Rico. Wellhead protection activities will be included as part of the tasks that EQB is developing in conjunction with this groundwater protection strategy for Puerto Rico. Given the fact that the EQB Groundwater Pollution Control Project has most of the information on wells and well contamination available through efforts initiated with the implementation of the groundwater protection strategy for Puerto Rico, EQB is in the position to initiate the establishment of WHP areas in Puerto Rico.

WHPA's delineation in Puerto Rico will be established by EQB taking into consideration the Island's limited territorial extension. Wells in Puerto Rico have been and are frequently located (1) near or within urban areas, (2) in densely populated

rural communities or (3) near industrial facilities. A general delineation goal consisting of wellfield management areas, including large land portions, may prove to be impractical for Puerto Rico. Many of these urban, rural or industrial zones are already located in well recharge areas. Many contaminant attenuation zones around potable water wells in Puerto Rico may contain portions of residential or industrial zones that constitute potential sources of contamination for groundwater. Most of the largest urban communities and industrial facilities in Puerto Rico are located in coastal areas and alluvial plains, where most of the island's most productive aquifers are encountered. Therefore, the wellhead protection program needs to take into consideration the island's limited land availability and the increasing industrial and urban developments in aquifer-bearing areas in Puerto Rico when delineating the wellhead protection areas throughout the island.

The occurrence and distribution of water resources in Puerto Rico will play an important role in the delineation of wellhead protection areas in Puerto Rico. These delineations need to be developed according (1) to the hydrogeologic characteristics and (2) available information of the island's aquifers. For conveniences of the WHP program, the island's aquifers have been grouped into the following seven (7) ground-water provinces in Puerto Rico shown in Figure 1 and listed in Table 1:

1. North Coast Province
2. South Coast Province
3. West Coast Province
4. East Coast Province



EXPLANATION

1. North Coast Province
2. South Coast Province
3. West Coast Province
4. East Coast Province
5. Lajas Valley
6. Interior Province
7. Vieques, Culebra

Figure 1.--Ground-water provinces in Puerto Rico (Modified from Gomez-Gomez, 1987)

TABLE 1. Wellhead Protection Area (WHPA) subdivisions in Puerto Rico and corresponding delineation methods.

Groundwater province	Aquifer or area	Type of aquifer	WHPA delineation Phase I	WHPA delineation Phase II	Status of USGS numerical groundwater flow model
North Coast...	San Juan	Leaky (alluvium limestone)	Distance (fixed radius 1500 feet)	Time-of-travel (analytical Approach #2)	Near Completion
	Vega Alta	Unconfined (alluvium limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available
	Manatí	Unconfined (alluvium limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available Being Updated
	Arecibo	Unconfined (alluvium limestone)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	In Progress
	Aguadilla	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	In Progress
	Artesian aquifer	Confined	Aquifer boundary (recharge area delineation)	Aquifer boundary (recharge area delineation)	Near Completion
East Coast...	Fajardo	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #1)	None
	Naguabo-Humacao	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	Available
	Yabucoa	Unconfined (alluvium)	Distance (fixed radius)	Time-of-travel (analytical Approach #2)	None
	Maunabo	Unconfined (alluvium)	Distance (fixed radius)	Distance (calculated radius Approach #1)	None

REFERENCE: 16

TELEFAX
DEPARTAMENTO CONTROL AMBIENTAL

PARA: Miriam Ortiz

FAX: (787) 766-0150

ASUNTO: Información pozos Metro

FECHA: 27-enero-2004

PÁGINAS: 2

COMENTARIOS: Para mas información puede comunicarse con nosotros a la ofcicina.

Priscila M. García
Directora Departamento Control Ambiental
Autoridad de Acueductos y Alcantarillados
Ave. Barbosa 604
Hato Rey, PR 00917
(787) 620-2277, ext. 2399
Telefax (787) 620-3749

NOMBRE POZO	DIRECCIÓN FÍSICA	TIPO POZO	PROFUNDIDAD	PRODUCCIÓN	DISPONIBILIDAD MUESTREO	COMENTARIOS
Las Américas	Calle 47 SE, Esq. 26 SE, Puerto Nuevo (al lado del Condominio Las Américas)	Freático	150 pies	300 gpm	Tiene pluma	Pozo de reserva está apagado.
Hiram Bithorn I	Ave. Domenech (final)	Freático	250 pies	212 gpm	Tiene pluma	Pozo de reserva está apagado.
UPR 1	N/A	N/A	N/A	N/A	N/A	Se eliminó con el Tren Urbano.
UPR 4	Ave. Barbosa	Freático	283 pies	0	N/A	Está completamente abandonado. Está pendiente de cierre final.

03:00P

P.02

FORMULARIO DE INSPECCION A POZOS DE EXTRACCION DE AGUA POTABLE

1. INFORMACION PRELIMINAR

Fecha de Inspección: 10/01/03

Hora de Comienzo: _____

Hora de Terminación: _____

Nombre del Técnico: I. Reyes / R. Español

Nombre del Representante de la AAA: Pedro Ortiz Maldonado.

Nombre del Archivo del GPS: _____

2. IDENTIFICACION DEL POZO

Nombre del Pozo: Hiran Betronn I

Dirección: Después del Hospital El Maestro Ave Domenech (Final)

Número de Permiso del Departamento de Salud (PWSA): _____

Número de Franquicia del DRNA: _____

Población Servida: 1581248

Número del Sistema (ID) Number: 2591

Cuadrángulo: 1

Coordenadas: Latitud: 182445.22

Longitud: 660413.99

Nombre del Sistema: Metropolitano

Código del Municipio: 127

Cuenca Hidrográfica: PREE 0086

Tipo de Bomba ( ) Sumergida ( ) Horizontal ( ) Vertical

3. TIPO DE USO:

( ) Industrial
( ) Industrial y Potable
(✓) AAA
( ) No-AAA
( ) Agrícola
( ) Otro

4. ESTADO O SITUACION:

( ) Activo
( ) Inactivo
( ) Abandonado
( ) Oasis
(✓) Se activa en casos de emergencias o sequías

5. PROFUNDIDAD: _____

Promedio de Bombeo: 300 gal/min) _____

Tipo de Tratamiento:

( ) gaseosa ( ) Líquida ( ) Filtración

POZOS EN OPERACION
Región Metro

Región	Municipio	PWSID	Nombre del Pozo	Dirección
Metropolitana	Hato Rey		Baldrich	Ext. Roosevelt, Hato Rey
Metropolitana	Toa Baja	2591	Campanilla 1	PR 865, Km. 4, Calle Principal Bo. Campanilla
Metropolitana	Toa Baja	2591	Campanilla 3	PR 865, Km. 0.8, Bo. Campanilla
Metropolitana	Toa Baja	2591	Campanilla 6	PR 865, Km. 2.2 (entrando lechería), Sec. Maví
Metropolitana	Toa Baja	2591	Campanilla 7	PR 865, Km. 2.2 (entrando lechería), Sec. Maví
Metropolitana	Toa Baja	2591	Campanilla 8	PR 865, Km. 2.2 Int. (entrando lechería), Sec. Maví
Metropolitana	Río Piedras	2591	Centro Médico	Centro Médico
Metropolitana	Bayamón	2591	Estancias de Cerro Gordo	Calle 8 (detrás Parque Pasivo), Ext. Cerro Gordo
Metropolitana	Río Piedras	2591	Gabriela Mistral	Ave. Piñeiro
Metropolitana	Río Piedras	2591	Hiram Bithorn ✓	Ave. Domenech Final
Metropolitana	Río Piedras	2591	Las 400 (Cedro)	Carr. 185, Km. 12.5, Bo. Carraizo
Metropolitana	Hato Rey	2591	Las Américas ✓	Urb. Las Américas → Stand By
Metropolitana	Toa Baja	2591	Levittown 10	Calle Font Higuyot, Paseo Vecinal, Levittown
Metropolitana	Toa Baja	2591	Levittown 4	Calle Las Palmas, Esq. Progreso, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 5	Calle Progreso, Parcelas 94, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 6	Calle Crispé, Esq. Marginal Este, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 7	Calle Marginal Oeste, Esq. Parcelas Nuevas, Sabana Seca
Metropolitana	Toa Baja	2591	Levittown 9	Calle Font Higuyot, Paseo Vecinal, Levittown
Metropolitana	Río Piedras	2591	Manuel A. Pérez	Res. Manuel A. Pérez
Metropolitana	Toa Baja		Media Luna 1	Carr. 2, Intersección 165
Metropolitana	Toa Baja		Media Luna 2	Carr. 2, Intersección 165
Metropolitana	Toa Baja		Media Luna 3	Carr. 2, Km. 21
Metropolitana	Río Piedras		Miguel Such	Ave. Barbosa, Frente Esc. Vocacional → dentro de un radio de 2 mi inoperante
Metropolitana	Río Piedras	2591	Parque Escorial I	Ave. 65 Inf. Int., Antiguo Hipódromo
Metropolitana	Río Piedras	2591	Parque Escorial II	Ave. 65 Inf. Int. PR 8
Metropolitana	Bayamón		Río Bayamón	Planta Río Bayamón, Carr. 29 Int. 21
Metropolitana	Río Piedras	2591	Sabana LLana	
Metropolitana	Bayamón	2591	Santa Rosa	Carr. 174, Ave. Main, Urb Santa Rosa
Metropolitana	Río Piedras	2591	Sorbona	Calle Sorbona, University Gardens
Metropolitana	Hato Rey		Truman	Calle Pereira Leal 567, Urb. Valencia
Metropolitana	Río Piedras		UPR #1 ✓	Terrenos UPR, Ave. Barbosa
Metropolitana	Río Piedras		UPR #4 ✓	UPR, Ave. Barbosa
Metropolitana	Carolina	2591	Urrutia	PR 853, Km. 11.4, Bo. Masas
Metropolitana	Toa Baja	2591	Candelaria Arena	
Metropolitana	Toa Baja	2591	Levittown 8	
Metropolitana	Carolina	2591	Villa Fontana	
Metropolitana	Carolina	2591	Villa Fontana II	
Metropolitana	Loiza	2591	Loiza Valley	
Metropolitana	San Juan	2591	Dos Pinos	
Metropolitana	San Juan	2591	Ext. Roosevelt	abandonado
Metropolitana	San Juan	2591	Reparto Metropolitano	
Metropolitana	San Juan	2591	UPR - Ponce de León	

Pozo Truman - dentro de radio de 2 mi Este facilidad
Puerto Nuevo - Oeste de la fac. ra. de 2 mi

FORMULARIO DE INSPECCION A POZOS DE EXTRACCION DE AGUA POTABLE

1. INFORMACION PRELIMINAR

Fecha de Inspección: 10/1/03

Hora de Comienzo: _____

Hora de Terminación: _____

Nombre del Técnico: R. Espanol / I Reyes

Nombre del Representante de la AAA: Sup. Pedro Ortiz

Nombre del Archivo del GPS: P9095C

2. IDENTIFICACION DEL POZO

Nombre del Pozo: Los Americos

Dirección: C/ 47 SE Esq. 26 URB. Los Americos

Número de Permiso del Departamento de Salud (PWSA): _____

Número de Franquicia del DRNA: _____

Población Servida: 1581248

Número del Sistema (ID) Number: 2591

Cuadrángulo: _____

Coordenadas: Latitud: 18 24 09-83

Longitud: 66 04 31. 46

Nombre del Sistema: Metropolitana PRASA

Código del Municipio: 127

Cuenca Hidrográfica: PRE. 0086

Tipo de Bomba (✓) Sumergida ( ) Horizontal ( ) Vertical

3. TIPO DE USO:

( ) Industrial
( ) Industrial y Potable
(✓) AAA
( ) No-AAA
( ) Agrícola
( ) Otro

4. ESTADO O SITUACION:

( ) Activo
(✓) Inactivo
( ) Abandonado
( ) Oasis
( ) Se activa en casos de emergencias o sequías

5. PROFUNDIDAD: 120

Promedio de Bombeo: 50 gal/min) _____

Tipo de Tratamiento:

( ) gaseosa (✓) Líquida ( ) Filtración

FORMULARIO DE INSPECCION A POZOS DE EXTRACCION DE AGUA POTABLE

6. FUENTES DE CONTAMINACION EN 1,500 PIES ALREDEDOR DEL POZO (AREA DE PROTECCION INMEDIATA):

   a) _____; En Inventario Sí _____ No ____
   b) _____; En Inventario Sí _____ No _____
   c) _____; En Inventario Sí _____ No _____

7. REQUISITOS DEL POZO:

   a) Bitácora Sí ____ No ____

   b) Grifo sin rosca (antes del punto de aplicación del desinfectante) Sí _____ No ____

   c) Sistema Eléctrico Sí _____ No _____

   d) Fecha de Construcción Sí _____ No _____

   e) Enverjado Sí _____ No _____

   f) Medidor de flujo (debe ser instalado antes de la aplicación del desinfectante) Sí _____ No ____

   g) Iluminación exterior (sobre el área del pozo) Sí ____ No ____

8. OBSERVACIONES O DEFICIENCIAS ENCONTRADAS:

   a)
   b) CARTA de CIERRE
   c)

TABLA DE DEFICIENCIAS A POZOS DE EXTRACCIÓN DE AGUA POTABLE

NOMBRE DEL POZO: LAS AMERICAS

DIRECCIÓN: _____

_____

COORDENADAS: LAT. _____; LONG. _____

DEFICIENCIAS U OBSERVACIONES	
1. No se encontró deficiencia alguna.	
2. Falta de mantenimiento en los alrededores.	
3. Medidor de flujo dañado.	
4. Gotereo en la reguladora.	
5. El pozo se encontraba inactivo por bajo en productividad.	
6. Gotereo en la incorporación del punto de aplicación del desinfectante.	
7. No hay iluminación exterior sobre el área del pozo.	
8. No tiene grifo sin rosca antes del punto de aplicación del desinfectante. Esto es necesario para que no se afecte la muestra de orgánicos volátiles.	
9. No tiene medidor de flujo el cual debe ser instalado antes de la aplicación del desinfectante.	
10. La tubería del sistema está en condición deteriorada.	
11. Gotereo en incorporación cerca del codo de 90.	
12. Gotereo en grifo de agua cruda o tratada.	
13. No se le aplica tratamiento al sistema del pozo. De ocurrir algún cambio de tratar el agua cruda favor de informarlo.	
14. Los cables del sistema eléctrico que proviene de la bomba de agua hasta el panel eléctrico se encuentran sin ninguna protección.	
15. Como mecanismo de protección o posible vandalismo al pozo, deberán reparar el enverjado.	
16. No tiene alarma para emergencia de escape del cloro gas.	
17. Derrame de cloro en el terreno.	
18. Cierre Inadecuado.	
19. Otras Candado de cierre.	

REFERENCE: 17

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

GSA Center
651 Federal Drive, Suite 400-15
Guaynabo, P.R. 00965

ERRATA

"Puerto Rico: Humedales"
U.S. Geological Survey Water-Supply Paper 2425

The first sentence of the description of the palustrine, lacustrine, and riverine wetlands should read as follows:

"Humedales de agua dulce sujetos **y no sujetos** al flujo y reflujo de las mareas..."

Note: a copy of this sheet should accompany every publication copy. Please, reproduce copies of this sheet as needed.

Puerto Rico
Humedales

La isla de Puerto Rico, localizada al noreste del Mar Caribe y sus islas principales, Vieques, Culebra e Isla de Mona, poseen humedales en abundancia. El clima subtropical, la lluvia abundante y las complejas formas topográficas y geológicas de estas islas dan origen a los humedales, que varían desde los raros e inusuales bosques cubiertos por nubes en las tierras altas, hasta los extensos manglares, yerbas marinas y arrecifes de coral a lo largo de las costas Norte y Sur. Sin embargo, los humedales en Puerto Rico han disminuido en los últimos siglos como resultado del aumento en el desarrollo agrícola, poblacional y turístico. Algunos tipos de humedales como los bosques de palo de pollo (Pterocarpus officinalis) se han reducido a sólo unos pocos remanentes (figura 1).

Biológicamente hablando, los humedales de las islas están entre las áreas más productivas. Los humedales asociados con el bosque pluvial en las tierras altas del interior de Puerto Rico contienen varias plantas raras y especies de animales que no se encuentran en otras partes de la Isla. El agua de escorrentía proveniente de los humedales en las partes altas de la Isla proveen una fuente de agua que utilizan varias ciudades para abasto público. Los humedales costeros como los mangles, los colchones de yerbas marinas y los arrecifes de coral proveen áreas para la reproducción y crianza de varios peces, crustáceos y otras especies en la cadena alimenticia (López y otros, 1988). De esta manera, los humedales costeros contribuyen a la productividad biológica de las aguas llanas del mar alrededor de las islas. Los humedales también estabilizan las costas atrapando y reteniendo sedimentos no consolidados y amortiguan la acción de las olas y de las tormentas que tienen el potencial de causar daños en la zona.

El valor de los humedales de Puerto Rico para la vida silvestre está muy bien documentado. Por ejemplo, las salinas de Cabo Rojo, en la costa suroeste, proveen áreas para el descanso y la alimentación de cientos de aves migratorias en ruta entre Norte y Suramérica. Antes del drenaje de los humedales costeros para propósitos agrícolas, pantanos de agua dulce como los de la Laguna Cartagena, Laguna Guánica y Ciénaga El Anegado proveían hábitat a más de 100 especies de aves residentes y migratorias. Los humedales de las tierras altas del área central son el último refugio de la cotorra puertorriqueña, una especie en peligro de extinción. Aún los humedales del área metropolitana de San Juan (Laguna La Torrecilla, Torrecilla Baja, Laguna de Piñones hasta Punta Vacía Talega) proveen un hábitat excelente para la vida silvestre, mantienen criaderos de peces de alto valor económico y proveen recreación y oportunidades educativas a la población urbana.

Figura 1. Árboles de palo de pollo en el Bosque de Pterocarpus cerca de Humacao, Puerto Rico. (Fotografía cortesía del Fideicomiso de Conservación de Puerto Rico.)

Treintiocho especies de vertebrados, moluscos y crustáceos, y 46 especies de aves, algunos raros o en peligro de extinción como la mariquita, el alcatraz, el pato dominicano, el pato silbón y la paloma cabeciblanca han sido observados en el área. También las playas asociadas con estos humedales urbanos proveen sitios de anidaje para las tortugas carey de concha y tinglar, ambas en peligro de extinción (Del Llano y otros, 1986).

TIPOS Y DISTRIBUCIÓN

Los humedales son tierras entre hábitats terrestres y de aguas profundas, donde el nivel freático está generalmente en o cerca de la superficie del terreno, o el terreno está cubierto por aguas poco profundas (Cowardin y otros, 1979). La figura 2A presenta la distribución de los humedales y los hábitats de aguas profundas en Puerto Rico. Aquí sólo se discutirán los humedales.

Los humedales pueden tener o no tener vegetación, y se clasifican a base de su hidrología, vegetación y sustrato. En este resumen, los humedales se clasifican de acuerdo con un sistema propuesto por Cowardin y otros (1979), el cual es usado por el Servicio de Pesca y Vida Silvestre de los Estados Unidos (FWS, por sus siglas en inglés) para trazar mapas y preparar inventarios de los humedales de los Estados Unidos. En el nivel más general del sistema de clasificación, los humedales se agrupan en cinco sistemas ecológicos: palustrino, lacustrino, riberino, estuarino y marino. El sistema palustrino incluye sólamente los humedales, mientras que los otros sistemas comprenden humedales y hábitats de aguas profundas. A continuación sigue la descripción de los humedales que existen en Puerto Rico:

Sistema	Descripción
palustrino	Humedales de agua dulce sujetos al flujo y reflujo de las mareas, en donde predominan los árboles (humedales de bosques húmedos), arbustos (humedales de malezas-arbustos); plantas herbáceas en desarrollo persistente, erectas y arraizadas (humedales de desarrollo persistente o no persistente); o plantas sumergidas y/o flotantes (colchones acuáticos). También, cuerpos de agua abiertos que cubran menos de 20 acres y cuya profundidad sea menor de 6.6 pies.
lacustrino	Humedales de agua dulce sujetos al flujo y reflujo de las mareas, dentro de un lago o embalse mayor de 20 acres y/o de una profundidad mayor de 6.6 pies que esté inundado permanente o intermitentemente. La vegetación, cuando está presente, consiste primordialmente en plantas emergentes de desarrollo temporero y plantas sumergidas y/o flotantes (colchones acuáticos), o ambas.
riberino	Humedales de agua dulce sujetos al flujo y reflujo de las mareas, dentro de un canal. Su vegetación es igual a la del sistema lacustrino.
estuarino	Humedales afectados por las mareas, en ambientes con olas de baja energía, donde la salinidad de las aguas es mayor de 0.5 partes por mil y es variable debido a la evaporación y la mezcla de agua de mar con agua dulce.
marino	Humedales expuestos a olas y corrientes del mar abierto, y a aguas de una salinidad mayor de 30 partes por mil.

En Puerto Rico, los sistemas lacustrinos y riberinos consisten en su mayoría en hábitats de aguas profundas. Los humedales lacustrinos es-

tán limitados a las áreas llanas de los lagos y embalses. Los humedales riberinos se limitan a las partes llanas de los cauces de ríos y canales. En lugares donde las corrientes de agua se mueven rápidamente, estos humedales se mantienen generalmente sin vegetación. Cuando se encuentra vegetación, los humedales lacustrinos y riberinos se caracterizan generalmente por plantas que crecen en lechos acuáticos en, o por debajo de la superficie del agua. Algunas de las plantas más comunes en estos humedales son las plantas acuáticas con raíces tales como: lirios, helechos, lirios, candelabro y ninfa sureña; y plantas acuáticas flotantes como la yerba de pato, la grasilla y el jacinto.

La mayoría de los humedales en Puerto Rico y en sus islas principales son palustrinos o estuarinos. Un tipo de humedal palustrino de particular interés en Puerto Rico es el bosque de palo de pollo. Estos bosques, que son comunes en algunas partes de Centro y Suramérica, son ahora raros en Puerto Rico. Los árboles de palo de pollo toleran poca salinidad y pueden crecer en monocultivos casi puros en el límite salobre del sistema estuarino o formar pantanos (bosques húmedos) en el interior. Los bosques de palo de pollo comparten numerosas características con los pantanos de ciprés del sureste de los Estados Unidos. Como los cipreses, los árboles de palo de pollo existen en monocultivos casi puros o mezclados con otras variedades de especies de árboles y arbustos. Las plantas epífitas (plantas que crecen sobre otras plantas) son comunes en estos árboles, y los helechos son típicamente la especie prevaleciente en el suelo (Alvarez-López, 1990). Las formas de crecimiento de estos dos árboles son similares; ambos, el ciprés y el palo de pollo, pueden desarrollar troncos reforzados y, por lo general, pueden tener raíces superficiales modificadas, las cuales forman estructuras con forma de rodilla (Bacon, 1990). El bosque más extenso de palo de pollo que queda en Puerto Rico es el Bosque de Pterocarpus (fig. 1), el cual tiene un área de 370 acres y está localizado cerca de Humacao, en la Costa Este. En las montañas de la Sierra de Luquillo (figura 2B) y en sitios cerca de Dorado, Mayagüez y Patillas (figura 2A) existen grupos mucho más pequeños de árboles de palo de pollo. En las pendientes de las montañas altas, a través de Puerto Rico se encuentran otros tres tipos importantes de humedales palustrinos, el bosque enano, el bosque de palo colorado y el bosque de palma (humedales de bosque húmedo o maleza-arbusto). En el tope de las montañas más altas está el bosque enano, en donde predominan

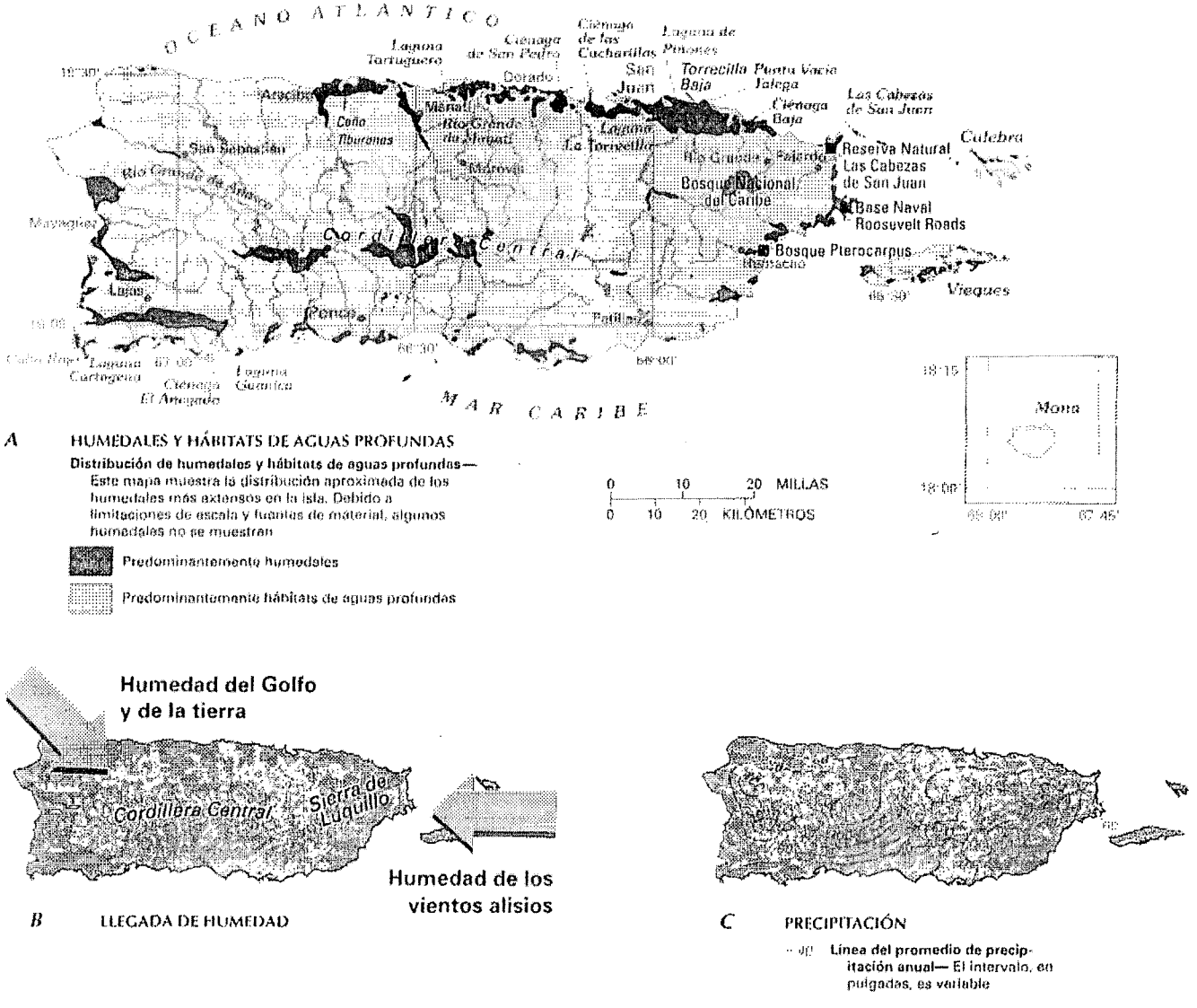


Figura 2. Distribución de humedales en Puerto Rico y factores físicos y climatológicos que afectan la distribución de humedales en Puerto Rico. ***A***, Distribución de humedales y hábitats de aguas profundas. ***B***, Fuentes principales y patrones de humedad en Puerto Rico. ***C***, Promedio de la precipitación anual en Puerto Rico. *(Fuentes: A, T.E. Dahl, Servicio de Pesca y Vida Silvestre de los Estados Unidos, datos sin publicar, 1991. B, Colón-Dieppa y otros, 1991. C, Colón-Dieppa, 1986.)*

árboles retorcidos de hoja perenne de 15–20 pies de alto. Los árboles más comunes en estas áreas incluyen el roble de sierra, el nemocá, el jusillo, el oreganillo y la guayabota (Ewel y Whitmore, 1973). Los árboles en el bosque enano se mantienen húmedos por estar continuamente cubiertos por nubes y promueven un abundante crecimiento epífito. El palo colorado, conocido como tití en el sureste de los Estados Unidos, es la especie de árbol dominante a elevaciones mayores de 2,500 pies, pero menores que las del bosque enano. Esta especie en los Estados Unidos es de tipo arbusto, pero en Puerto Rico puede crecer hasta una altura de más de 30 pies y tener un tronco de más de 6 pies de diámetro (Lugo y Brown, 1988). A elevaciones entre 1,500 y 3,000 pies, las laderas de las montañas están cubiertas por bosques de palma, donde predomina mayormente la palma de sierra. Esta palma es un componente importante de los humedales de las planicies inundables. Algunos investigadores creen que estos bosques de palma montañosos son una etapa temprana de una sucesión en áreas susceptibles a deslizamientos de tierra u otras formas de erosión severa (Beard, 1955). A pesar de que se desconoce la extensión total de los humedales montañosos en Puerto Rico, el Bosque Nacional del Caribe, en la Cordillera Central, posee un área estimada de 933 acres de bosque enano, 8,490 acres de bosque colorado y 5,088 acres de bosque de palma.

Los pantanos de agua dulce (humedales palustrinos emergentes) son comunes a través de la Isla, especialmente a lo largo de la costa norte. En algunas áreas, estos pantanos de agua dulce han sido drenados para el cultivo de caña de azúcar y pastos. Entre los pantanos más grandes de agua dulce se encuentran el Caño Tiburones cerca de Arecibo, la Laguna Cartagena en Lajas, la Ciénaga de San Pedro y la Ciénaga de las Cucharillas a lo largo de la costa norte, y la Ciénaga Baja cerca de Río Grande. La especie de planta más común en los pantanos profundos son las eneas, como también son comunes la cortadora de ciénaga y el junco gigante. Los pantanos llanos tienen una composición de especies más compleja y suelos que están saturados por períodos más cortos durante el año. Las plantas comunes en los pantanos llanos son el helecho de mangle, juncos, yerba de río, junco fino, millo de puerco, saladillo, y junco pico (Cuerpo de Ingenieros Waterways Experiment Station, 1978). El gran complejo pantanoso en la Laguna Tortuguero, cerca de Manatí es el único pantano documentado que se nutre de manantiales y de percolaciones en Puerto Rico (Quiñones-Márquez y Fusté, 1978). El agua que entra a los acuíferos calizos en la región kárstica del interior de la Isla descarga hacia arriba en forma de manantiales y percolaciones, manteniendo el suelo saturado. Cerca de 700 especies de plantas, muchas de las cuales son raras, en peligro de extinción o endémicas de Puerto Rico, han sido identificadas en este pantano (Lugo y Brown, 1988).

Los humedales estuarinos más extensos son los bosques de mangle (maleza-arbustos), en donde predominan el mangle rojo, blanco y negro, y el mangle botón. Los mangles forman islas costaneras, bordean la zona costanera, forman bosques extensos a lo largo de los estuarios y crecen en cuencas que atrapan agua salada (Lugo y Brown, 1988). El manglar más extenso en Puerto Rico está localizado justo al este del área metropolitana de San Juan, en un área que incluye aproximadamente 2,500 acres de humedales, playas y hábitats asociados al mar abierto. En las áreas a lo largo de la costa sur de la Isla, las cuales están sujetas a condiciones climatológicas más secas, las salinas o humedales salinos (principalmente humedales costeros no consolidados) existen, por lo general, conjuntamente con hábitats dominados por mangles. Estos ambientes extremadamente salinos se desarrollan donde el agua salada de las mareas queda atrapada y se evapora. Las altas concentraciones de sal en los suelos de las salinas sólo pueden ser toleradas por pocas plantas y en la mayoría no hay vegetación. Un ejemplo excelente son los humedales de Cabo Rojo, en el extremo suroeste de Puerto Rico.

Los pantanos estuarinos (humedales emergentes) no son comunes en Puerto Rico. Usualmente forman una zona estrecha de transición entre los humedales dominados por mangles y los humedales de agua dulce adyacentes. Las especies de plantas en los pantanos estuarinos incluyen, por lo general, la cortadora de ciénaga, las eneas y los helechos de mangle.

Las áreas en mar abierto de los sistemas estuarinos y marinos contienen ambos hábitats, el de aguas profundas y el de humedales. El sustrato y plantas asociadas, las rocas o los corales de un área inundada permanentemente constituyen un hábitat de agua profunda, mientras que las áreas que están expuestas aun durante la marca más baja de primavera son clasificadas como humedales. En Puerto Rico los humedales estuarinos en mar abierto pueden tener o no tener vegetación. Los humedales estuarinos que no tienen vegetación son principalmente las playas, las dunas de arena y las salinas (humedales costeros no consolidados); los humedales con vegetación son mayormente los de colchones de algas marinas. De forma semejante, los humedales marinos en Puerto Rico incluyen las costas no consolidadas y los humedales de colchones acuáticos; las áreas donde los arrecifes de coral están expuestos a mareas extremadamente bajas también se consideran humedales.

MARCO HIDROLÓGICO

El marco hidrológico de Puerto Rico es el principal factor que controla la diversidad y exclusividad de los humedales de la Isla. Las características hidrogeológicas locales difieren a través de la Isla mayormente debido a variaciones en la geología, la topografía y el clima. En la Cordillera Central y en la Sierra de Luquillo (figura 2B), que tienen picos cuya elevación excede los 4,300 pies sobre el nivel del mar, las tasas de lluvia y escorrentía son altas. La Cordillera Central, el eje de la cadena central de montañas, se extiende de este a oeste, y el centro de las montañas está compuesto principalmente de rocas volcánicas intrusivas con fallas y pliegues, y de rocas sedimentarias. A lo largo del flanco norte de las montañas, se extiende casi hasta la costa una banda topográfica de calizas maduras, formada por una serie de formaciones calizas inclinadas hacia el norte, partidas por ríos y drenajes subterráneos. Estas formaciones calizas forman algunos de los acuíferos más productivos de la Isla. Una planicie costera se extiende a través de las costas en muchas partes de la isla. La planicie costera predomina a lo largo de la costa sur, donde se unen los abanicos aluviales de los drenajes sureños. Además de los terrenos aluviales, hay varios deslizamientos de tierra, terrazas marinas, dunas costeras, playas, pantanos y otros depósitos recientes que cubren las rocas más viejas, tanto en la costa norte como en la Sur (P.G. Olcott, Servicio Geológico de los Estados Unidos, com. escrita, 1993). En la costa este de la Isla, la topografía se caracteriza por valles angostos con laderas empinadas y en la costa oeste, por anchos valles aluviales que cubren las rocas volcánicas y los lentes calizos.

El clima se clasifica como subtropical, de acuerdo con el mapa de zonas de vida del sistema de clasificación de Holdridge, comúnmente usado en Puerto Rico (Ewell y Whitmore, 1973). El invierno es la estación más fría y seca. Durante el invierno, hay al menos 2 meses de poca lluvia, cuando la región está bajo la influencia de un sistema de alta presión subtropical. Por lo general, las lluvias en invierno y primavera están asociadas a los sistemas frontales cargados de humedad que se acercan a la Isla por el noroeste (fig. 2B). Los veranos son calientes y húmedos. Durante el verano, las islas ya no están bajo la influencia de la alta presión atmosférica y hay una corriente estable de aire húmedo proveniente del Océano Atlántico hacia el Oeste (vientos alisios), que es la fuente principal de las lluvias de verano y otoño.

La lluvia en la isla de Puerto Rico varía tanto geográficamente como por época. La lluvia promedio anual varía de menos de 35 pulgadas en algunos valles costeros del suroeste hasta más de 200 pulgadas en algunas áreas montañosas del bosque pluvial (fig. 2C) y promedia cerca de 70 a 72 pulgadas al año, a través de la Isla. La variación en la cantidad de lluvia es principalmente el resultado de la topografía y de los patrones predominantes del tiempo. Las partes norte y sur de la isla de Puerto Rico están separadas por una cordillera de montañas que se

extiende de este a oeste, la Cordillera Central, que se une a la Sierra de Luquillo en la parte noreste de la Isla. La tasa de precipitación es alta en las montañas porque cuando el aire húmedo es forzado a subir las pendientes hacia el aire más frío en las altas elevaciones, la humedad se condensa y cae en forma de lluvia. A lo largo de la costa sur, la precipitación total anual es relativamente más baja que en el resto de la Isla debido a que esta área se halla a la sombra de las montañas que la rodean, las cuales interceptan los patrones de tiempo prevalecientes hacia el sureste y el oeste.

La razón entre la precipitación y la evaporación es un factor que afecta el tipo y la diversidad de los humedales en Puerto Rico. A medida que esta razón (entre la lluvia y la evaporación) aumenta, la diversidad de humedales también aumenta. Como por ejemplo, en la parte sur de la Isla, donde la tasa de precipitación es baja y la de evapotranspiración es alta, predominan los humedales estuarinos. En la parte norte de la Isla, donde la tasa de precipitación es alta, los humedales palustrinos son más comunes. Estos humedales de agua dulce se extienden a lo largo de los ríos perennes desde las cuencas costeras del interior, hasta las laderas de las montañas y se encuentran en los bosques pluviales, a elevaciones altas (Zack y Román-Más, 1988).

Los humedales de agua dulce en el norte de Puerto Rico reciben lluvia casi constante en los bosques pluviales montañosos, y los humedales en las planicies costeras reciben agua de escorrentía y descargas de aguas subterráneas del sistema de acuíferos calizos (fig. 3). Cerca de la costa, los humedales estuarinos reciben agua del océano y de fuentes de tierra adentro. En los humedales costeros al norte de la Isla, la lluvia directa es prácticamente insignificante en relación con otras fuentes de humedad. Sin embargo, entre más tierra adentro y a mayor elevación esté un humedal, más importante es la lluvia directa (Lugo y otros, 1980).

Debido a que la parte sur de la Isla recibe menos lluvia y tiene mayor tasa de evapotranspiración, se considera árida en relación con otras partes de la Isla. Aun cuando la lluvia no es abundante en esta parte de la Isla, es importante para los humedales en las planicies de la costa sur. La lluvia produce agua de escorrentía, llena los ríos y recarga el sistema de agua subterránea. Éstas son las mayores fuentes de humedad para los humedales de agua dulce en la costa sur y son fuentes importantes para los humedales estuarinos. El sistema de agua subterránea en el sur de Puerto Rico está contenido enteramente en los acuíferos sedimentarios de la planicie costera. La recarga del acuífero ocurre donde la planicie costera se une con el costado sur de las montañas en los valles riberinos. Los ríos que fluyen hacia el sur son generalmente efímeros, ya que alcanzan el Mar Caribe y los humedales estuarinos sólo durante los períodos de flujos altos, en verano y en otoño. En otras épocas del año, el agua subterránea descarga al mar y es la única fuente significativa de humedad para los humedales libres del flujo y reflujo de las mareas.

El agua subterránea en los valles del este y oeste de Puerto Rico por lo general está limitada a acuíferos aluviales locales y, con el tiempo, es descargada en el océano. Esta descarga de agua subterránea sustenta a los humedales estrechos y discontinuos a lo largo de las costas en estas áreas.

Los principales tipos de humedales en Puerto Rico y su distribución con respecto a la elevación se muestran en la figura 3. La lluvia casi continua y las delgadas capas de suelo, sobre las rocas insolubles en lo alto de las montañas, aseguran la saturación de la estrata radicular, lo mismo que la saturación casi continua de vapor de agua de la atmósfera que rodea el dosel de los humedales montañosos. Esta abundancia de agua también provee grandes volúmenes de agua de escorrentía para los humedales en sucesión, a elevaciones bajas. El agua desciende hacia los ríos, donde recarga los acuíferos calizos. Más abajo, el acuífero descarga en los ríos y manantiales, y provee agua a los terrenos bajos y a los humedales costeros.

TENDENCIAS

En la actualidad, no hay disponibles estimados confiables sobre la extensión de los humedales originales en Puerto Rico, pero los humedales en la Isla se han reducido grandemente en número y tamaño como resultado del desarrollo agrícola y del crecimiento poblacional. Prácticamente todo humedal, con excepción de aquéllos en las tierras

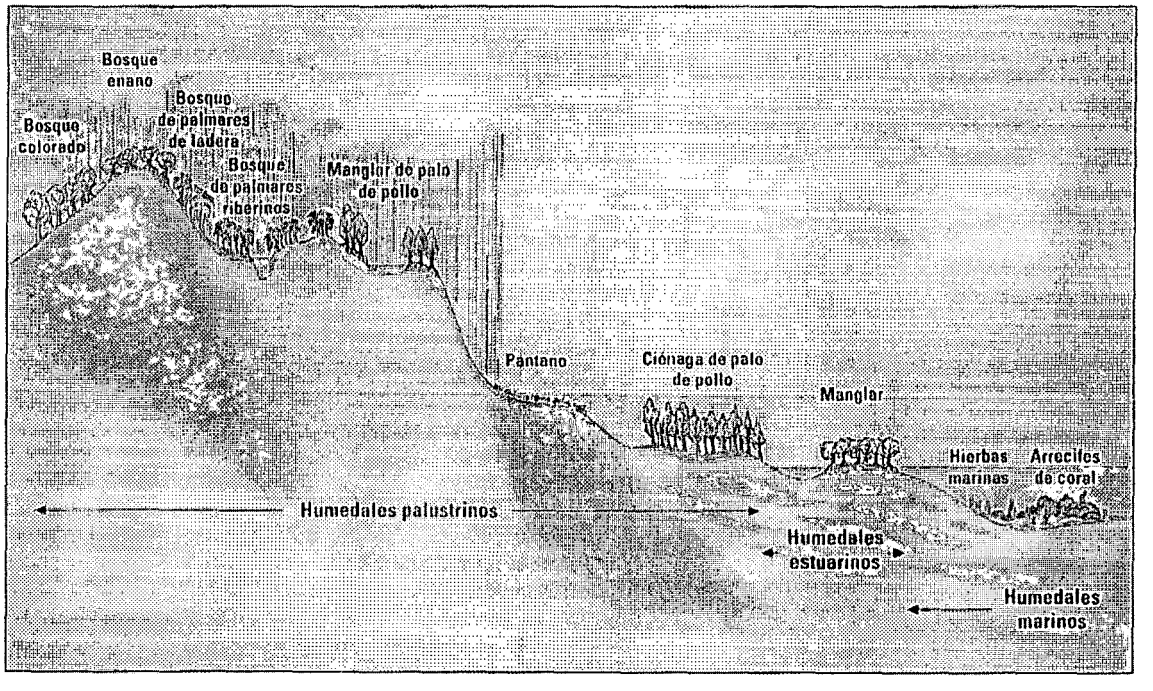


Figura 3. Marco hidrogeológico generalizado de los humedales en Puerto Rico. *(Fuente: Tipos de Humedales de Lugo y Brown, 1988.)*

con el manejo de humedales. Los estados costeros y los de los Grandes Lagos que adopten programas y planes para el manejo de la zona costanera, aprobados por la Administración Nacional Oceánica y Atmosférica, son elegibles para recibir fondos federales y asistencia técnica a través de la Ley para el Manejo de la Zona Costanera.

En Puerto Rico hay agencias federales que adquieren y manejan humedales en numerosas localidades. El Bosque Nacional del Caribe, administrado por el Servicio Forestal de los Estados Unidos, se encarga de los humedales del bosque pluvial de El Yunque y de las tierras altas que lo rodean. El FWS también maneja activamente los humedales como parte del Sistema Nacional para el Refugio de la Vida Silvestre. Recientemente adquirió los humedales de agua dulce de la Laguna Cartagena. Al presente, se están desarrollando planes para el manejo y la restauración de esta laguna, en cooperación con el municipio de Lajas. La Marina de los Estados Unidos está a cargo del manejo de los humedales que se encuentran en sus bases de Roosevelt Roads y en la isla de Vieques.

Actividades del Estado Libre Asociado.— Muchos de los humedales en Puerto Rico son de dominio público. Teóricamente bajo las leyes españolas, aún en efecto, todos los bosques de mangle son propiedad del Estado Libre Asociado de Puerto Rico porque están dentro de la zona marítima (Lugo 1988). Extensas áreas de bosque de mangle, que por años se han considerado como una futura fuente de combustible, son manejadas por el Departamento de Recursos Naturales y Ambientales como parte del sistema de bosques del Estado Libre Asociado. La administración por el Departamento no se limita a los hábitats estuarinos; los humedales de agua dulce en el bosque de Pterocarpus cerca de Humacao y la Laguna Tortuguero están también bajo el control del Departamento.

Bajo la autoridad de la Ley para el Manejo de la Zona Costanera de 1972, el Estado Libre Asociado ha desarrollado un plan detallado de manejo, en el cual la protección de los humedales, particularmente los mangles, es parte integral. Antes de conceder cualquier permiso federal o licencia para actividades en la zona costanera, se requiere un certificado de cumplimiento con el plan. La Junta de Planificación del Estado Libre Asociado es la agencia principalmente responsable de la administración del plan.

Para guiar las actividades del manejo de humedales, se han desarrollado varios documentos de planificación. El Departamento de Recursos Naturales y Ambientales, el Servicio de Pesca y Vida Silvestre de los Estados Unidos y la Agencia de Protección Ambiental han preparado independientemente unas listas de los humedales más importantes del área, en orden de prioridad. El Programa de Patrimonio Nacional del Departamento de Recursos Naturales y Ambientales también ha desarrollado programas para la restauración y manejo de los humedales de importancia excepcional, como los del Caño Tiburones y la Laguna de Guánica.

Actividades Privadas.— El Fideicomiso de Conservación de Puerto Rico es la principal organización privada envuelta activamente en la preservación y manejo de los humedales en Puerto Rico. El Fideicomiso de Conservación de Puerto Rico es una institución con fondos privados que adquiere y maneja los humedales y otras propiedades históricas de notable importancia y valor cultural en Puerto Rico. Por ejemplo, el Fideicomiso de Conservación de Puerto Rico en cooperación con el Departamento de Recursos Naturales y Ambientales de Puerto Rico, maneja las tierras del Departamento en la Reserva Natural de las Cabezas de San Juan, cerca de Fajardo, en el extremo este de la Isla.

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PARA INFORMACIÓN ADICIONAL: Jefe de Distrito, Servicio Geológico de los Estados Unidos, GSA Center, 651 Federal Drive, Suite 400-15, Guaynabo, P.R. 00965; Coordinador Regional de los Humedales, Servicio de Pesca y Vida Silvestre de los Estados Unidos,1875 Century Building, Atlanta GA 30345

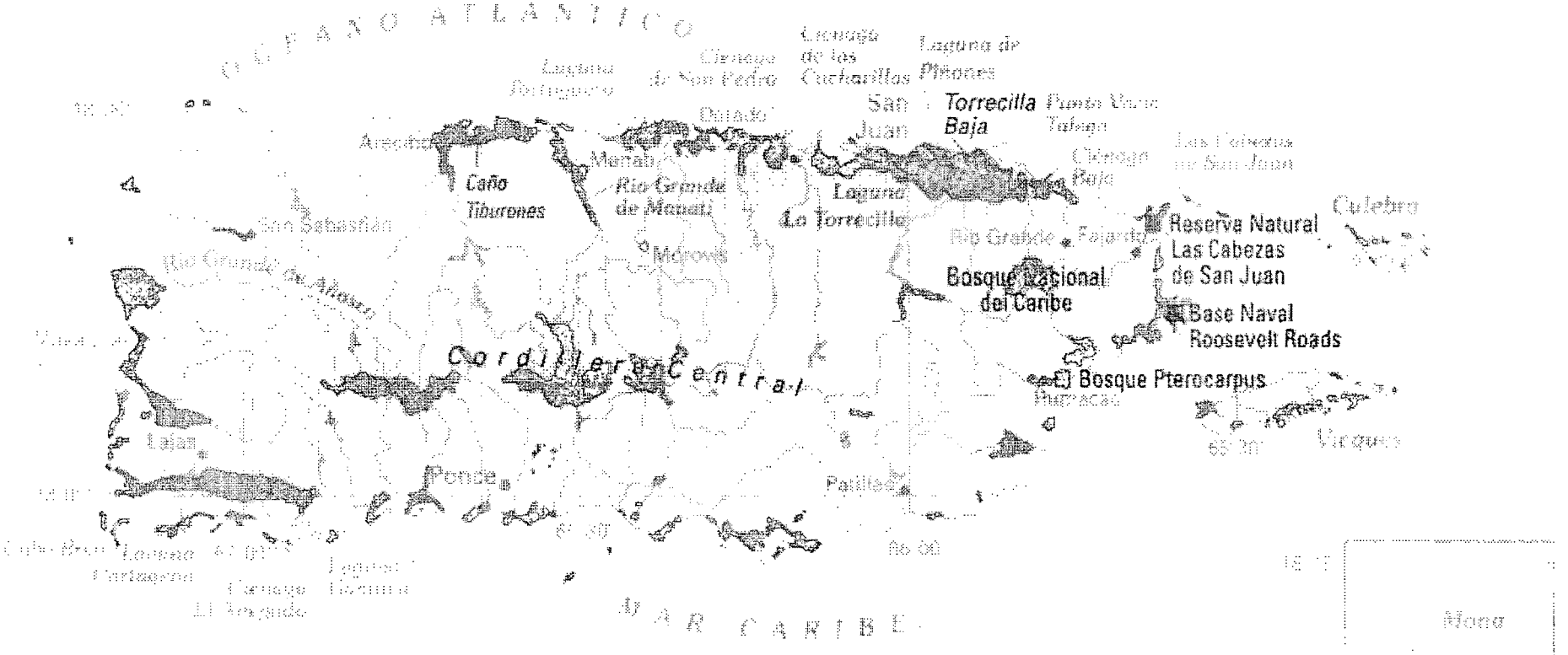
Preparado por

D. Briane Adams, Servicio Geológico de los Estados Unidos, y John M. Hefner, Servicio de Pesca y Vida Silvestre de los Estados Unidos.

Traducido por

Teresa Dopazo, Servicio Geológico de los Estados Unidos

Printed on recycled paper



A HUMEDALES Y HÁBITATS DE AGUAS PROFUNDAS

Distribución de humedales y hábitats de aguas profundas— Este mapa muestra la distribución aproximada de los humedales más extensos en la isla. Debido a limitaciones de escala y fuentes de material, algunos humedales no se muestran

Predominantemente humedales

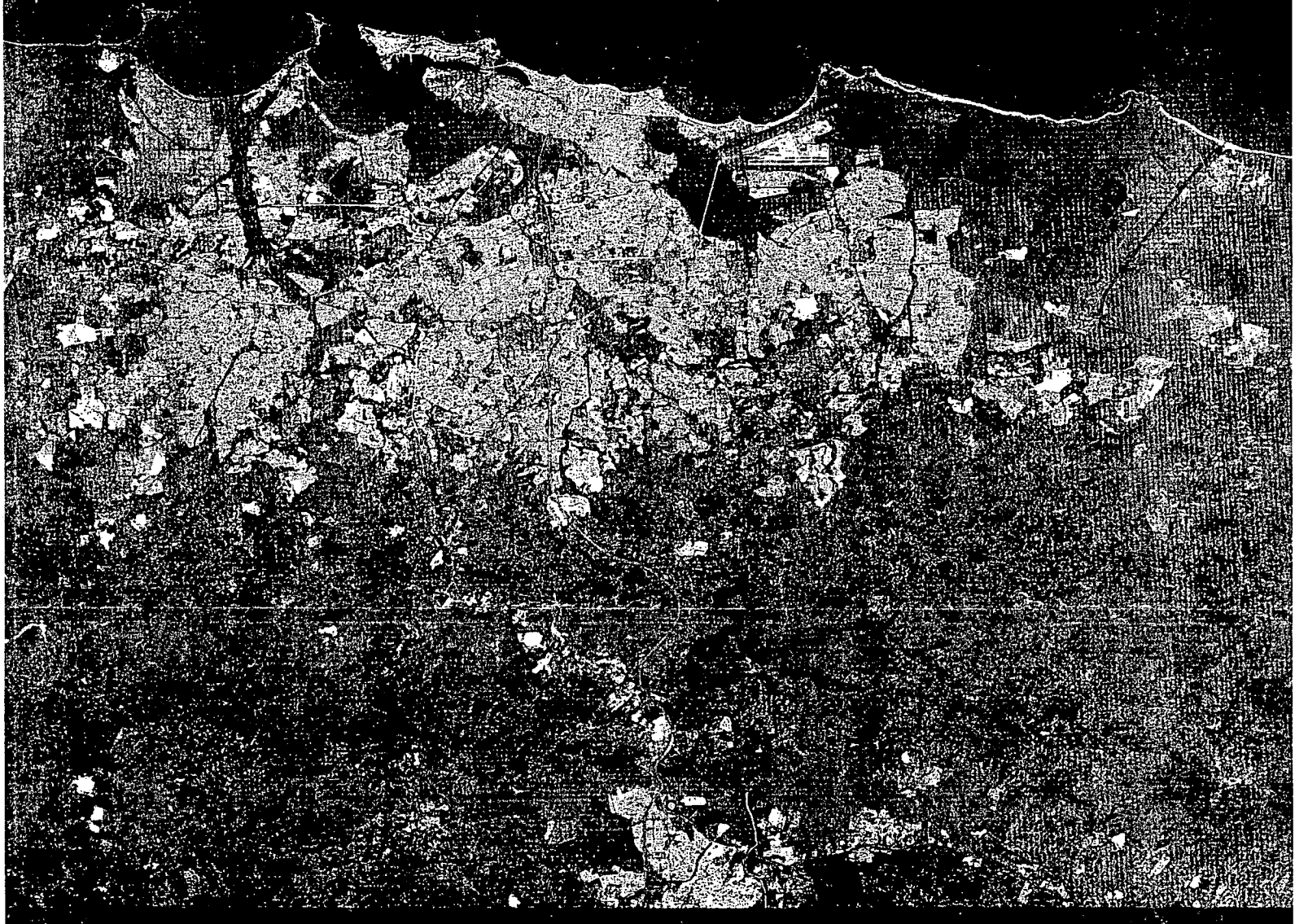
0 10 20 MILLAS

0 10 20 KILÓMETROS

REFERENCE: 18

Synoptic Survey of Water Quality and Bottom Sediments, San Juan Bay Estuary System, Puerto Rico, December 1994-July 1995

U.S. GEOLOGICAL SURVEY Water-Resources Investigations Report 97-4144



USGS
science for a changing world

Prepared in cooperation with the
PUERTO RICO ENVIRONMENTAL QUALITY BOARD and
U.S. ENVIRONMENTAL PROTECTION AGENCY for the
SAN JUAN BAY ESTUARY PROGRAM

Synoptic Survey of Water Quality and Bottom Sediments, San Juan Bay Estuary System, Puerto Rico, December 1994–July 1995

By Richard M.T. Webb and Fernando Gómez-Gómez

U.S. GEOLOGICAL SURVEY

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San Juan, Puerto Rico
1998

Synoptic Survey of Water Quality and Bottom Sediments, San Juan Bay Estuary System, Puerto Rico, December 1994–July 1995

By Richard M.T. Webb *and* Fernando Gómez-Gómez

Abstract

During 1994 and 1995, the U.S. Geological Survey, in cooperation with the U.S. Environmental Protection Agency and the Puerto Rico Environmental Quality Board carried out a synoptic sampling of the quality of water (dry and wet periods) and sediment of the San Juan Bay estuary system for the San Juan Bay Estuary Program. Secchi depth at 15 sampling sites ranged from 12 to 152 centimeters. Turbidity values were less than or equal to 11 nephelometric turbidity units at all sites whereas total suspended solids were less than 31 milligrams per liter. Caño de Martín Peña had elevated ammonia concentrations (2.3 milligrams of ammonia as nitrogen per liter) and counts of fecal-coliform bacteria on the order of 100,000 colonies per 100 milliliters. At none of the other sampled sites did dissolved ammonia exceed 0.45 milligrams per liter or fecal coliform concentrations exceed 6,000 colonies per 100 milliliters. Concentrations of dissolved oxygen in the eutrophic Laguna San José ranged from near zero to more than 200 percent saturation levels. Sedimentation rates at six coring sites varied from 0.24 centimeters per year in Laguna de Piñones to 3.9 centimeters per year in Caño de Martín Peña, as determined by downcore activity of cesium-137. At Caño de Martín Peña, the PCB concentrations increased from 12 micrograms per kilogram in the oldest strata (pre-1950) to 380 micrograms per kilogram in the most recently deposited sediments (1975–95). Also at the Caño de Martín Peña site, concentrations of DDT (and metabolites), a pesticide used extensively from the 1940s through the end of the 1960s, were highest (at 62 micrograms per kilogram) in the sediments deposited from 1950 to 1974, decreasing to 27 micrograms per kilogram in sediments deposited from 1975–95. Bis(2-ethylhexl) phthalate, a common plasticizing agent, exceeded 20,000 micrograms per kilogram in the most recent strata of the Caño de Martín Peña core site; the likely source being the PVC and other plastics contained in the construction debris commonly used for fill in the squatter communities. Lead concentrations increased at the Caño de Martín Peña core site from 30 micrograms per gram in the oldest strata to 750 micrograms per gram in the most recent strata; similarly, mercury increased from 0.16 to 4.7 micrograms per gram. Analysis of data collected from 1970 to 1995 indicates that since 1985, the quality of water in the San Juan Bay estuary system has improved as leaded gasoline has been phased out and wastewater from local plants, previously discharged to inland waters, is now collected and routed to regional facilities for discharge to offshore ocean outfalls.

INTRODUCTION

The Clean Water Act of 1977, as amended by the Water Quality Act of 1987, formally established the National Estuary Program with the goal of providing guidance to local decision makers in restoring the health of estuaries of national significance. Coordination between the Puerto Rico Environmental Quality Board (PREQB) and the U.S. Environmental Protection Agency (USEPA) resulted in the inclusion of San Juan Bay (Bahía de San Juan), and its lagoons and interconnecting waterways, into the National Estuary Program beginning in 1993. The local implementation of the program is the San Juan Bay Estuary Program. The principal objective of the program is to develop a Comprehensive Conservation and Management Plan (CCMP). The CCMP will provide guidance for government, private industry, and citizens as they work together to improve the environmental quality of the estuarine system.

The San Juan Bay estuary system is contained within a relatively small drainage basin (240 km^2) above a broad, flat coastal plain (fig. 1). The subtidal portion of the system consists of the Bahía de San Juan, connected by a series of natural and dredged channels to four lagoons: Laguna del Condado, Laguna San José, Laguna La Torrecilla, and Laguna de Piñones. Laguna de Piñones is located within the Bosque Estatal de Piñones, the largest remaining mangrove forest in Puerto Rico. The forest is connected to the estuarine reach of the Río Grande de Loíza through a series of gated canals constructed to drain the forest and to facilitate transport of mangrove harvested for charcoal production. Intense rainfall in eastern Puerto Rico can cause the Río Grande de Loíza to rise above the gates and dikes, and flood the eastern part of the estuary system. The water quality of the bay, lagoons, and interconnecting natural and man-made channels has been significantly altered from its natural state not only by land-use activities, but also by modification of the hydraulic properties through dredging of channels and placement of fill (Ellis, 1976; Seguinot-Barbosa, 1983). In places the estuary system is hypereutrophic, has anoxic bottom waters, is contaminated by heavy metals, trace elements, and organic compounds; and receives raw-sewage from combined storm-sewer overflows and from direct discharges from housing along parts of its perimeter.

Objectives

The objectives of this study were to:

1) document general water-quality conditions in the estuary system during a dry period and immediately after a significant storm-runoff event;

2) characterize the physical and chemical composition of sub-tidal sediments throughout the bay and lagoons; and

3) relate the water-quality and sediment data acquired as part of this study to observations documented in previous studies.

The U.S. Geological Survey (USGS) conducted this study, in cooperation with the USEPA and the Puerto Rico Environmental Quality Board (PREQB), to provide the water-quality and sediment data required by the San Juan Bay Estuary Program in order to prioritize actions to be included in the CCMP.

Purpose and Scope

This report presents the results of the synoptic survey of water quality and bottom sediments of the San Juan Bay estuary system, Puerto Rico. The data, collected between December 1994 and July 1995, include:

- General water quality observations made at 15 sites during dry weather conditions and immediately after a storm-runoff event. Variables measured at each site include water depth, color, and vertical profiles of temperature, specific conductance, pH, and dissolved oxygen. In addition, samples collected near the surface of the water column at each site were analyzed for turbidity, total suspended solids, nitrate, nitrite, ammonia, orthophosphate, fecal-coliform bacteria, chlorophyll'a', and chlorophyll'b'.

- Analysis of grain-size distribution and concentrations of total Kjeldahl nitrogen, total phosphorus, and total carbon in the surficial sediments at 15 sites.

- Analysis of grain-size distribution and concentrations of total Kjeldahl nitrogen, total phosphorus, total carbon, and of the activity of the radioisotope cesium-137 (Cs-137) in sediment cores obtained at six sites.

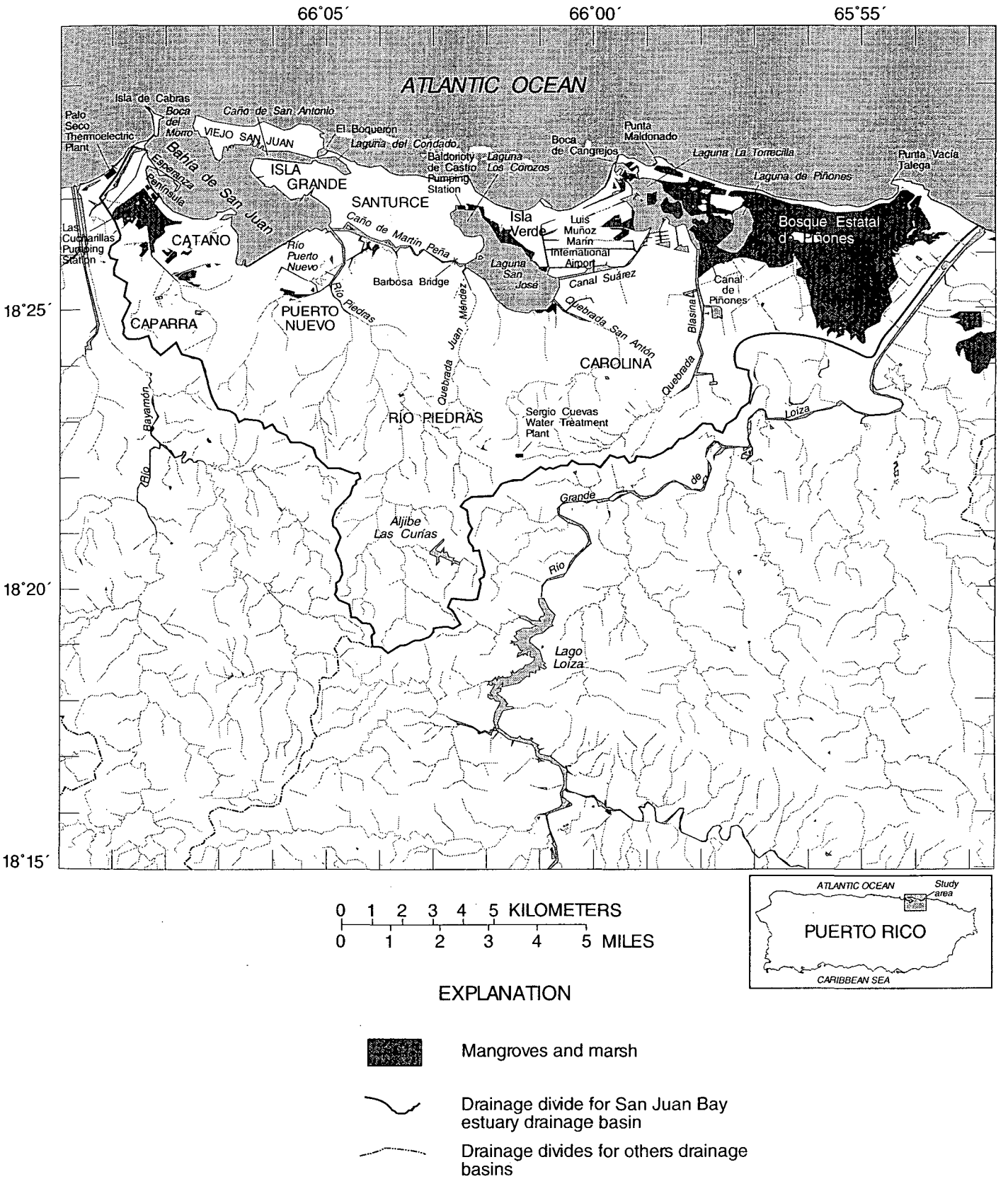


Figure 1. Drainage basin of the San Juan Bay estuary and site localities in Puerto Rico.

- Estimates of average sedimentation rates at the six sediment core sites as determined from the activity of Cs-137 in the sediment cores. The estimated sedimentation rates were used to define strata containing sediments and associated constituents deposited during discrete time periods corresponding approximately to 1925–49, 1950–74, and 1975–95.

- Concentrations of selected pesticides, trace elements, and semi-volatile organic compounds deposited at the six core sites during the approximate time periods 1925–49, 1950–74, and 1975–95.

The results of the dry-weather/wet-weather water-quality sampling in the San Juan Bay estuary system are complemented with associated data sets compiled by the USGS in cooperation with Federal and Commonwealth agencies over the last 25 years.

Changes in the composition of the sediments deposited during each approximated time period are related in general terms to land-use changes and the changing loads of selected contaminants. Concentrations of trace elements in the oldest (deepest) sediment samples can be taken to represent natural baseline concentrations.

Acknowledgments

Dr. Sherwood McIntyre, Agronomist with the United States Department of Agriculture, Water Quality and Watershed Research Laboratory, assisted in the initial coring operations to obtain the samples needed to estimate sedimentation rates using the activity of Cs-137. Senén Guzmán-Ríos, Caribbean District Water-Quality Specialist, validated the data included in this report. Javier Ruíz-Nieves and Mario Oliveras-Feliciano, Volunteers for Science, assisted greatly both in the field and during data reduction. Sandra Galarza-Rivera's help with data entry and analysis is greatly appreciated. The authors would also like to thank Ramón Carrasquillo, Luis Soler, Miguel Rodríguez, Ivette Reyes, and Luis Jorge Herrera for assisting in field sampling and laboratory analysis and Francisco Maldonado, Ruth Guzmán, and Luis Menoyo for helping produce the final report.

STUDY AREA

The San Juan Bay estuary system lies almost entirely within the San Juan metropolitan area with the exception of the easternmost part which consists of the Bosque Estatal de Piñones mangrove forest reserve. The normal range of mean monthly temperatures in San Juan is only 3.2 °C between the warmest month, August (27.1 °C), and the coolest months, January and February (23.9 °C) (Calvesbert, 1970). Mean-annual rainfall varies from 1,500 mm near the coast in the San Juan area to 2,100 mm in the uplands defining the southern boundary of the drainage basin. Most of the rainfall occurs from July to September and is related to easterly waves which pass through the region at an average rate of four to six times per month (Nieuwolt, 1977). From August to October, tropical depressions, some of which develop into hurricanes, commonly pass through the region and deliver torrential rains. A second annual peak in rainfall amount occurs in May, responding to disturbances formed as occasional cold air masses from the North American continent enter the region from the west. Pan evaporation at the coast averages about 2,070 mm/yr, and is, to a large degree, the result of the Trade Winds which blow almost invariably from the northeast (fig. 2).

Geology

Almost all of the most common geomorphic terranes of Puerto Rico are present in the watershed (fig. 3). These include volcaniclastic and plutonic rocks typical of the center of the island, limited exposures of the extensive limestone deposits that cover much of northern Puerto Rico, and alluvium-covered valleys and coastal plains. The drainage basin of the San Juan Bay estuary system covers 240 km^2, of which 215 km^2 is land and 25 km^2 is covered by water. The volcaniclastic and intrusive rocks in the uplands cover 55 km^2, the limestone formations cover 13 km^2, whereas Quaternary deposits — which include marine and riverine terrace deposits, alluvium, beach and swamp deposits, blanket deposits, and artificial fill — cover 147 km^2.

The predecessors to both the Río Grande de Loíza and the Río Bayamón apparently passed through the estuary system in the past (Rodríguez and others, 1992, Kaye, 1959a and 1959b) and deposited most of the Quaternary alluvium and coastal deposits that blanket the San Juan Bay estuary system today. Mangrove and swamp deposits, which cover 27 km^2, are limited to protected low-energy parts of the bay and lagoons. As recently as 1,500 years ago, the bay north of Isla Verde was a sheltered mangrove community that was drowned as sea level rose following the most recent glacial period (Cintrón and

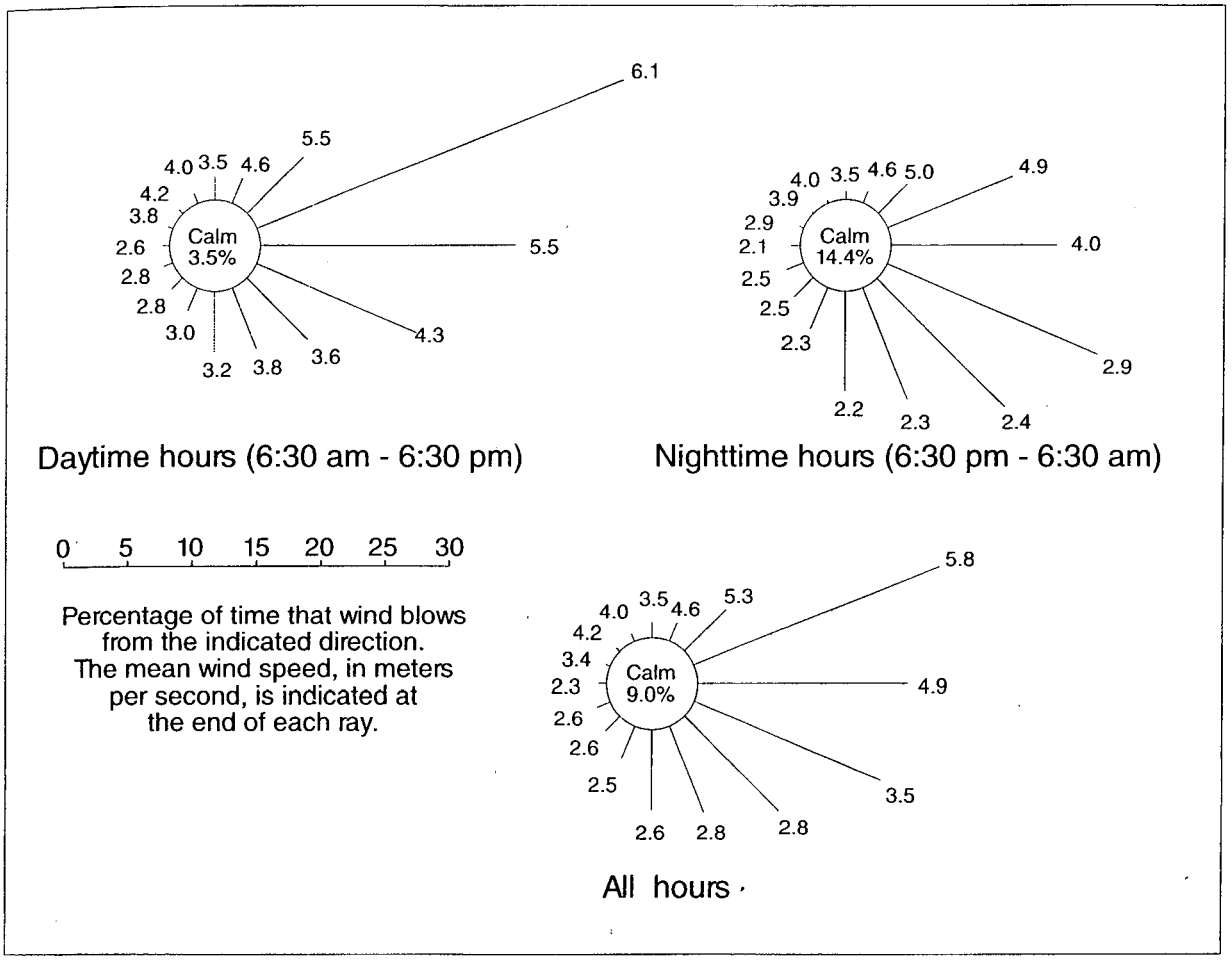


Figure 2. Average wind conditions for San Juan, Puerto Rico (Source data: National Climatic Data Center, 1995, Period of record: 1955–90).

others, 1984). Beach deposits, which cover 10 km^2, include the consolidated sand dunes at Isla de Cabras, Old San Juan and the headlands of Boca de Cangrejos, Punta Maldonado, and Punta Vacía Talega. Eleven km^2 of quartz-sand blanket deposits underlie Santurce, northern Laguna San José, and Laguna La Torrecilla. Reflecting the intense development of the San Juan Metropolitan area, 29 km^2 (12 percent of the watershed) is covered with artificial fill.

Hydrology and Oceanography

Surface water quality in the estuary system and the nearshore areas is closely related to surface-water runoff, ground water, tides, and currents in the lagoons and nearshore marine waters (fig. 4).

Surface-Water Runoff

The steep topography and the almost complete urbanization of the drainage basin results in extremely flashy rainfall-runoff events. The extensive impermeable surfaces laid down during urbanization has led to flooding which constitutes a critical problem not only in areas receiving drainage from the Río Piedras, the main stream in the estuary system, but also in areas adjacent to many of the smaller tributaries in the estuary system basin.

Runoff from the Río Piedras at the USGS long-term gaging station 50049000, which monitors drainage from 32.4 km^2, averages about 26 Mm^3/yr (15-year record), equivalent to 810 mm of the average rainfall of 2,000 mm/yr. This indicates that the ratio for runoff to rainfall above the gage site is approximately 0.40. Taking into consideration that

REFERENCE: 19

E.A 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
EDISON, NEW JERSEY 08837

JUL 20 2004

Miriam Ortiz Torres
Puerto Rico Environmental Quality Board
431 Ponce de Leon Avenue
Hato Rey, Puerto Rico 00919

Dear Ms. Torres:

Enclosed are the results of the Celia's Laundry sampling survey conducted by your office. Any correspondence concerning these results should refer to our internal project number, 04050017, to uniquely identify the data. Please refer to the first page of the report for a description of any remark codes used as data qualifiers. It should be noted that all data are considered to be EPA-validated.

If you have any questions you can contact me by phone at (732) 906-6886, by fax at (732) 906-6165 or via the Internet at "birri.john@epa.gov".

Sincerely,

John Birri
Special Projects Coordinator
Laboratory Branch

Enclosure

U.S. Environmental Protection Agency
Region 2 Laboratory

Data Report: CELIA'S LAUNDRY, IND

Project Number: 04050017

Program: Y206E

Project Leader: MIRIAM ORTIZ TORRES

Remark Codes	Explanation
U	THE ANALYTE WAS NOT DETECTED AT OR ABOVE THE REPORTING LIMIT.
J	THE IDENTIFICATION OF THE ANALYTE IS ACCEPTABLE; THE REPORTED VALUE IS AN ESTIMATE.
UJ	THE ANALYTE WAS NOT DETECTED AT OR ABOVE THE REPORTING LIMIT. THE REPORTING LIMIT IS AN ESTIMATE.
N	THERE IS PRESUMPTIVE EVIDENCE THAT THE ANALYTE IS PRESENT; THE ANALYTE IS REPORTED AS A TENTATIVE IDENTIFICATION.
NJ	THERE IS PRESUMPTIVE EVIDENCE THAT THE ANALYTE IS PRESENT; THE ANALYTE IS REPORTED AS A TENTATIVE IDENTIFICATION. THE REPORTED VALUE IS AN ESTIMATE.
R	THE PRESENCE OR ABSENCE OF THE ANALYTE CANNOT BE DETERMINED FROM THE DATA DUE TO SEVERE QUALITY CONTROL PROBLEMS. THE DATA ARE REJECTED AND CONSIDERED UNUSABLE.
K	THE IDENTIFICATION OF THE ANALYTE IS ACCEPTABLE; THE REPORTED VALUE MAY BE BIASED HIGH. THE ACTUAL VALUE IS EXPECTED TO BE LESS THAN THE REPORTED VALUE.
L	THE IDENTIFICATION OF THE ANALYTE IS ACCEPTABLE; THE REPORTED VALUE MAY BE BIASED LOW. THE ACTUAL VALUE IS EXPECTED TO BE GREATER THAN THE REPORTED VALUE.
NV	NOT VALIDATED
INC	RESULT NOT ENTERED

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01525 Field/Station ID: CLI-SS-01 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH90

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	6,100		mg/Kg
007440382	ARSENIC	5.1		mg/Kg
007440393	BARIUM	50		mg/Kg
007440417	BERYLLIUM	---	0.60U	mg/Kg
007440702	CALCIUM	55,000		mg/Kg
7440-43-9	CADMIUM	2.5		mg/Kg
007440484	COBALT	6.8		mg/Kg
007440473	CHROMIUM	31		mg/Kg
007440508	COPPER	66		mg/Kg
007439896	IRON	22,000		mg/Kg
007440097	POTASSIUM	---	600U	mg/Kg
007439954	MAGNESIUM	5,500		mg/Kg
007439965	MANGANESE	290		mg/Kg
007440235	SODIUM	---	600U	mg/Kg
007440020	NICKEL	25		mg/Kg
007439921	LEAD	160	L	mg/Kg
007440360	ANTIMONY	---	7.1U	mg/Kg
007782492	SELENIUM	---	4.2U	mg/Kg
007440280	THALLIUM	---	3.0U	mg/Kg
007440622	VANADIUM	42		mg/Kg
007440666	ZINC	1,200		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.68	L	mg/Kg
57-12-5	CYANIDE TOT.	---	0.14U	mg/Kg

AF01526 Field/Station ID: CLI-SS-02 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH91

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	9,200		mg/Kg
007440382	ARSENIC	6.8		mg/Kg
007440393	BARIUM	57		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01526 Field/Station ID: CLI-SS-02 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH91

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.61U	mg/Kg
007440702	CALCIUM	47,000		mg/Kg
7440-43-9	CADMIUM	1.9		mg/Kg
007440484	COBALT	---	6.1U	mg/Kg
007440473	CHROMIUM	27		mg/Kg
007440508	COPPER	84		mg/Kg
007439896	IRON	22,000		mg/Kg
007440097	POTASSIUM	---	610U	mg/Kg
007439954	MAGNESIUM	3,800		mg/Kg
007439965	MANGANESE	250		mg/Kg
007440235	SODIUM	---	610U	mg/Kg
007440020	NICKEL	12		mg/Kg
007439921	LEAD	230		mg/Kg
007440360	ANTIMONY	---	7.3U	mg/Kg
007782492	SELENIUM	---	4.3U	mg/Kg
007440280	THALLIUM	---	3.1U	mg/Kg
007440622	VANADIUM	58		mg/Kg
007440666	ZINC	500		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.36		mg/Kg
57-12-5	CYANIDE TOT.	---	0.14U	mg/Kg

AF01527 Field/Station ID: CLI-SS-03 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH92

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	6,900		mg/Kg
007440382	ARSENIC	6.7		mg/Kg
007440393	BARIUM	110		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01527 Field/Station ID: CLI-SS-03 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH92

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.62U	mg/Kg
007440702	CALCIUM	18,000		mg/Kg
7440-43-9	CADMIUM	1.5		mg/Kg
007440484	COBALT	---	6.2U	mg/Kg
007440473	CHROMIUM	20		mg/Kg
007440508	COPPER	23		mg/Kg
007439896	IRON	21,000		mg/Kg
007440097	POTASSIUM	---	620U	mg/Kg
007439954	MAGNESIUM	960		mg/Kg
007439965	MANGANESE	310		mg/Kg
007440235	SODIUM	---	620U	mg/Kg
007440020	NICKEL	---	5.0U	mg/Kg
007439921	LEAD	260		mg/Kg
007440360	ANTIMONY	---	7.4U	mg/Kg
007782492	SELENIUM	---	4.3U	mg/Kg
007440280	THALLIUM	---	3.1U	mg/Kg
007440622	VANADIUM	62		mg/Kg
007440666	ZINC	550		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.32		mg/Kg
57-12-5	CYANIDE TOT.	0.17		mg/Kg

AF01528 Field/Station ID: CLI-SS-04 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH93

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	7,900		mg/Kg
007440382	ARSENIC	8.0		mg/Kg
007440393	BARIUM	120		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01528 Field/Station ID: CLI-SS-04 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH93

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.62U	mg/Kg
007440702	CALCIUM	14,000		mg/Kg
7440-43-9	CADMIUM	2.6		mg/Kg
007440484	COBALT	---	6.2U	mg/Kg
007440473	CHROMIUM	21		mg/Kg
007440508	COPPER	27		mg/Kg
007439896	IRON	23,000		mg/Kg
007440097	POTASSIUM	---	620U	mg/Kg
007439954	MAGNESIUM	1,300		mg/Kg
007439965	MANGANESE	400		mg/Kg
007440235	SODIUM	---	620U	mg/Kg
007440020	NICKEL	5.3		mg/Kg
007439921	LEAD	260		mg/Kg
007440360	ANTIMONY	---	7.4U	mg/Kg
007782492	SELENIUM	---	4.3U	mg/Kg
007440280	THALLIUM	---	3.1U	mg/Kg
007440622	VANADIUM	69		mg/Kg
007440666	ZINC	530		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.33		mg/Kg
57-12-5	CYANIDE TOT.	0.17		mg/Kg

AF01529 Field/Station ID: CLI-SS-05 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH94

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.3U	mg/Kg
007429905	ALUMINUM	11,000		mg/Kg
007440382	ARSENIC	12		mg/Kg
007440393	BARIUM	120		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01529 Field/Station ID: CLI-SS-05 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH94

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.66U	mg/Kg
007440702	CALCIUM	16,000		mg/Kg
7440-43-9	CADMIUM	3.2		mg/Kg
007440484	COBALT	---	6.6U	mg/Kg
007440473	CHROMIUM	48		mg/Kg
007440508	COPPER	73		mg/Kg
007439896	IRON	50,000		mg/Kg
007440097	POTASSIUM	---	660U	mg/Kg
007439954	MAGNESIUM	1,400		mg/Kg
007439965	MANGANESE	240		mg/Kg
007440235	SODIUM	---	660U	mg/Kg
007440020	NICKEL	11		mg/Kg
007439921	LEAD	210		mg/Kg
007440360	ANTIMONY	---	8.0U	mg/Kg
007782492	SELENIUM	---	4.6U	mg/Kg
007440280	THALLIUM	---	3.3U	mg/Kg
007440622	VANADIUM	110		mg/Kg
007440666	ZINC	1,400		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.56		mg/Kg
57-12-5	CYANIDE TOT.	---	0.15U	mg/Kg

AF01530 Field/Station ID: CLI-SS-06 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH95

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.3U	mg/Kg
007429905	ALUMINUM	7,100		mg/Kg
007440382	ARSENIC	7.2		mg/Kg
007440393	BARIUM	110		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01530 Field/Station ID: CLI-SS-06 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH95

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.63U	mg/Kg
007440702	CALCIUM	27,000		mg/Kg
7440-43-9	CADMIUM	2.9		mg/Kg
007440484	COBALT	---	6.3U	mg/Kg
007440473	CHROMIUM	23		mg/Kg
007440508	COPPER	55		mg/Kg
007439896	IRON	21,000		mg/Kg
007440097	POTASSIUM	---	630U	mg/Kg
007439954	MAGNESIUM	2,500		mg/Kg
007439965	MANGANESE	320		mg/Kg
007440235	SODIUM	---	630U	mg/Kg
007440020	NICKEL	11		mg/Kg
007439921	LEAD	170		mg/Kg
007440360	ANTIMONY	---	7.6U	mg/Kg
007782492	SELENIUM	---	4.4U	mg/Kg
007440280	THALLIUM	---	3.2U	mg/Kg
007440622	VANADIUM	54		mg/Kg
007440666	ZINC	880		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.51		mg/Kg
57-12-5	CYANIDE TOT.	0.23		mg/Kg

AF01531 Field/Station ID: CLI-SS-07 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH96

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.3U	mg/Kg
007429905	ALUMINUM	7,200		mg/Kg
007440382	ARSENIC	9.6		mg/Kg
007440393	BARIUM	47		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01531 Field/Station ID: CLI-SS-07 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH96

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.67U	mg/Kg
007440702	CALCIUM	12,000		mg/Kg
7440-43-9	CADMIUM	1.5		mg/Kg
007440484	COBALT	---	6.7U	mg/Kg
007440473	CHROMIUM	35		mg/Kg
007440508	COPPER	48		mg/Kg
007439896	IRON	28,000		mg/Kg
007440097	POTASSIUM	---	670U	mg/Kg
007439954	MAGNESIUM	840		mg/Kg
007439965	MANGANESE	220		mg/Kg
007440235	SODIUM	---	670U	mg/Kg
007440020	NICKEL	7.5		mg/Kg
007439921	LEAD	140		mg/Kg
007440360	ANTIMONY	---	8.0U	mg/Kg
007782492	SELENIUM	---	4.7U	mg/Kg
007440280	THALLIUM	---	3.3U	mg/Kg
007440622	VANADIUM	75		mg/Kg
007440666	ZINC	810		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.36		mg/Kg
57-12-5	CYANIDE TOT.	---	0.15U	mg/Kg

AF01532 Field/Station ID: CLI-SS-08 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH97

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	17,000		mg/Kg
007440382	ARSENIC	4.0		mg/Kg
007440393	BARIUM	130		mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01532 Field/Station ID: CLI-SS-08 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH97

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.62U	mg/Kg
007440702	CALCIUM	5,200		mg/Kg
7440-43-9	CADMIUM	---	0.62U	mg/Kg
007440484	COBALT	23		mg/Kg
007440473	CHROMIUM	48		mg/Kg
007440508	COPPER	91		mg/Kg
007439896	IRON	40,000		mg/Kg
007440097	POTASSIUM	---	620U	mg/Kg
007439954	MAGNESIUM	6,600		mg/Kg
007439965	MANGANESE	960		mg/Kg
007440235	SODIUM	---	620U	mg/Kg
007440020	NICKEL	21		mg/Kg
007439921	LEAD	14		mg/Kg
007440360	ANTIMONY	---	7.5U	mg/Kg
007782492	SELENIUM	---	4.4U	mg/Kg
007440280	THALLIUM	---	3.1U	mg/Kg
007440622	VANADIUM	130		mg/Kg
007440666	ZINC	76		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.080		mg/Kg
57-12-5	CYANIDE TOT	---	0.14U	mg/Kg

AF01533 Field/Station ID: CLI-SS-09 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH98

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	1.2U	mg/Kg
007429905	ALUMINUM	4,000		mg/Kg
007440382	ARSENIC	8.1		mg/Kg
007440393	BARIUM	---	24U	mg/Kg

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01533 Field/Station ID: CLI-SS-09 Date Received: 5/18/2004
Matrix: Sediment

Sample Description: MBPH98

Analysis Type: METALS TAL ICP SOLID

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	0.59U	mg/Kg
007440702	CALCIUM	74,000		mg/Kg
7440-43-9	CADMIUM	---	0.59U	mg/Kg
007440484	COBALT	---	5.9U	mg/Kg
007440473	CHROMIUM	18		mg/Kg
007440508	COPPER	16		mg/Kg
007439896	IRON	11,000		mg/Kg
007440097	POTASSIUM	---	590U	mg/Kg
007439954	MAGNESIUM	750		mg/Kg
007439965	MANGANESE	170		mg/Kg
007440235	SODIUM	---	590U	mg/Kg
007440020	NICKEL	---	4.8U	mg/Kg
007439921	LEAD	35		mg/Kg
007440360	ANTIMONY	---	7.1U	mg/Kg
007782492	SELENIUM	---	4.2U	mg/Kg
007440280	THALLIUM	---	3.0U	mg/Kg
007440622	VANADIUM	42		mg/Kg
007440666	ZINC	67		mg/Kg

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	0.19		mg/Kg
57-12-5	CYANIDE TOT.	0.27		mg/Kg

AF01534 Field/Station ID: CLI-FRB-01 Date Received: 5/18/2004
Matrix: Aqueous

Sample Description: MBPJ02

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	10U	ug/L
007429905	ALUMINUM	---	200U	ug/L
007440382	ARSENIC	---	15U	ug/L
007440393	BARIUM	---	200U	ug/L

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01534 Field/Station ID: CLI-FRB-01 Date Received: 5/18/2004
Matrix: Aqueous

Sample Description: MBPJ02

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	5.0U	ug/L
007440702	CALCIUM	---	5,000U	ug/L
7440-43-9	CADMIUM	---	5.0U	ug/L
007440484	COBALT	---	50U	ug/L
007440473	CHROMIUM	---	10U	ug/L
007440508	COPPER	---	25U	ug/L
007439896	IRON	---	100U	ug/L
007440097	POTASSIUM	---	5,000U	ug/L
007439954	MAGNESIUM	---	5,000U	ug/L
007439965	MANGANESE	---	15U	ug/L
007440235	SODIUM	---	5,000U	ug/L
007440020	NICKEL	---	40U	ug/L
007439921	LEAD	---	10U	ug/L
007440360	ANTIMONY	---	60U	ug/L
007782492	SELENIUM	---	35U	ug/L
007440280	THALLIUM	---	25U	ug/L
007440622	VANADIUM	---	50U	ug/L
007440666	ZINC	---	60U	ug/L

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	---	0.20U	ug/L
57-12-5	CYANIDE TOT.	---	10U	ug/L

AF01535 Field/Station ID: CLI-AFB-01 Date Received: 5/18/2004
Matrix: Aqueous

Sample Description: MBPJ03

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	10U	ug/L
007429905	ALUMINUM	---	200U	ug/L
007440382	ARSENIC	---	15U	ug/L
007440393	BARIUM	---	200U	ug/L

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01535 Field/Station ID: CLI-AFB-01 Date Received: 5/18/2004
Matrix: Aqueous

Sample Description: MBPJ03

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	5.0U	ug/L
007440702	CALCIUM	---	5,000U	ug/L
7440-43-9	CADMIUM	---	5.0U	ug/L
007440484	COBALT	---	50U	ug/L
007440473	CHROMIUM	---	10U	ug/L
007440508	COPPER	---	25U	ug/L
007439896	IRON	---	100U	ug/L
007440097	POTASSIUM	---	5,000U	ug/L
007439954	MAGNESIUM	---	5,000U	ug/L
007439965	MANGANESE	---	15U	ug/L
007440235	SODIUM	---	5,000U	ug/L
007440020	NICKEL	---	40U	ug/L
007439921	LEAD	---	10U	ug/L
007440360	ANTIMONY	---	60U	ug/L
007782492	SELENIUM	---	35U	ug/L
007440280	THALLIUM	---	25U	ug/L
007440622	VANADIUM	---	50U	ug/L
007440666	ZINC	---	60U	ug/L

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	---	0.20U	ug/L
57-12-5	CYANIDE TOT.	---	10U	ug/L

AF01545 Field/Station ID: CLI-GW-01 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPH99

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	10U	ug/L
007429905	ALUMINUM	---	200U	ug/L
007440382	ARSENIC	---	15U	ug/L
007440393	BARIUM	---	200U	ug/L

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01545 Field/Station ID: CLI-GW-01 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPH99

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	5.0U	ug/L
007440702	CALCIUM	39,000		ug/L
7440-43-9	CADMIUM	---	5.0U	ug/L
007440484	COBALT	---	50U	ug/L
007440473	CHROMIUM	---	10U	ug/L
007440508	COPPER	31		ug/L
007439896	IRON	4,700		ug/L
007440097	POTASSIUM	---	5,000U	ug/L
007439954	MAGNESIUM	7,900		ug/L
007439965	MANGANESE	170		ug/L
007440235	SODIUM	66,000		ug/L
007440020	NICKEL	---	40U	ug/L
007439921	LEAD	---	10U	ug/L
007440360	ANTIMONY	---	60U	ug/L
007782492	SELENIUM	---	35U	ug/L
007440280	THALLIUM	---	25U	ug/L
007440622	VANADIUM	---	50U	ug/L
007440666	ZINC	---	60U	ug/L

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	---	0.20U	ug/L
57-12-5	CYANIDE TOT.	---	10U	ug/L

AF01546 Field/Station ID: CLI-GW-02 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPJ00

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	10U	ug/L
007429905	ALUMINUM	400		ug/L
007440382	ARSENIC	---	15U	ug/L
007440393	BARIUM	---	200U	ug/L

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01546 Field/Station ID: CLI-GW-02 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPJ00

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	5.0U	ug/L
007440702	CALCIUM	38,000		ug/L
7440-43-9	CADMIUM	---	5.0U	ug/L
007440484	COBALT	---	50U	ug/L
007440473	CHROMIUM	---	10U	ug/L
007440508	COPPER	60		ug/L
007439896	IRON	2,200		ug/L
007440097	POTASSIUM	---	5,000U	ug/L
007439954	MAGNESIUM	8,000		ug/L
007439965	MANGANESE	190		ug/L
007440235	SODIUM	65,000		ug/L
007440020	NICKEL	---	40U	ug/L
007439921	LEAD	---	10U	ug/L
007440360	ANTIMONY	---	60U	ug/L
007782492	SELENIUM	---	35U	ug/L
007440280	THALLIUM	---	25U	ug/L
007440622	VANADIUM	---	50U	ug/L
007440666	ZINC	---	60U	ug/L

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	---	0.20U	ug/L
57-12-5	CYANIDE TOT.	---	10U	ug/L

AF01547 Field/Station ID: CLI-GW-03 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPJ01

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440224	SILVER	---	10U	ug/L
007429905	ALUMINUM	---	200U	ug/L
007440382	ARSENIC	---	15U	ug/L
007440393	BARIUM	---	200U	ug/L

U.S. EPA Region 2 Laboratory
Data Report

Survey Name: CELIA'S LAUNDRY, IND

Project Number: 04050017

*Sorted By Sample ID

AF01547 Field/Station ID: CLI-GW-03 Date Received: 5/19/2004
Matrix: Aqueous

Sample Description: MBPJ01

Analysis Type: METALS TAL ICP AQUEOUS

CAS Number	Analyte Name	Result	Remark Codes	Units
007440417	BERYLLIUM	---	5.0U	ug/L
007440702	CALCIUM	36,000		ug/L
7440-43-9	CADMIUM	---	5.0U	ug/L
007440484	COBALT	---	50U	ug/L
007440473	CHROMIUM	---	10U	ug/L
007440508	COPPER	---	25U	ug/L
007439896	IRON	1,500		ug/L
007440097	POTASSIUM	---	5,000U	ug/L
007439954	MAGNESIUM	6,400		ug/L
007439965	MANGANESE	87		ug/L
007440235	SODIUM	100,000		ug/L
007440020	NICKEL	---	40U	ug/L
007439921	LEAD	---	10U	ug/L
007440360	ANTIMONY	---	60U	ug/L
007782492	SELENIUM	---	35U	ug/L
007440280	THALLIUM	---	25U	ug/L
007440622	VANADIUM	---	50U	ug/L
007440666	ZINC	---	60U	ug/L

Single Component Analyses

CAS Number	Analyte Name	Result	Remark Codes	Units
007439976	MERCURY	---	0.20U	ug/L
57-12-5	CYANIDE TOT.	---	10U	ug/L

Project Approval: _____ **Date:** 7/19/04

Refer to Page 1 for an explanation of Remark Codes

REFERENCE: 20

PR EQB-FIT PHOTO LOG

Site Name: CELIA'S LAUNDRY, INC.
Case No: PR 0002196368
TDD No. 02-0401-39
Sampling Date(s): May 17-18, 2004

Camera: CANON SURE SHOT 35 MM
Film: Kodak Max 400, 12 exp.
Field SM Signature:
Date: May 17, 2004

Date	Time	Roll 1 Photo ID #	Photographer	Comments
05/17/04	0720 hrs	1	M. Ortiz	Collection of the organic fraction of CLI-SS-08.
05/17/04	0735 hrs	2	M. Ortiz	Collection of the inorganic fraction of CLI -SS-08.
05/17/04	0756 hrs	3	M. Ortiz	Collection of the organic fraction of CLI -SS-09.
05/17/04	0810 hrs	4	M. Ortiz	Collection of the inorganic fraction of CLI -SS-09.
05/17/04	0850 hrs	5	M. Ortiz	Collection of the organic fraction of CLI -SS-01.
05/17/04	0900 hrs	6	M. Ortiz	Collection of the inorganic fraction of CLI -SS-01.
05/17/04	0905 hrs	7	M. Ortiz	Collection of the organic fraction of CLI -SS-03.
05/17/04	0919 hrs	8	M. Ortiz	Collection of the inorganic fraction of CLI -SS-03.

PR EQB-FIT PHOTO LOG

Site Name: CELIA'S LAUNDRY, INC.
Case No: PR 0002196368
TDD No. 02-0401-39
Sampling Date(s): May 17-18, 2004

Camera: CANON SURE SHOT 35 MM
Film: Kodak Max 400, 12 exp.
Field SM Signature:
Date: May 17, 2004

05/17/04	0911 hrs	9	M. Ortiz	Collection of the organic fraction of CLI -SS-04 D.
05/17/04	0924	10	M. Ortiz	Collection of the inorganic fraction of CLI -SS-04 D.
05/17/04	0936 hrs	11	M. Ortiz	Collection of the organic fraction of CLI -SS-02.
05/17/04	0943 hrs	12	M. Ortiz	Collection of the inorganic fraction of CLI -SS-02.
05/17/04	0948 hrs	1	M. Ortiz	Collection of the organic fraction of CLI -SS-07.
05/17/04	0958 hrs	2	M. Ortiz	Collection of the inorganic fraction of CLI -SS-07.

PR EQB-FIT PHOTO LOG

Site Name: CELIA'S LAUNDRY, INC.
Case No: PR 0002196368
TDD No. 02-0401-39
Sampling Date(s): May 17-18, 2004

Camera: CANON SURE SHOT 35 MM
Film: Kodak Max 400, 12 exp.
Field SM Signature:
Date: May 17and 18, 2004

Date	Time	Roll 2 Photo ID #	Photographer	Comments
05/17/04	1106 hrs	3	M. Ortiz	Collection of the organic fraction of CLI-SS-06.
05/17/04	1115 hrs	4	M. Ortiz	Collection of the inorganic fraction of CLI SS-06.
05/17/04	1122 hrs	5	M. Ortiz	Collection of the organic fraction of CLI -SS-05.
05/17/04	1134 hrs	6	M. Ortiz	Collection of the inorganic fraction of CLI -SS-05.
05/18/04	0935 hrs	7	M. Ortiz	Collection of the organic fraction of CLI -GW-03.
05/18/04	0950 hrs	8	M. Ortiz	Collection of the inorganic fraction of CLI -GW-03.

Site Name: CELIA'S LAUNDRY, INC.
Case No: PR 0002196368
TDD No. 02-0401-39
Sampling Date(s): May 17-18, 2004

Camera: CANON SURE SHOT 35 MM
Film: Kodak Max 400, 12 exp.
Field SM Signature:
Date: May 17and 18, 2004

Date	Time	Roll 2 Photo ID #	Photographer	Comments
05/18/04	1055 hrs	9	M. Ortiz	Collection of the organic fraction of CLI -GW-01.
05/18/04	1058 hrs	10	M. Ortiz	Collection of the organic fraction of CLI -GW-02D.
05/18/04	1115 hrs	11	M. Ortiz	Collection of the inorganic fraction of CLI -GW-01.
05/18/04	1120 hrs	12	M. Ortiz	Collection of the inorganic fraction of CLI -GW-02.
05/17/04	0710 hrs	1 (Roll 3)	D. Coreano	Collection of the organic fraction of CLI-AFB-01
05/17/04	0726 hrs	2	D. Coreano	Collection of the inorganic fraction of CLI-AFB-01
05/17/04	0836	3	D. Coreano	Collection of the organic fraction of CLI-TB-01
05/17/04	0922	4	D. Coreano	Collection of the organic fraction of CLI-FRB-01
05/17/04	0934	5	D. Coreano	Collection of the inorganic fraction of CLI-FRB-01

PR EQB-FIT PHOTO LOG

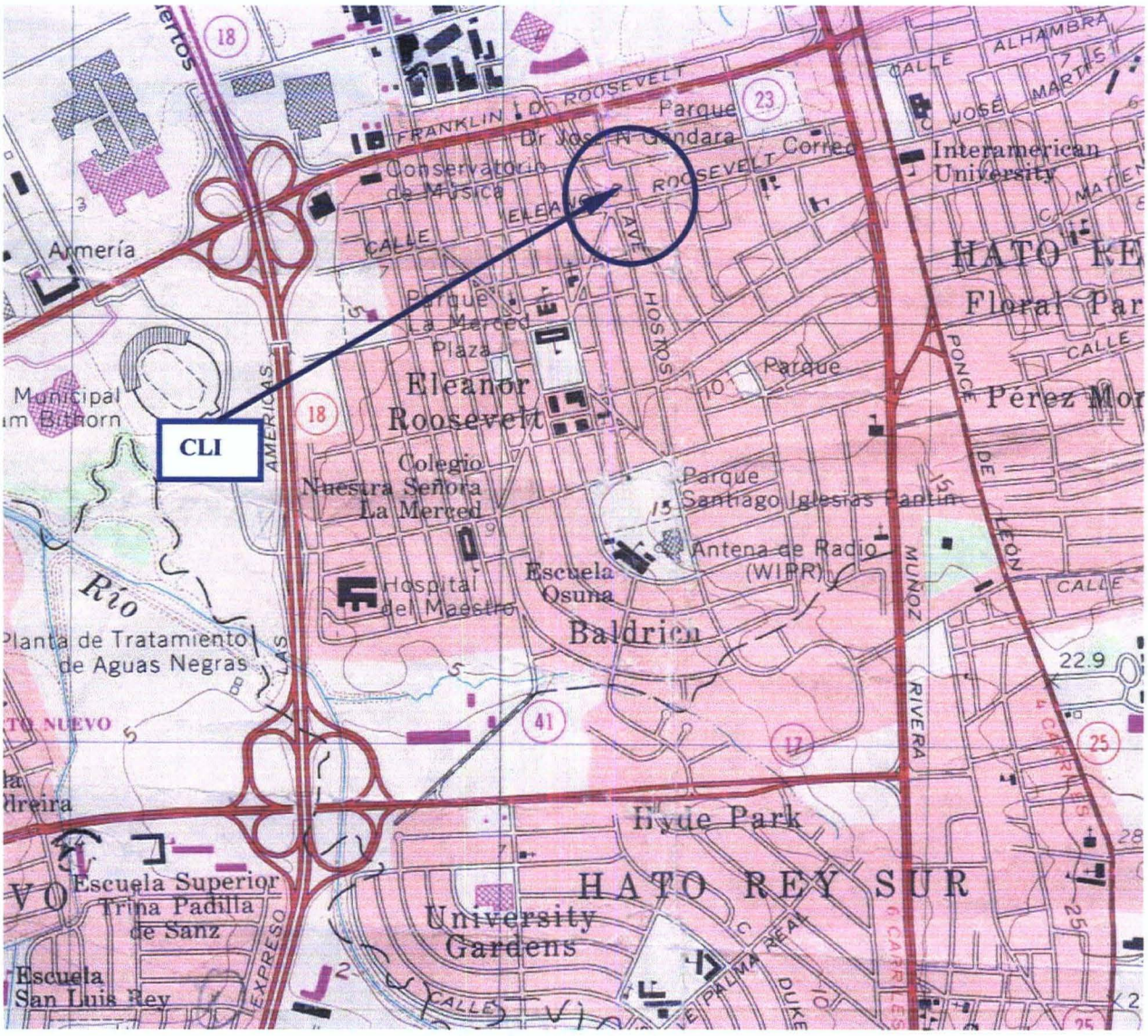
Site Name: CELIA'S LAUNDRY, INC.
Case No: PR 0002196368
TDD No. 02-0401-39
Sampling Date(s): May 17-18, 2004

Camera: CANON SURE SHOT 35 MM
Film: Kodak Max 400, 12 exp.
Field SM Signature:
Date: May 17and 18, 2004

05/18/04	0734	6	D. Coreano	Collection of the organic fraction of CLI-FB-01
05/18/04	0748	7	D. Coreano	Collection of the organic fraction of CLI-TB-02
05/18/04	0758	8	D. Coreano	Collection of the organic fraction of CLI-TB-03

SITE LOCATION MAP
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO

N



NOT TO SCALE

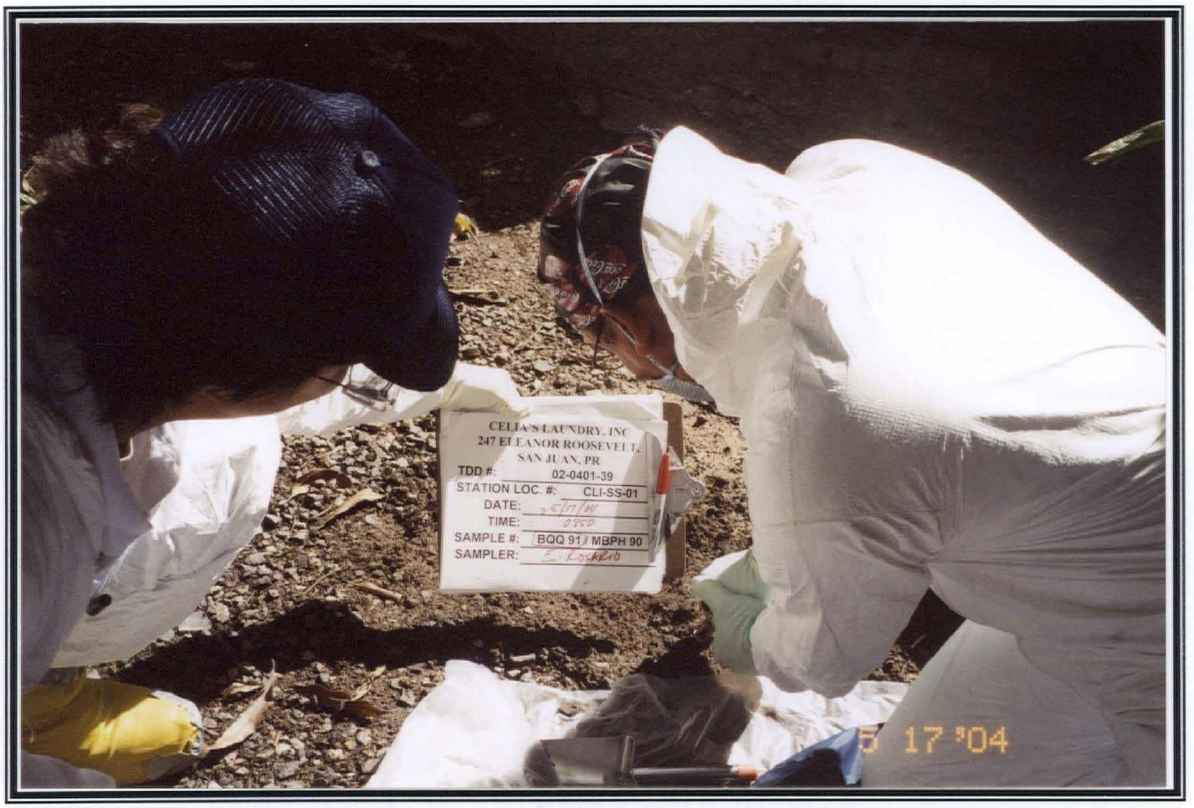
FIGURE 1

Photo 1

Photo 2

Photo 3

Photo 4



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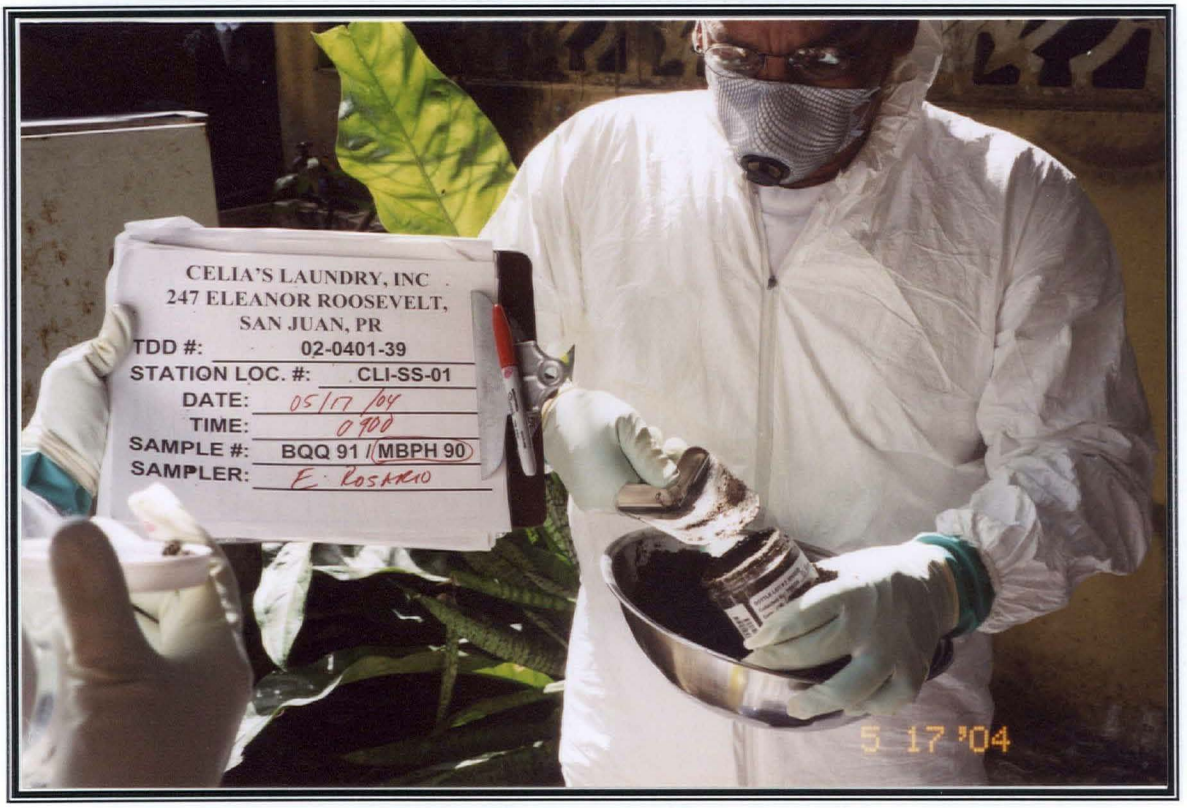
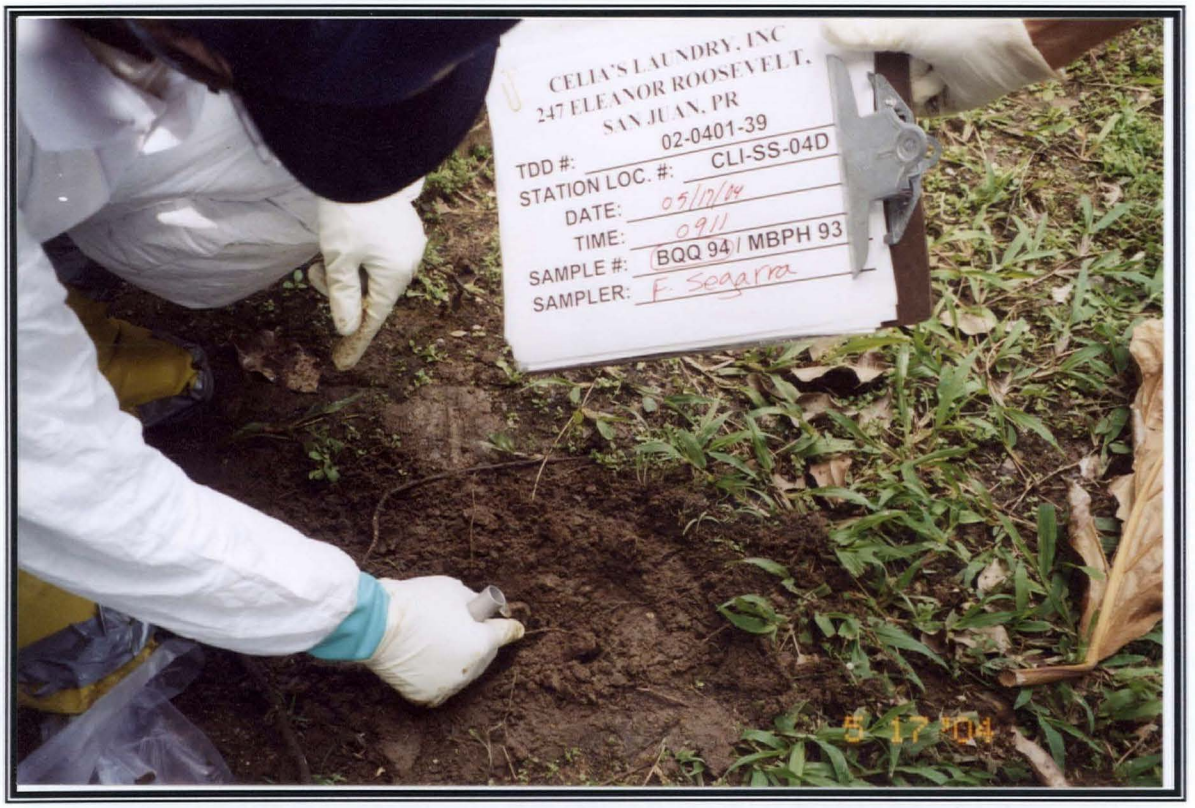


Photo 6

Photo 7

Photo 8



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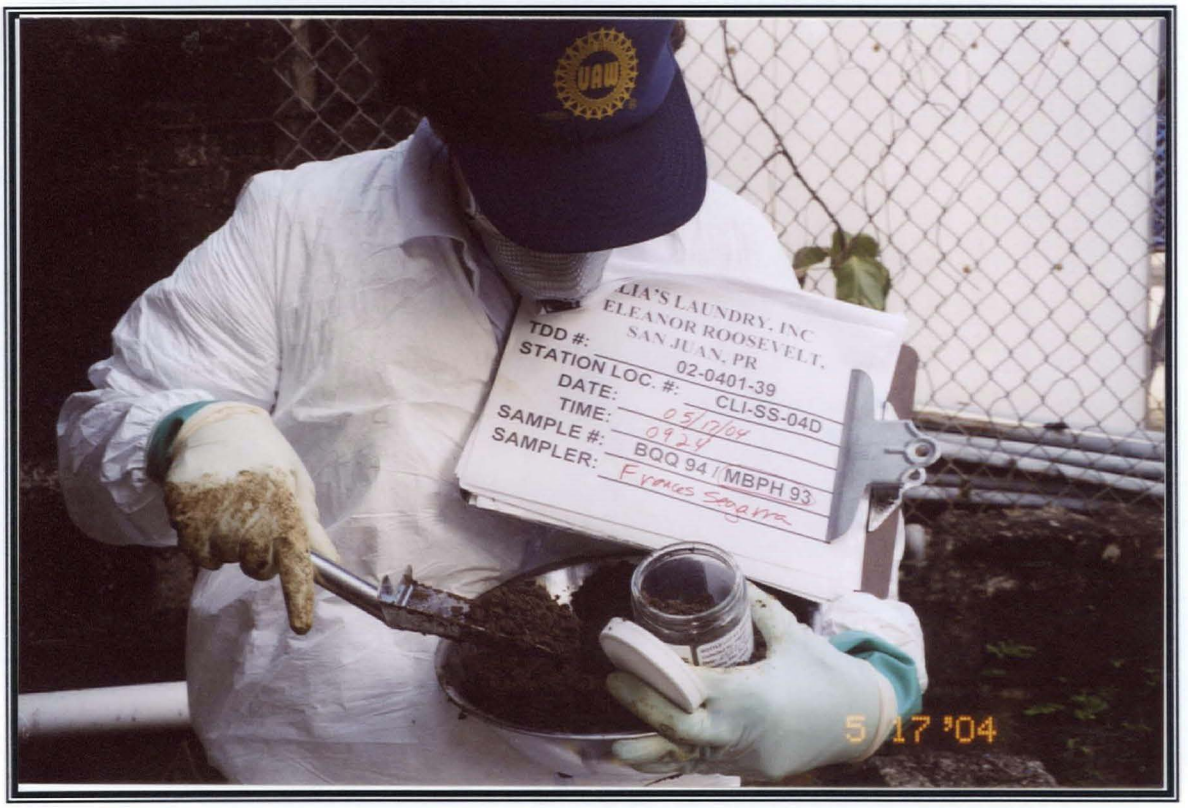

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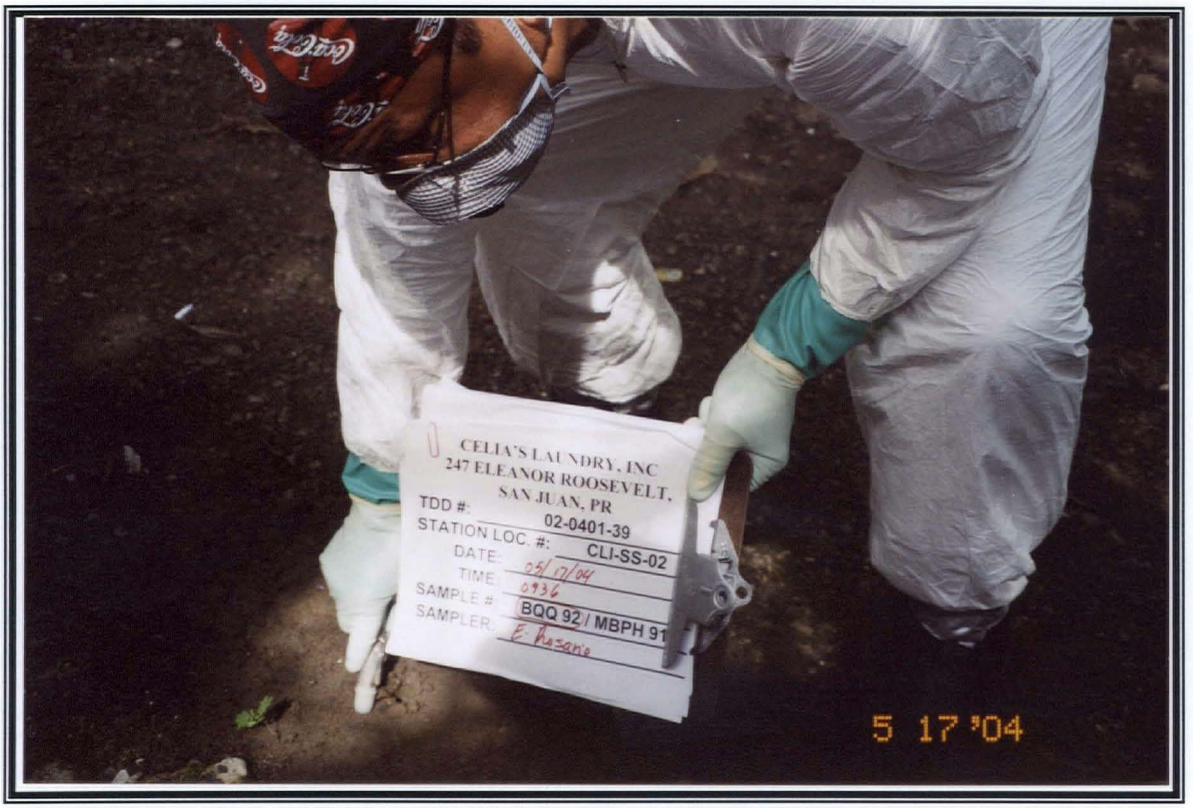

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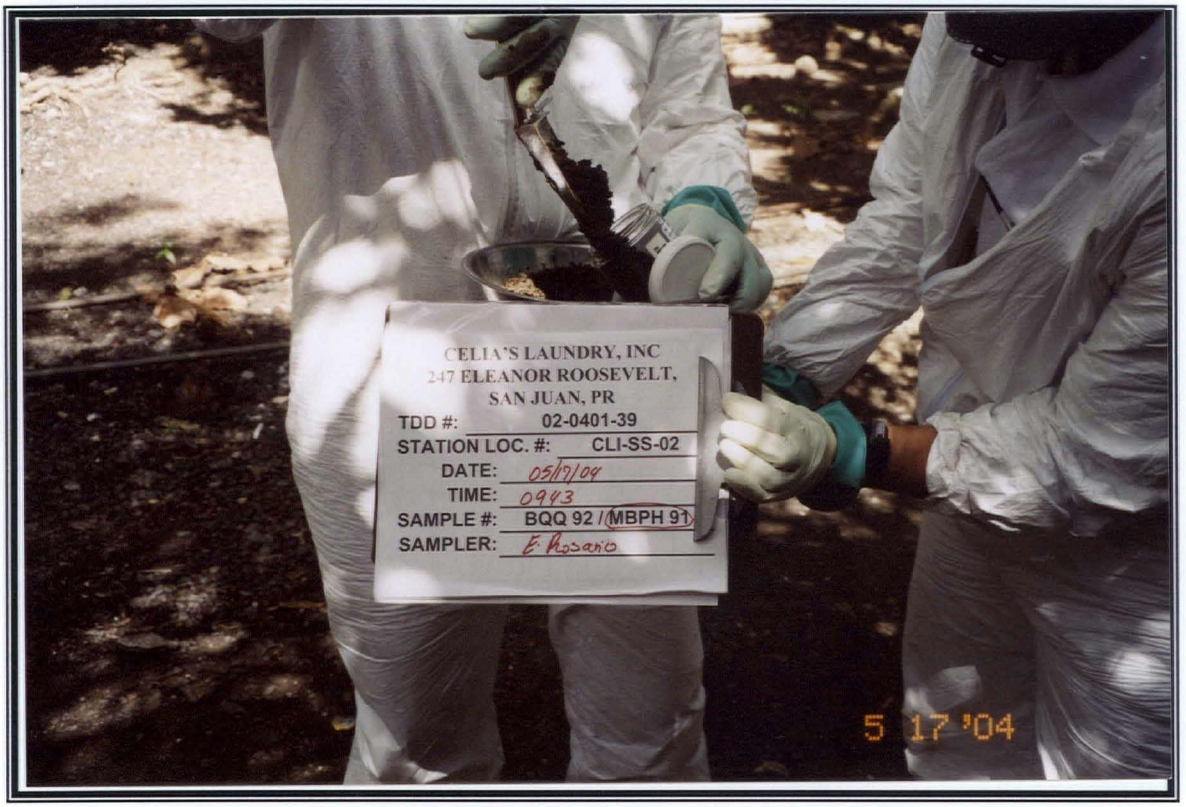


Photo 12

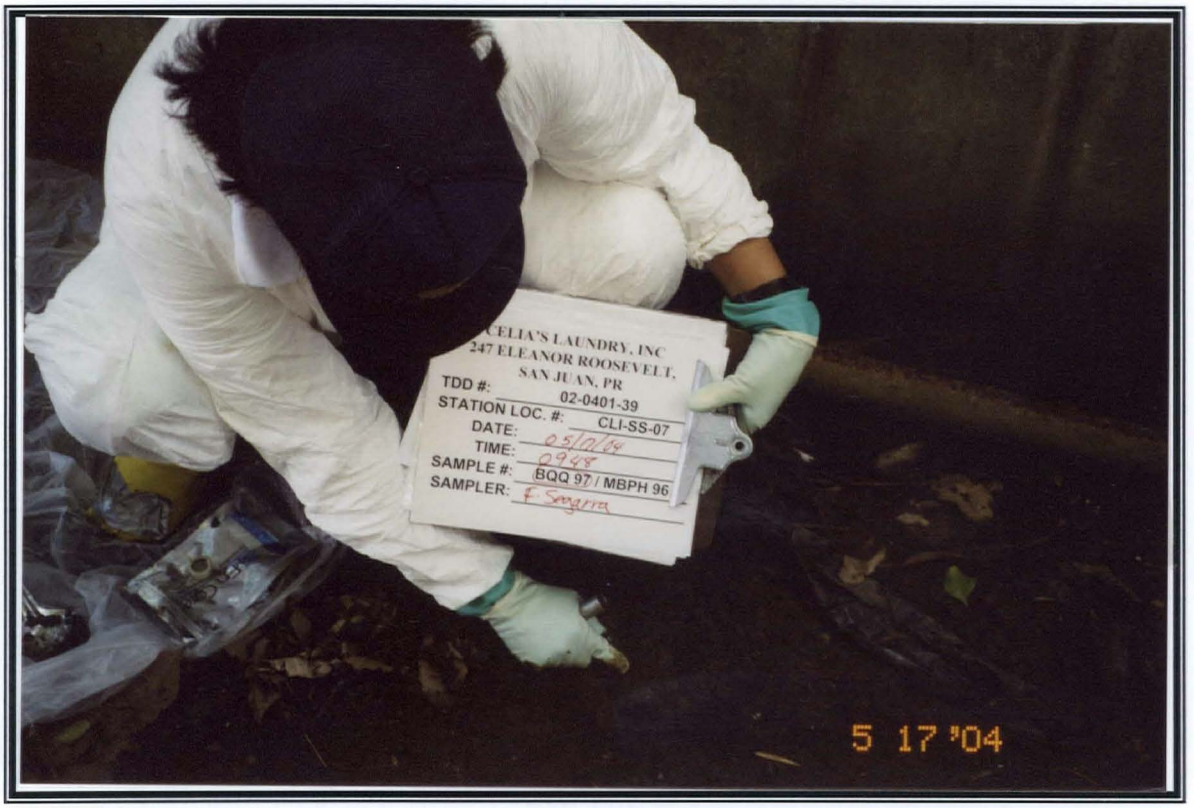


Photo 1

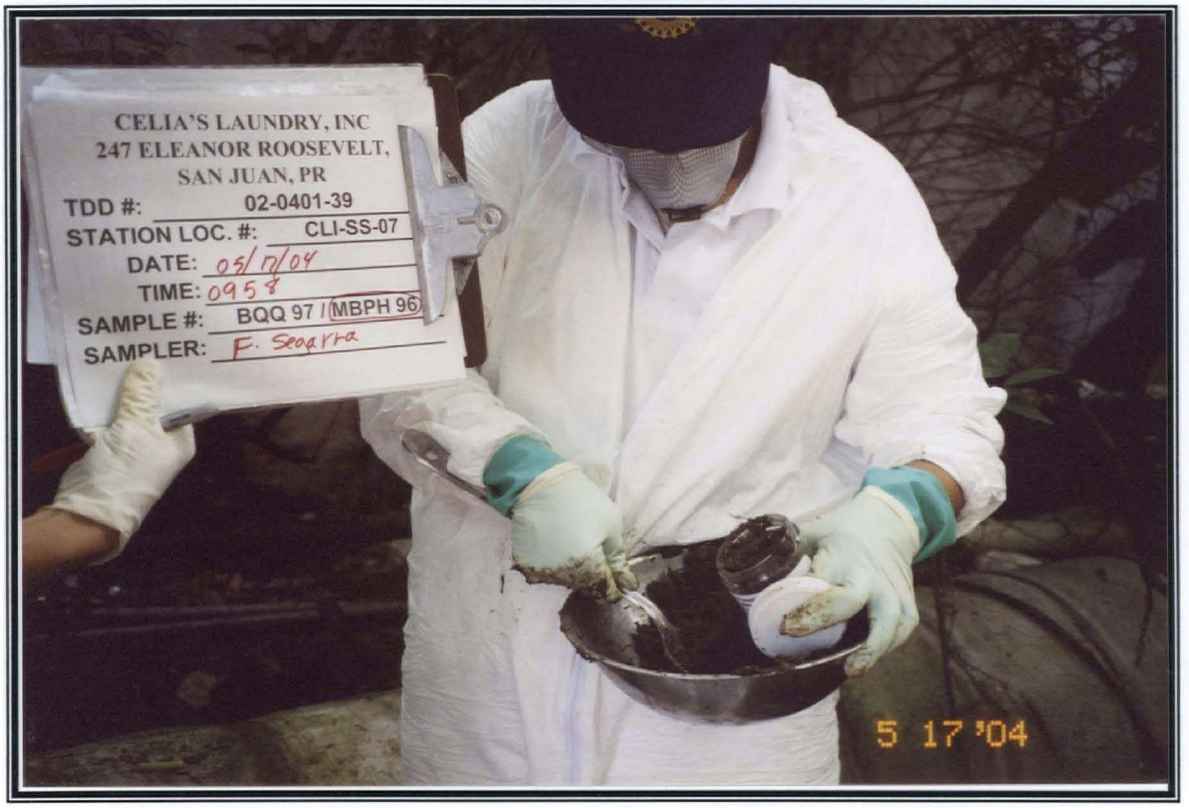


Photo 2

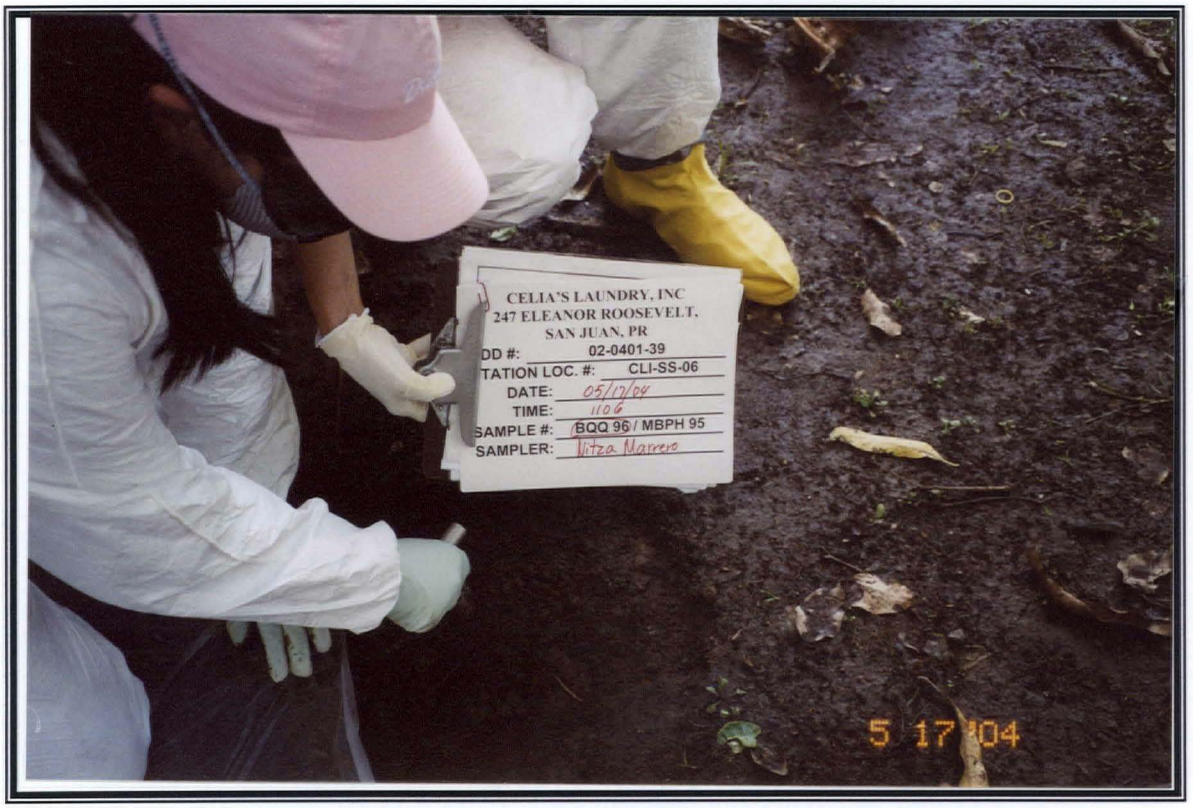


Photo 3

Photo 4

CELIA'S LAUNDRY, INC
247 ELEANOR ROOSEVELT,
SAN JUAN, PR
TDD #: 02-0401-39
STATION LOC. #: CLI-SS-05
DATE: 05/17/04
TIME: 1122
SAMPLE #: BQQ 95 / MBPH 94
SAMPLER: Nitza Marrero
5 17 '04

Photo 5

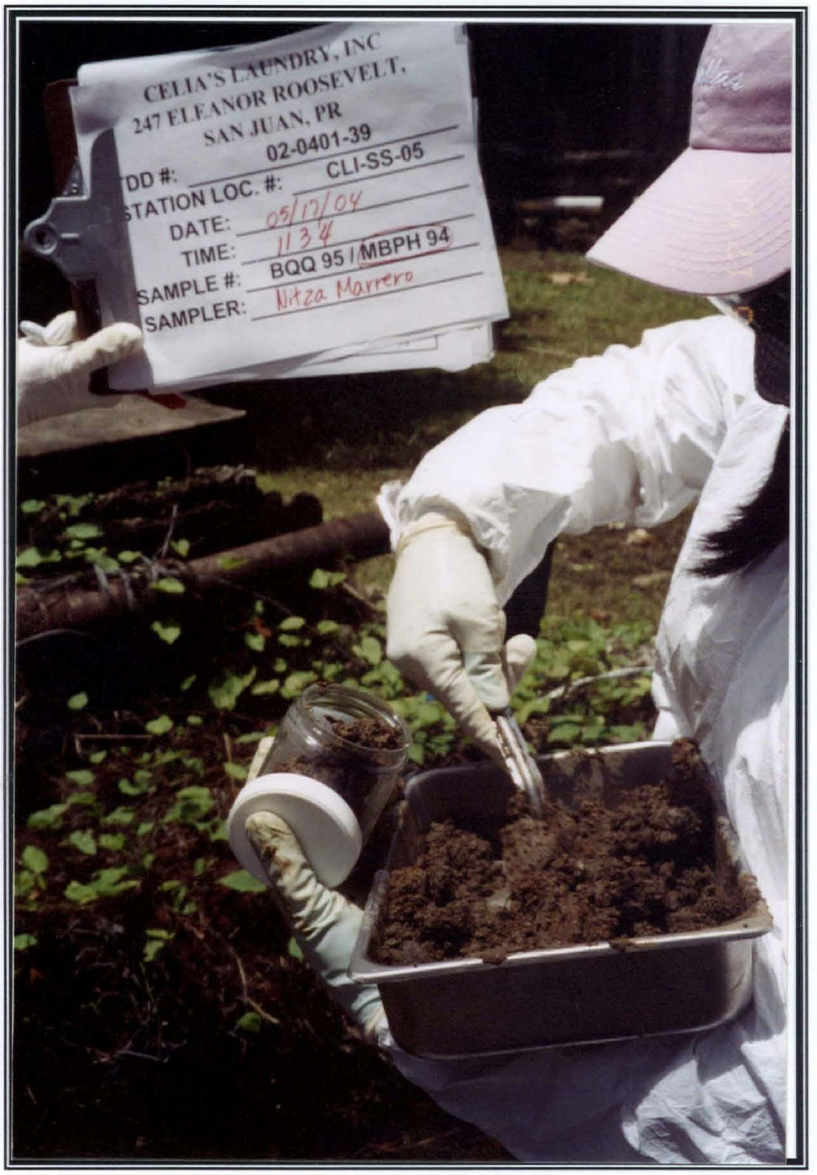

CELIA'S LAUNDRY, INC
247 ELEANOR ROOSEVELT,
SAN JUAN, PR
TDD #: 02-0401-39
STATION LOC. #: CLI-SS-05
DATE: 05/17/04
TIME: 1134
SAMPLE #: BQQ 95 / MBPH 94
SAMPLER: Nitza Marrero

Photo 6

Photo 7

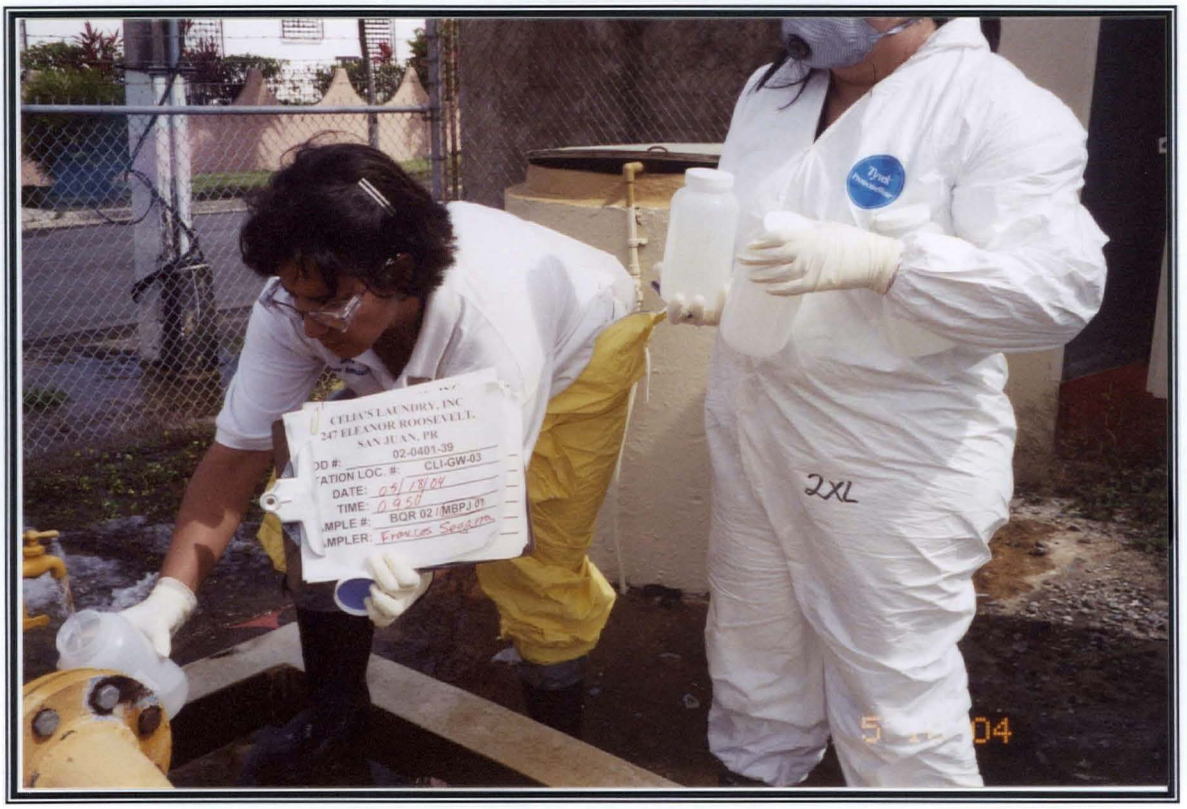


Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 1

Photo 2

CELIA'S LAUNDRY, INC
247 ELEANOR ROOSEVELT
SAN JUAN, PR
TDD #: 02-0401-39
STATION LOC. #: CLI-TB-01
DATE: May 17, 2004
TIME: 0836
SAMPLE #: BQR 04
SAMPLER: N. Hernández
5 18 '04

Photo 3

Photo 4

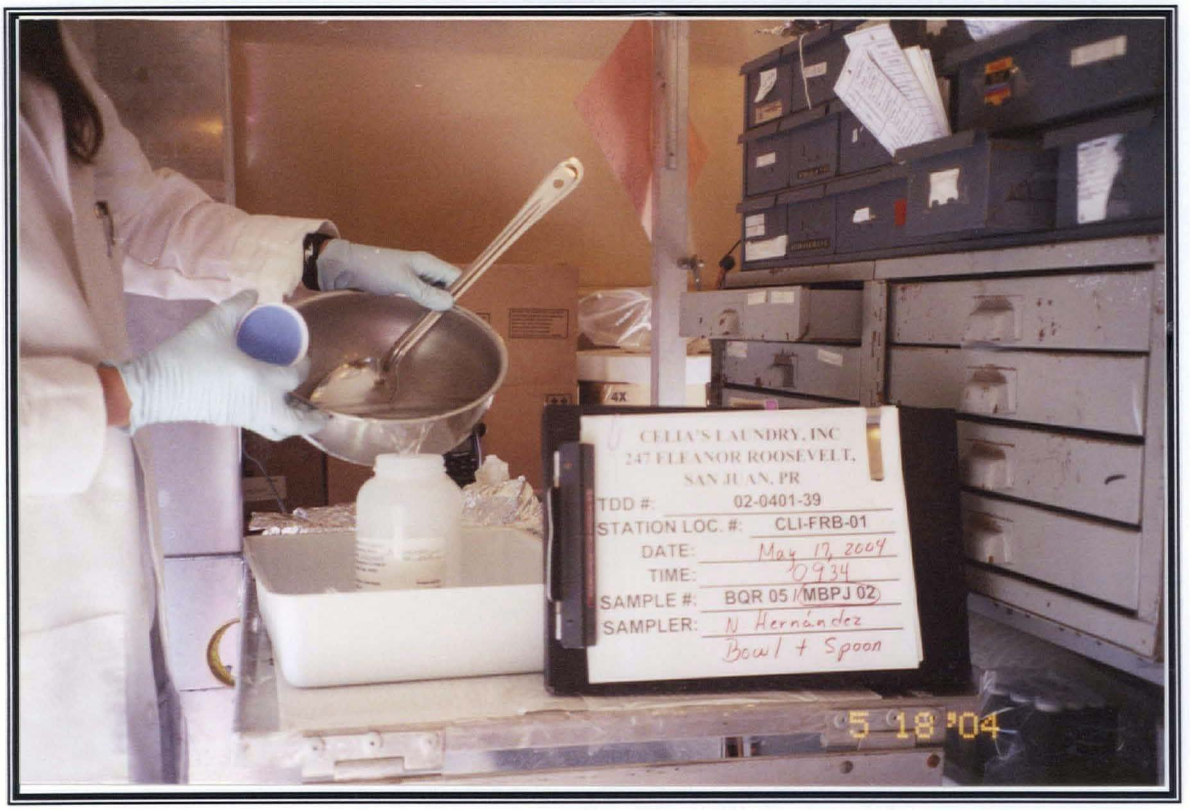


Photo 5

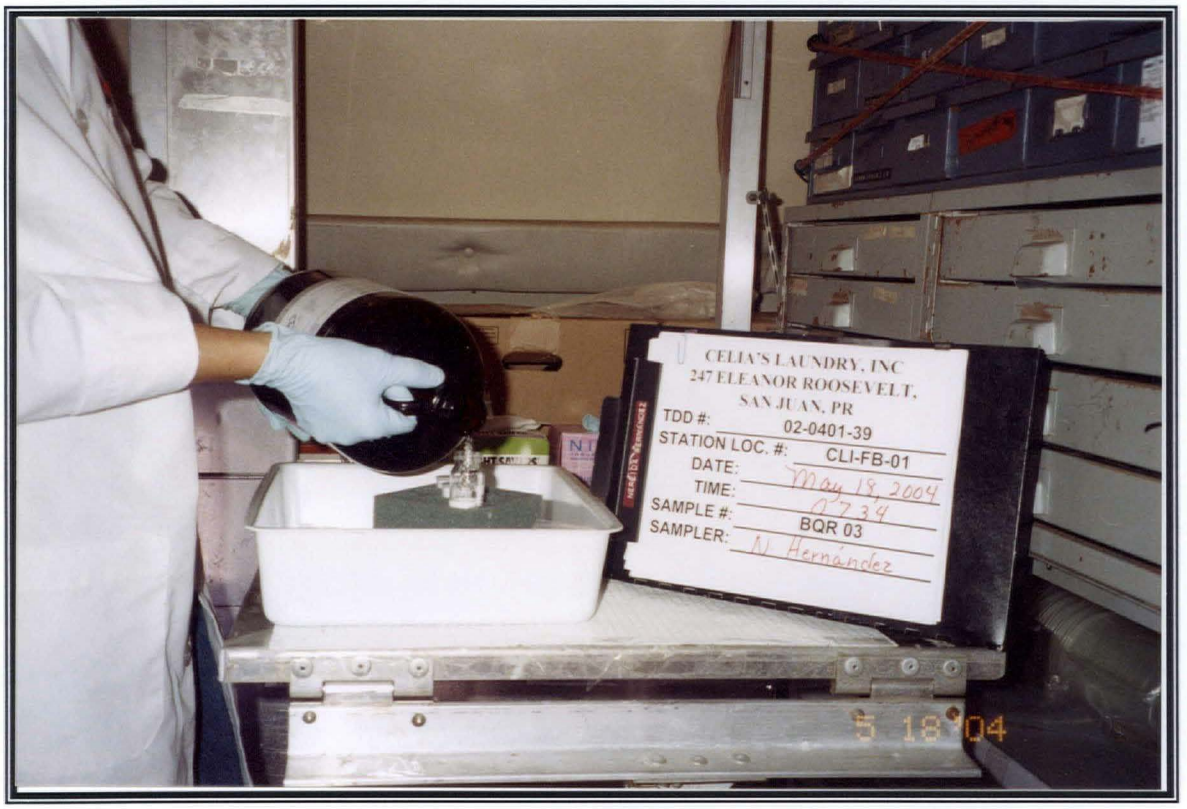

CELIA'S LAUNDRY, INC
247 ELEANOR ROOSEVELT,
SAN JUAN, PR
TDD #: 02-0401-39
STATION LOC. #: CLI-FB-01
DATE: May 18 2004
TIME: 17:34
SAMPLE #: BQR 03
SAMPLER: N Hernández
5 18 04

Photo 6

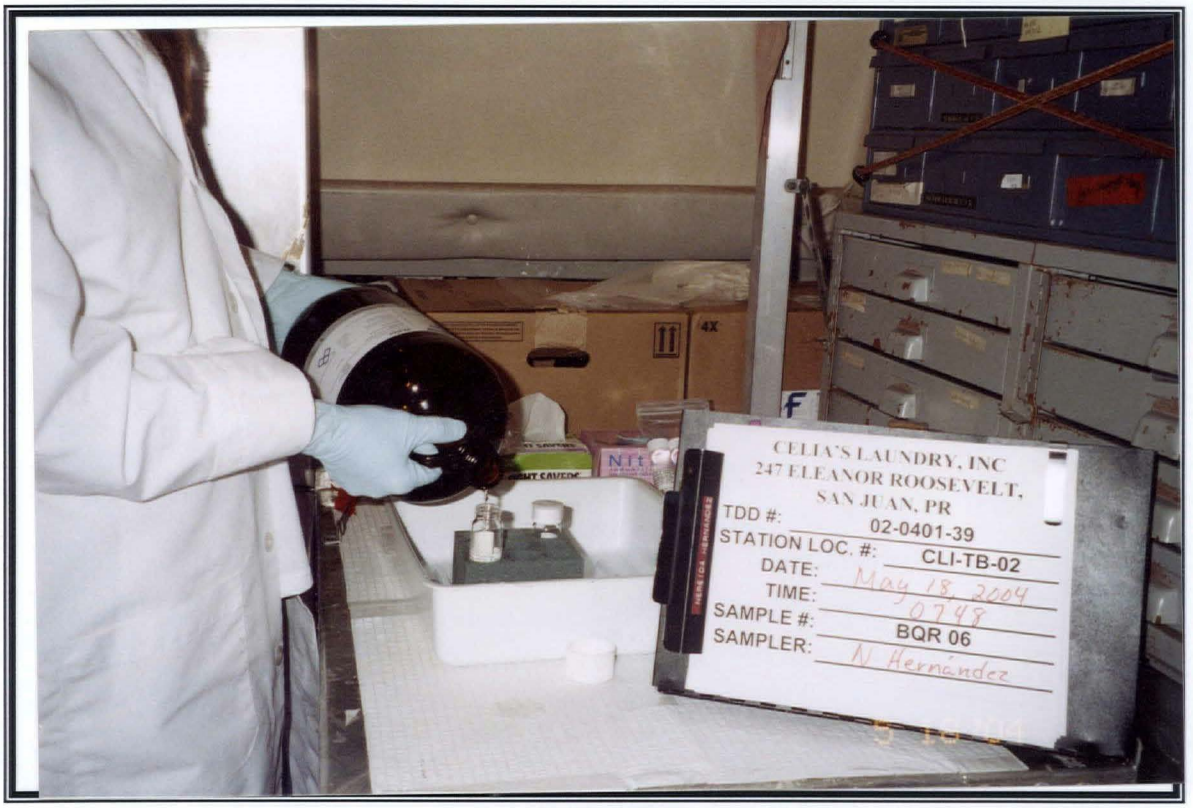


Photo 7

Photo 8

REFERENCE: 21

SAMPLING TRIP REPORT

SITE NAME: Celia's Laundry, Inc.

TDD No.: 02-0401-39

SAMPLING DATE: May 17-18, 2004

EPA CASE No.: 32903

1. Site Location Map: Figure 1
2. Sampling Points Location Map I: Figure 2
3. Sampling Points Location Map II Figure 3
4. Sample Descriptions: Tables 1and 2
5. Laboratories Receiving Samples:

Sample Type	Name and Address of Laboratory
Organic Analysis (Soil) (VOA's, BNA,s, Pesticides and PCB's)	Ceimic Corporation (CEIMIC) 10 Dean Knauss Dr. Narragansett, RI 02882
Inorganic Analysis (soil, aqueous) (Total metals and Cyanide)	USEPA Region 2 (DESA) Building 209, MS-230 2890 Woodbridge Ave. Edison, NJ 08837
Organic Analysis (Aqueous) (VOA's, BNA's, Pesticides/PCB's)	A4 Scientific (A 4) 1544 Sawdust Road, Suite 505 The Woodlands, TX 77380

6. Sample Dispatch Data:

The sampling activities were performed in two (2) days from May 17-18, 2004. The samples were sent to the laboratory mentioned before as follow:

On May 17, 2004 at 1515 hours, the PREQB Superfund PA/SI personnel sent via United Parcel Services (UPS) a total of nine (9) soil samples to Ceimic Corporation (CEIMIC), under airbill # N237-4861-24-8, a total of nine (9) soil samples and two (2) aqueous samples to DESA Laboratory under airbill # N237-4861-44-4, and a total of five (5) aqueous samples to A4 Scientific Laboratory under airbill # N237-4861-06-0.

On May 18, 2004 at 1530 hours, the PREQB Superfund PA/SI personnel sent via United Parcel Services (UPS) a total of three (3) aqueous samples to DESA Laboratory, under airbills # N-4861-20-2, and nine (9) aqueous samples to A4 Scientific Laboratory, under airbills # N237-4861-04-2 and N 237-4861-07-9.

7. Sampling Personnel:

May 17-18, 2004

Name	Organization	Duties on Site
Miriam Ortiz	PREQB	Site Manager
Nereida Hernández	PREQB	Sample Manager Officer
Frances Segarra	PREQB	Health & Safety Officer / Sampler
Nitsa Marrero	PREQB	Sampler
Ernesto Rosario	PREQB	Decon / Sampler

8. Additional Comments:

All samples, except for the trip blanks, will be analyzed for Target Compound List (TCL) and Target Analyte List (TAL), including cyanide. The trip blanks and field trip blanks will be analyzed for volatile organic compounds only (VOC's).

9. Report Prepared By: _____ Date: May 19, 2004

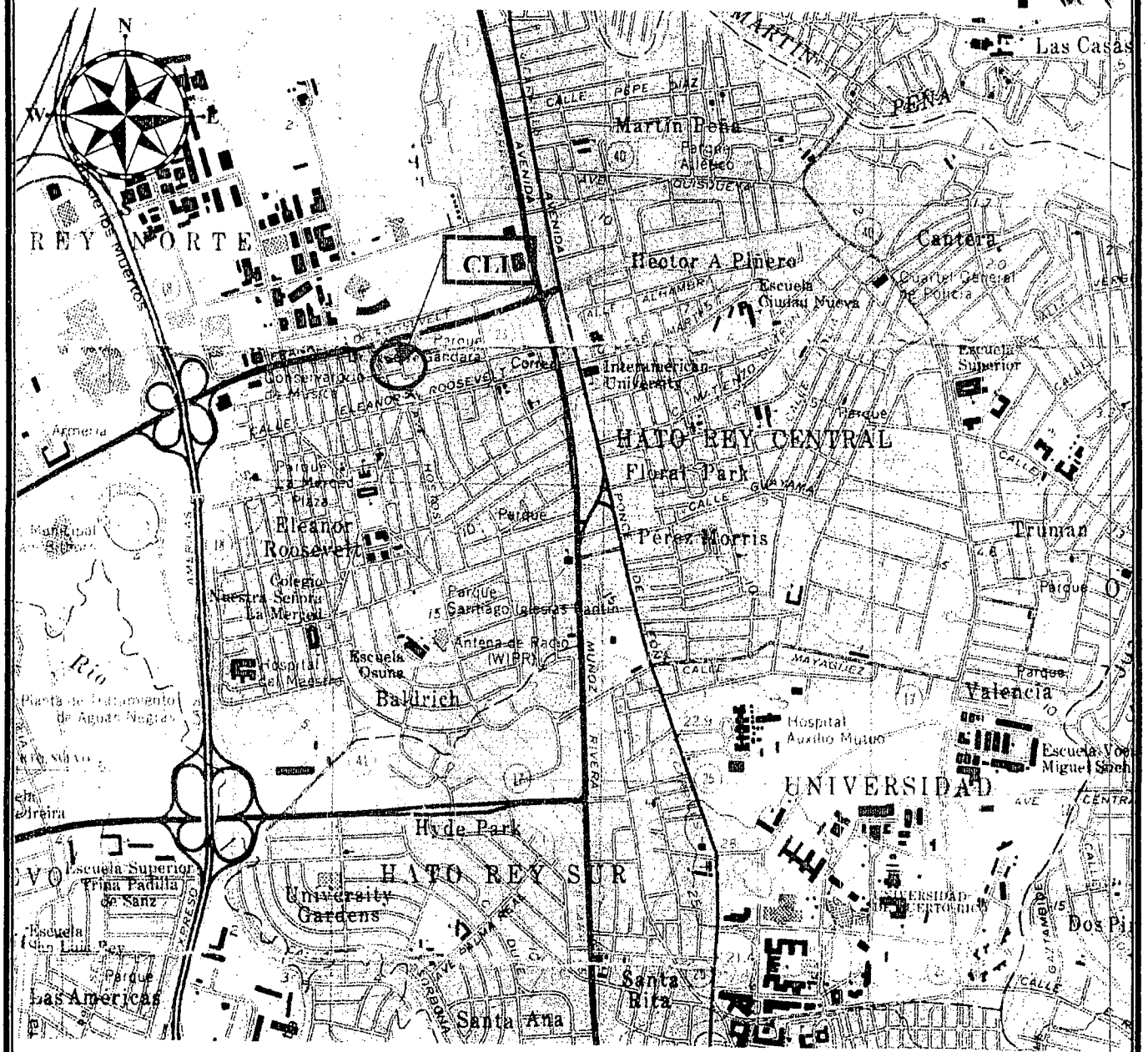
Miriam Ortiz Torres

10. Approved By: _____ Date: May 19, 2004

May 19, 2004

Juan J. Babá Peebles

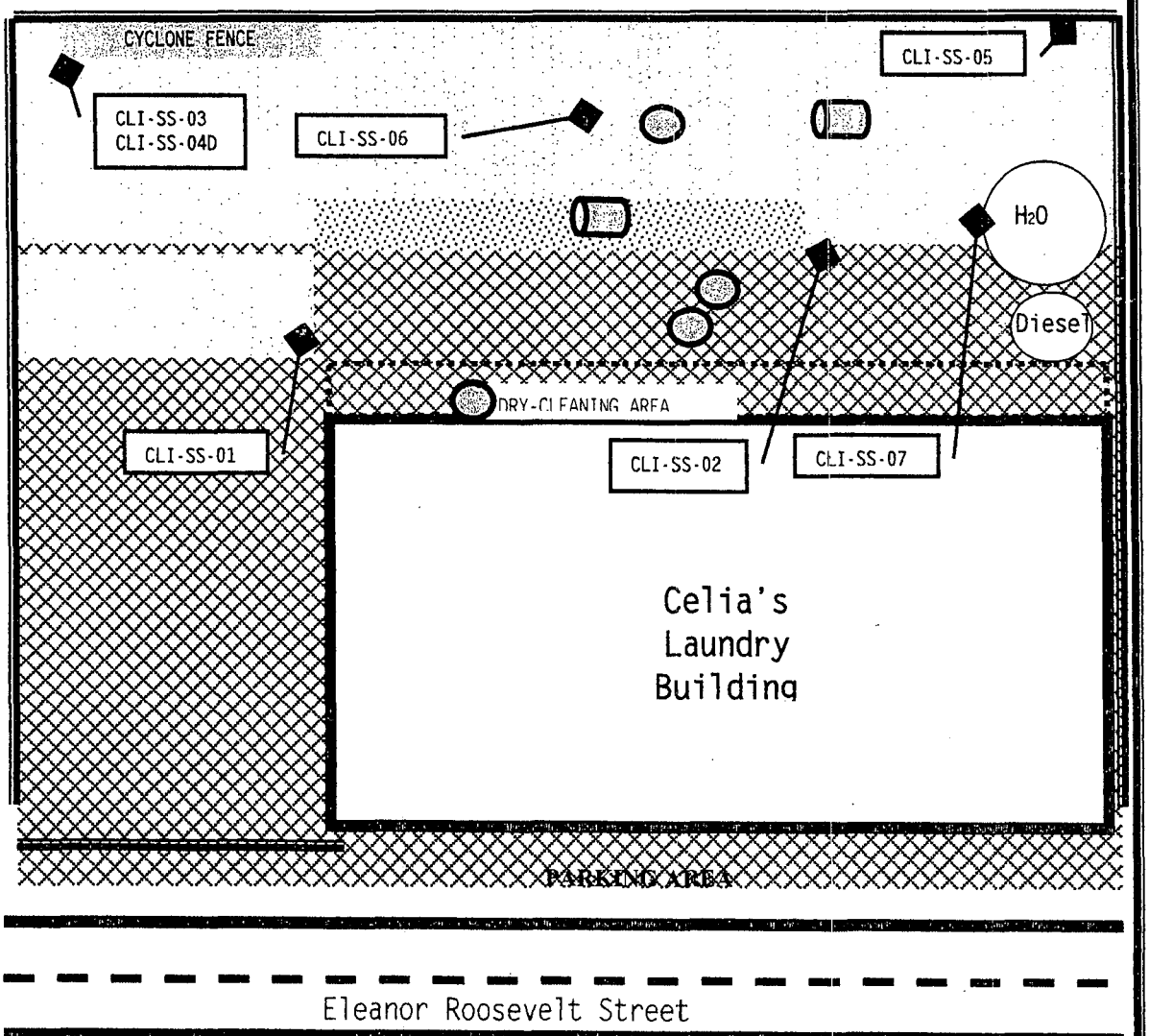
SITE LOCATION MAP
CELIA'S LAUNDRY, INC.
247 ELEANOR ROOSVELT STREET
SAN JUAN, PUERTO RICO



NOT TO SCALE

FIGURE 1

SAMPLES POINTS LOCATION MAP
CELIA'S LAUNDRY, INC.
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO

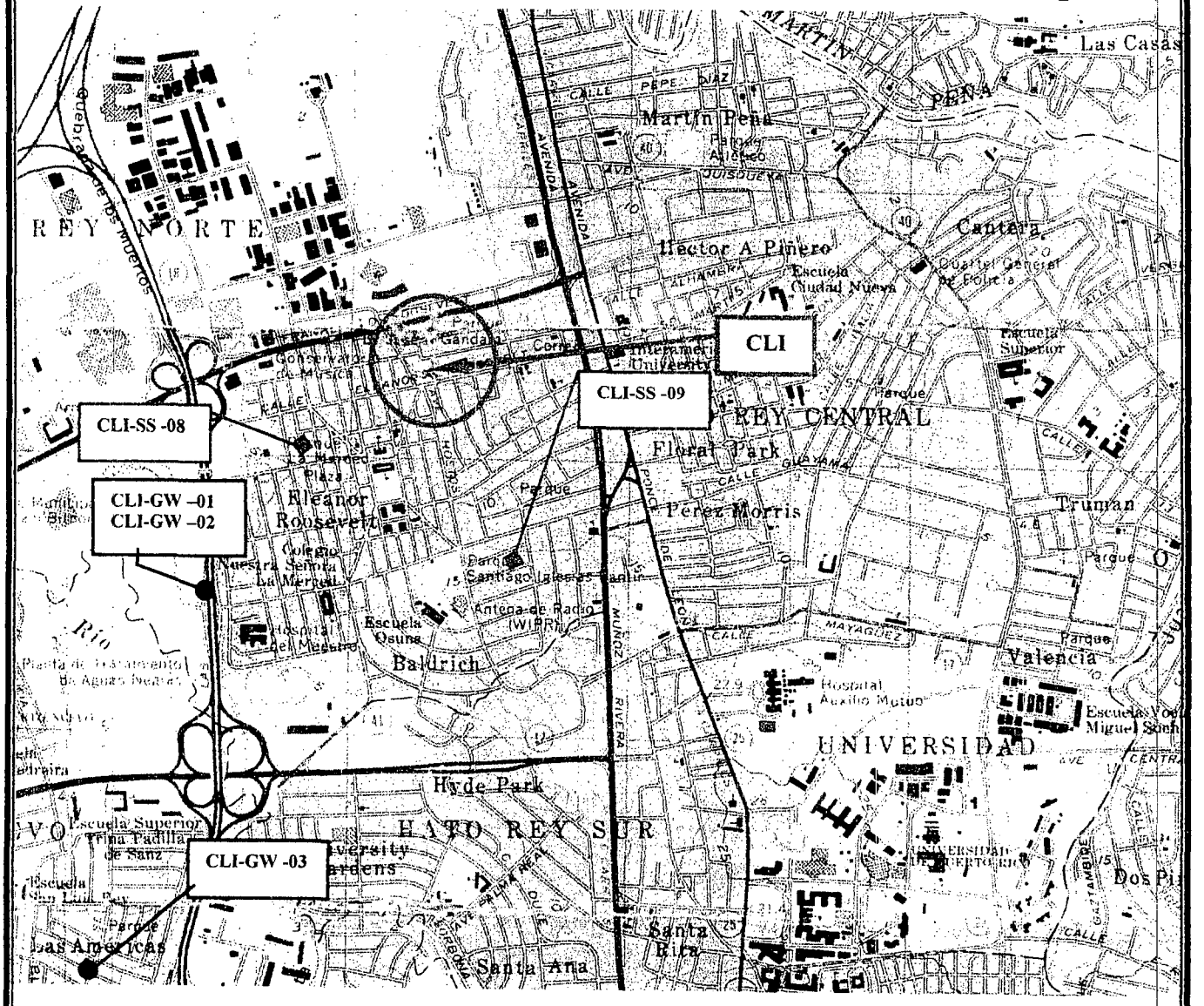


KEY:

- AREAS COVERED WITH GRAVEL
- AREAS WITH EXPOSED SOIL (WITH LITTLE VEGETATION)
- CONCRETE COVERED AREAS
- DRUM LAYING ON ITS SIDE
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR TETRACHLOROETHYLENE)
- 55-GALLON METAL DRUMS CONTAINING TETRACHLORDETHYLENE)
- CORRODED 55-GALLON METAL DRUMS PARTIALLY FULL OR EMPTY (USED FOR KEROSENE). PARTIALLY BURIED

FIGURE 2

SAMPLE POINTS LOCATION MAP (CONT'N.)
CELIA'S LAUNDRY
247 ELEANOR ROOSEVELT STREET
SAN JUAN, PUERTO RICO



NOT TO SCALE

FIGURE 3

TABLE I: SAMPLE DESCRIPTION
SITE NAME: Celia's Laundry
ADRESS: 247 Eleanor Roosevelt Street
San Juan Puerto Rico,
CASE No.: 32903

PREQB Sample Number	CLP Organic Traffic Report No.	CLP Inorganic Traffic Report No.	Collection Date/Time	Sample Type	Sample Location
CLI-SS-01	BQQ 91	MBPH 90	5/17/2004; 0850 hours	Soil	Grab sample collected on site from an area of exposed soil located adjacent and to the north of a concrete platform on the west side of the site, to determine type and concentration of contaminants. Depth 0-12".
CLI -SS-02	BQQ 92	MBPH 91	5/17/2004; 0936 hours	Soil	Grab sample collected on site from an area of exposed soil to the northeast of an outdoors area covered with concrete where 55-gallon metal drums containing tetrachloroethylene were previously observed. Depth 0-12".
CLI -SS-03	BQQ 93	MBPH 92	5/17/2004; 0905 hours	Soil	Grab sample collected on site from an area of exposed soil on the northwestern corner of CLI's backyard, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI -SS-04*D	BQQ 94	MBPH 93	5/17/2004; 0911 hours	Soil	Duplicate of sample CLI-SS-03.
CLI -SS-05	BQQ 95	MBPH 94	5/17/2004; 1122 hours	Soil	Grab sample collected on site from an area of exposed soil on the northeastern corner of the CLI's backyard, to determine type, concentration and possible migration of contaminants. Depth 0-12".
CLI -SS-06	BQQ 96	MBPH 95	5/17/2004; 1106 hours	Soil	Grab sample collected from an area of exposed soil located halfway between the Celia's building and the northern border of the property, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI -SS-07	BQQ 97	MBPH 96	5/17/2004; 0948 hours	Soil	Grab sample collected from an area of exposed soil located in the southeast corner of CLI's backyard, to determine type, concentration, and possible migration of contaminants. Depth 0-12".
CLI -SS-08	BQQ 98	MBPH 97	5/17/2004; 0720 hours	Soil	Grab background sample collected offsite from a location to the south and within 0- 1/4-mile distance from the site, and the Matrix Spike/Matrix Spike Duplicate for quality control purposes. This location is presumed to be out of the influence of site activities and contamination. Depth 0-12".
CLI -SS-09	BQQ 99	MBPH 98	5/17/2004; 0756 hours	Soil	Grab background sample collected offsite from a location to the northeast and within 0- 1/4-mile distance from the site. This location is presumed to be out of the influence of site activities and contamination. Depth 0-12".

* Duplicate - Indicates that a sample was designated for duplicate analysis.

TABLE I: SAMPLE DESCRIPTION (Cont.)
SITE NAME: Celia's Laundry, Inc.
ADDRESS: 247 Eleanor Roosevelt Street,
San Juan, P.R.
CASE No.: 32903

PREQB Sample Number	CLP Organic Traffic Report No.	CLP Inorganic Traffic Report No.	Collection Date/Time	Sample Type	Sample Location
CLI-GW-01	BQR 00	MBPH 99	5/18/2004; 1055 hours	Groundwater	Groundwater sample collected from the downgradient PRASA drinking water well Hiram Bithorn, (stand-by well) to determine type, concentration, and possible migration of contaminants from the site to the groundwater. This well is located to the southwest of and at approximately 2-mile radius from the site.
CLI -GW-02*	BQR 01	MBPJ 00	5/18/2004; 1058 hours	Groundwater	Duplicate of sample CLI-GW-01.
CLI -GW-03**	BQR 02	MBPJ 01	5/18/2004; 0935 hours	Groundwater	Groundwater sample collected from a downgradient PRASA drinking water well Las Américas, (stand-by well) to determine possible migration of contaminants from the site to the groundwater and the Matrix Spike/Matrix Spike Duplicate. This well is located to the southwest of and within 2-mile radius from the site.
CLI -FB-01	BQR 03	------	5/18/2004; 0734 hours	Aqueous	Field Trip Blanks for quality control purposes, when volatile organics in aqueous matrix were collected.
CLI -FRB-01	BQR 05	MBPJ 02	5/17/2004; 0922 hours	Aqueous	Field Rinsate Blank for quality control purposes.
CLI -TB-01	BQR 04	------	5/17/2004; 0836 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI -TB-02	BQR 06	------	5/17/2004; 0748 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI -TB-03	BQR 08	------	5/18/2004; 0758 hours	Aqueous	Trip Blank for quality control purposes. One per cooler per each day of organic sampling.
CLI-AFB-01	BQR 07	MBPJ 03	5/17/2004; 0710 hours	Aqueous	Analyte Free Blank for quality control purposes.

*Duplicate - Indicates that a sample was designated for duplicate analysis.
**MS/MSD - Indicates that additional sample volume that was collected and shipped to the laboratory for Matrix Spike (MS) and Matrix Spike Duplicate (MSD) analysis.

REFERENCE: 22

1. Basic Identifying Information

1.1 Site Name (as entered in CERCLIS): Celia's Laundry

1.2 CERCLIS ID Number:

None Apply

1.3 Name of Person(s) Completing Form: Frances M. Segarra
Affiliation (agency/company): PREQB
Phone Number: 787-764-8824

1.4 Date Form Was Completed: 12/20/01 (m/d/y)

1.5 Site Location: City: San Juan State: PR
County:_ Zip Code: 00910

1.6 Site Coordinates (in degrees, minutes, seconds, and tenths of seconds):

North Latitude	West Longitude
18° 25' 22."	066° 03' 45."

If tenths of seconds are unknown, use "0" as a default value. If necessary, refer to Appendix E of EPA's 1991 PA guidance document for directions on how to determine coordinates.

1.7 **ATSDR HEALTH ADVISORY.** Has an Agency for Toxic Substances and Disease Registry (ATSDR) Health Advisory been issued?

No

If yes, what was the date of issue?_ (m/d/y)

1.8 **HOW INITIALLY IDENTIFIED.** How was the site initially identified to EPA? If this information is not available in the HRS scoring package, check the PA narrative or other parts of the site file.

Other

1.9 **UNKNOWN SOURCE.** Does the site consist exclusively of contaminated ground water or contaminated surface water sediments with ***no identifiable primary source(s)***?

No

STOP HERE. If answer to question #1.9 is "Yes", proceed to Appendix A and complete the Supplemental Data Collection Form, then *return* to Section 6 (page 9) of this form. If answer is "No", continue to Section 2 of this form.

2. General Site Description

2.1 **SETTING.** What is the site setting?

Large City

2.2 **LAND USE.** What is the current land use(s) within 1 mile of the site?

Current
Commercial

Future
Commercial

2.3 **AREA.** What is the approximate area of contamination (i.e., total area that includes all sources of contamination and other areas where contamination has come to be located, plus the area between the sources)? If the site is large with only a small contaminated portion, only the area of the contaminated portion should be estimated. If the approximate area of contamination cannot be estimated, use the area within the property boundary.

2.4 **OWNER AND OPERATOR.** What/who are the current owner(s) and operator(s) of the site, and who were the owner(s) and operator(s) at the time of principal contamination?

CURRENT Owner(s)
Private

CURRENT Operator(s)
Private/Small Business

AT TIME OF CONTAMINATION Owner(s)
Private

AT TIME OF CONTAMINATION Operator(s)
Private/Small Business

2.5 **SPILL/OTHER ONE-TIME EVENT.** Is this site the result of a one-time spill (e.g., truck, rail car, or barge accident) or other one-time event (e.g., one-time illegal dumping), with no other ongoing waste management or waste generation activities on site?

No If Yes, year of spill/other one-time event

If answer is "Yes" to this question, proceed to Section 3. If answer is "No," continue to question #2.6.

2.6 **YEARS OF OPERATION.** What are the beginning and ending years of operation at the site? "Operation" includes any activity occurring at the site (other than site remediation and related site investigation activity), and does ***not*** necessarily have to involve waste generation and/or management. Aggregated sites that have a combination of active and inactive/abandoned operations, and active sites that have had periods of inoperation during their existence, should be considered currently operating. For these sites, indicate the beginning year of their earliest operation. If sites such as this are no longer operating, indicate the beginning year of their earliest operation and the ending year of their latest operation.

Currently operating: from (beginning year) 1978 to (ending year)

2.7 **YEARS OF WASTE MANAGEMENT ACTIVITIES.** What are the beginning and ending years of waste management at the site? Applicable waste management activities include generation, treatment, and/or recycling of waste containing hazardous substances and/or receipt of such wastes from off-site sources. Aggregated sites that have a combination of active and inactive/abandoned waste management activities, and sites that are actively managing waste that have had periods without waste management activities during their existence, should be considered currently managing waste. For these sites, indicate the beginning year of their earliest waste management activity. If sites such as this are no longer managing waste, indicate the beginning year of their earliest activity and the ending year of their latest activity. All responses should be consistent with responses given for question #2.6.

Currently managing waste: from (beginning year) 1978 to (ending year)

3. Site Type

3.1 **SITE ACTIVITIES.** Which of the following best describe current activities/operations/conditions at the site (i.e., on-site activities)? Also, identify all former activities that are at least partly responsible for the principal contamination at the site.

Current

Laundries/Dry Cleaners

Former

Laundries/Dry Cleaners

3.2 **WASTE TREATMENT, STORAGE, AND DISPOSAL ACTIVITIES.** What treatment, storage, and/or disposal activities occur/occurred at the site?

Other - Air Emision permit.

4. Waste Description

4.1 **ON-SITE/OFF-SITE GENERATION.** Is an on-site or off-site generator responsible for the waste disposed or deposited on site that resulted in the principal contamination? For consistency, recycling facilities should be considered on-site generators.

On-site generator only

4.2 **ENTITY THAT GENERATED THE WASTE.** What is the source(s) of the waste disposed or deposited on site that resulted in the principal contamination (***not*** necessarily the entity that generated the original product)? Note that this question is different from question #3.1 regarding site activities, although the response options are similar. This question targets the generator(s) of the waste present on site, not the site activities. However, if the waste is/was generated entirely on site, then the response(s) to this question should match the response(s) to question #3.1.

Laundries/Dry Cleaners

4.3 **PHYSICAL STATE OF WASTE.** What is the physical state(s) of the hazardous substance-containing waste(s) deposited or detected on site? (check all that apply)

- ☐ Solid
- ■ Liquid
- ☐ Sludge

■ Gas

4.4 **GENERAL WASTE TYPES.** What are the waste types deposited or detected on site? Indicate all the waste types present on site under "Overall." If three or fewer waste types are known to comprise the majority (i.e., over 50%) of the waste volume on site, indicate their types under "Predominant." Otherwise, leave the "Predominant" column blank.

Overall

Chlorinated Organic Chemicals

Predominant

Chlorinated Organic Chemicals

4.5 **SPECIFIC WASTE CONSTITUENTS.** Which of the following waste constituents have been deposited or detected on site?

None of the Above

4.6 **QUANTITY OF WASTE.** What is the highest HRS hazardous waste quantity factor value among the pathways scored, regardless of which tier(s) (A, B, C, and/or D) was used in scoring?

0

4.7 **WASTE ACCESSIBILITY.** Is the waste on site currently accessible to the public (e.g., is site access unrestricted so people can potentially come into direct contact with contaminated materials)? Items to be considered when judging accessibility include, for example, presence or absence of a complete cover over the waste area and a secure fence around the site. A site with natural access restrictions (e.g., steep terrain) also can be considered inaccessible. Do not count on-site workers as part of the public when answering this question.

No

5. Demographics

For this section, do not directly use the population factor values calculated in the HRS and entered in HRS scoresheets. Use actual (i.e., unweighted, unadjusted) population figures, which should be available in the HRS supporting documentation.

5.1 **NUMBER OF WORKERS ON SITE.** What is the current number of workers present on site (not including workers involved in response activities)?

Greater than 0 to 10

5.2 **DISTANCE TO POPULATION.** What is the shortest distance from any source or area of contamination at the site to the nearest residential individual (include all persons occupying homes, apartments, businesses, or schools)? If contamination has migrated off site onto the property of a nearby resident(s), then check the box next to "0 miles." If the source or contaminated area is not clearly identified, use distance from the site property boundary.

0 miles

5.3 **POPULATION.** What is the total residential population within 1 mile and 4 miles of the site (include all persons occupying homes, apartments, businesses, or schools)?

Within 1 mile	**Within 4 miles**
Greater than 10,000 to 100,000	Greater than 100,000

6. Water Use

For purposes of this section, "local" refers to ground water withdrawals within 4 miles and surface water withdrawals within 15 "in-water" miles (e.g., downstream miles for streams and rivers) of the site (i.e., within HRS target distance limits).

6.1 **TOTAL DRINKING WATER POPULATION SERVED.** What is the total population served by local ground and surface water sources of drinking water? Use actual population numbers and not adjusted values taken directly from HRS scoresheets. For blended systems, use total population served instead of prorated values. Note that the total population served does not have to reside within the HRS target distance limits, only the drinking water supply withdrawal point(s) needs to be within the limits.

Ground	Surface
Greater than 100,000	Greater than 100,000

6.2 **TYPE OF DRINKING WATER SUPPLY SYSTEM.** What type(s) of local drinking water supply system(s) is present? "Public" should be checked for any central water supply system, even if operated by a private entity.

Ground

Public

Surface

Public

6.3 **OTHER GROUND WATER USES.** What are the other uses of ground water withdrawn within 4 miles of the site?

Commercial

6.4 **DEPTH TO AQUIFER.** What is the approximate depth from the ground surface to the uppermost usable aquifer (i.e., an aquifer having sufficient yield and water quality to be usable as drinking water or for other beneficial uses) beneath the site?

Unknown

6.5 **OTHER SURFACE WATER USES.** What are the other uses of surface water withdrawn within 15 "in-water" miles of the site?

None

6.6 **TYPE OF SURFACE WATER ADJACENT TO/DRAINING SITE.** What are the type(s) of surface water adjacent to/draining the site that could potentially be affected by overland runoff from the site (i.e., are within 2 miles of any source)? Indicate whether the water body is known or suspected of being contaminated by the site. "Yes" would indicate that the surface water body meets the HRS criteria for observed release. "Suspected" would indicate that there is some evidence of contamination that is attributable to the site, but the surface water body does not meet the HRS criteria for observed release.

Contaminated?

None

7. Sensitive Environment and Reported Environmental Damage Information

7.1 **EXISTENCE OF SENSITIVE OR POTENTIALLY VULNERABLE ENVIRONMENT.** Is the site in or near (i.e., within a 4-mile radial distance, or for surface water within 15 "in-water" miles) an HRS-designated sensitive environment(s) or other potentially vulnerable environment(s)?

Wetland

7.2 **HUMAN HEALTH/BIOLOGICAL IMPACTS.** Have human health or biological impacts attributable to the site been reported or observed?

Unknown

8. Response Actions

8.1 **TYPE OF RESPONSE ACTION.** What type(s) of response actions has already occurred at or near the site?

None

8.2 **AUTHORITY RESPONSIBLE FOR RESPONSE ACTION.** Who performed (or contracted for) the response action(s)?

N/A

STOP HERE. Section 9 will be completed by a Headquarters QA reviewer.

REVIEW OF COMPLETED FORM. When you have completed Sections 1 through 8 of the NPL Characteristics Data Collection Form, please check to ***make sure*** that:

(1) All questions are answered, except for ones that you were specifically directed to skip; and

(2) All questions have been answered such that the responses are internally consistent, especially those in Sections 2 and 3. For example, if the site is the result of a spill or other one-time event, the responses for questions #2.4, #2.5, #3.1, and #3.2 should be consistent, while if the site is inactive or abandoned, the responses for questions #2.4, #2.6, #2.7, and #3.1 should be consistent.

REFERENCE: 23

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

FIELD

All-Weather Notebook

No. 351

CELIA'S LAUNDRY (CLI)

247 ELEANOR ROOSEVELT STREET

TDD 02-0401-39

PR00002196368

CASE # 32903

LB-220

Celtals Laundry, Inc. CLI
TDD # 02-0401-39
247 Eleanor Roosevelt Street,
San Juan, P/R

PREQB Personnel	Initials	Position
Miriam Ortiz		Site Manager
Nereida Hernandez		SHO
Frances Segarra		Sampler and Hand
Ernesto Rosario		Sampler
Naza Marrero		Sampler
Doraldina Coreano		SSO assistant

0500 - Arrived to the warehouse and fill some coolers with ice to the samples preservation.

0540 - Exit from the warehouse to the command post.

Weather Conditions:
Temperature 80°C
Sunny Day
No wind

M. Ortiz
05/17/04

Celia's Laundry, Inc.

0600 - Arrived to La Merced Park and setup the Command Post.

0615 - Doraldina Coriano start to take the blood pressure and the temperature to the PREAB personnel.

0616 - Equipment to be used during the sampling activities:
- GPS Garmin III plus
  JCA 19216
- Digital Thermometer
- Blood Pressure Monitor
- Two-Way Radios
- Photographic Camera
- Cannon Sure Shot 35 mm.
  JCA 13050
  JCA 13049
- Water proof camera MX-10
  JCA 20506

[illegible] 05/17/04

Celia's Laundry, Inc.

- Dosimeter Model 3500
  SN# 740-1190
  JCA 13299
- 0645 - Preparing for the background samples collection. The sampler will be Frances Segarra. The level to be used is level C. (booties, tyvek, cotton, nitrile and latex gloves; safety boots, safety glasses and dust mask.) The VOA's samples will be collected using an Encore of 5 grams.
- 0710 - 5 NO collected CLIAFB-01 CBAR07
  0726 " " CLIAFB-01 MBPJ03

0719 - Exit to the sampling point CLI-SS-08 (BAA98)

0720 - Arrived to the sampling point CLI-SS-08. This sample is a background

→ 0720. Coordinates: 18.3009°
66.0674°

H. Ortiz 05/17/04

Celia's Laundry
- Dosimeter 0mR/h

→0720- The sampler F. Segarra started to collect the VOA's using one Encore of 5g. The sample point is (CLI-55-08) The roll # 1 is number 9 in the camara because it was used previously for other site, but it will be number one for the sample point CLI-55-08.
— photo #1, roll #1 was taken for VOA's (BBR98 CLI-55-08.

0730- The sampler homogenized the sample using a bowl and a spoon. The sample was collected from 0-12" inches.
- The samples were collected for the organic; VOA's, on 4 glass jar of 4 oz, the extractables for BNA's and Pesticides/PCB's

M. Ortiz
05/17/04

Celia's Laundry Dup
that were collected in one glass jar of 8 oz.

0735- Were collected the inorganics for total metals and cyanide.
MBR98 (CLI-55-08) These samples were collected in one glass jar of 8 oz. each.
- Roll #1 photo #2 was taken for inorganics.
- Soil Characteristics
brown red
sticky and very loose
humid
some rocks.

0736- Finished with the sample point CLI-55-08

0740- Ernesto Rosario received the samples of the point CLI-55-08 to decon.

0746- Preparing for the background sample point CLI-55-09

M. Ortiz
05/17/04

Celia's Laundry, Inc.

The sampler will be Nitza Marrero.

0748 - SMO Repaired the TB-02 BQR-06 not included

0750 - Exit the Command Post to the sample point CLI-SS-09.

0755 - Arrived to collect the sample point CLI-SS-09

0756 - The sampler Nitza Marrero collected the VOA's using an Encore 5g - BQQ 99.

Began to homogenized using a bowl and a trowel. Were collected the organics for VOA's in 1 one glass jar of 4-oz and the Extractables for BNA/ pesticides/ PCB's. The BNA's and Pesticides were collected in 1 one 8 oz glass jar each. Sampling point CLI-SS-09. The samples were collected from 0-12"

0757 - Photo #3 roll #1
Soil Characteristics
dark brown
loose, some rocks

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05/17/04

Celia's Laundry, Inc.

Coordinates for sample point CLI-SS-09

18.4138°
66.06159°

0758 - SMO - Collected the TB-03 - BQR 08

0810 - Were collected the inorganics for total metals and cyanide. The sampling point CLI-SS-09 MBPA98

Photo #4, roll #1 for the inorganic portion.

0811 - Finish the collection of the sample point CLI-SS-09.

0812 - Exit the sample point CLI-SS-09

0820 - Arrived to the Command Post. Ernesto Rosario received the samples to decon and gave them to the SMO Nereida Hernández.

0822 - Personnel of the PREQB changed the cloth and proceeded

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Celia's Laundry Inc

to prepare to collect of the samples points:

CLI-01

CLI-02

CLI-55-03

CLI-55-04D

0836 - SMO- Keeping the TB-01 BQA04

0840- Arrived to Celia's Laundry. The sampler Ernesto Rosario will collect the sample point CLI-55-01 (BQA 91)

0850- Collected the VOA's using an Encore of 39 - 0-12 inches

Coordinates of sample point CLI-55-01:

18.4203°

66.0630°

photo #5 roll #2 for the organic portion.

0852- Sampler Ernesto Rosario began to homogenized for the collection

M. Ortiz 09/17/04

Celia's Laundry Inc.

of the VOA's in one glass jar of 4-02; for BNA and extractable for pesticide/PCB's in one glass jar of 8-02 each.

0-12" inches.

Soil characteristics.

- dark brown
- wet soil
- many rocks

This sample point is CLI-55-01

0900 - Collected for inorganics Photo #6, roll #2 - for total metals and cyanide CLI-55-01; MPA-90

0901 - Finished to collect the sample point CLI-55-01

0905 - Sampler Frances Segarra Collected sample point CLI-55-03 and CLI-55-04 Duplicate Photo #7 roll #2.

M. Ortiz 09/17/04

Celia's Laundry Inc.

0910 - Were collected the organic for VOA's using an Encore 5g (BQQ93) CLI-SS-03.
Coordinates:
18.4204°
66.0629°

0911 - Were collected the organic VOA's - CLI-SS-04 (BQQ 94) using an Encore 5g.
Soil characteristics:
- brown
- sticky
- some rocks

0915 - Frances Segarra began to homogenized in a Bowl with a trowel. The sample point to be collected for VOA's in a glass jar 4-oz is CLI-SS-03. The Extractables for BNA and Pesticides/PCB's collected in a glass jar 8-oz each. Deph - 0-12".

0919 - Began to collect the inorganic

[illegible] 04

Celia's Laundry Inc.

samples (CLI-SS-03 - MBPA-92) For total metals and cyanide used a glass jar of 8-oz for each one. photo #8; roll #2

0920 - Frances Segarra began to homogenized for the sample point CLI-SS-04.
For the VOA's used a glass jar of 4-oz and for extractables BNA's and pesticides/PCB's in a glass jar of 8-oz each. She used a bowl and a trowel.

0922 - SMO collected FRB-01 BQR05

- 0924 - Frances Segarra began to collect the sample point (CLI-SS-04) - for inorganics. Total Metals and cyanide collected in a glass jar of 8-oz each (MBPA93) photo #9; roll #2

- 0925 - The sampler finished to collect the sample point CLI-SS-04

[illegible]

Celra's Laundry, Inc.
Coordinates for sample point
CLI-SS-04
18-4204°
66.0629° W
0934 - SMO collected CLI-FBB-01 MBPJ02
0935 - The sampler Ernesto Rosario is preparing to collect the sample point CLI-SS-02 (BAQ-92)

0936 - Began to collect the VOA's in a 5g Encore 0-6" inches.
photo #10, roll #2
Coordinates:
18.42.03°
66.0629°
0937 - E. Rosario began to homogenized in a bowl with a trowel for VOA's collected in a glass jar of 4-oz; for BNA's and Pesticides/PCB's in a glass jar of 8 oz each.
CLI-SS-02 (0-12" inches) BAQ92

0943 - E. Rosario collected the

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Celra's Laundry I
inorganics for the sample point
CLI-SS-02; MBPJ4-91
photo #11, roll #2

0944 - Finished to collect the sample point CLI-SS-02

0948 - Sampler Frances Segarra collected the sample point CLI-SS-03, BAQ97.
- Soil Characteristics.
- dark brown
- Some areas are black
- humid
- Collected the VOA's using an Encore of 5g; 0-12" inches
photo #12, roll #2

0955 - Began to homogenized with a bowl and a spoon. The sample collected for VOA's in a glass jar of 4-oz and for Extractables for BNA's and Pesticides/PCB's in a glass jar of 8-oz each.

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Celia's Laundry Inc.

Coordinates for CLI-SS-01

18.4203°

66.0629°

0958- Collected the inorganics for total metals and Cyanide in a glass jar of 8-oz each. The samples were collected at 0-12" inches. The sample point is CLI-SS-01; MBPH-96

1000- The sampler Frances Segarra finished to collect the sample point CLI-SS-01

1001- Exit from the site Celia's Laundry.

1010- Arrived to the command Post. Nitza Navarro received the samples taken or collected and gave them to the SMO- Reneida Hernández

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Celia's Laundry, Inc.

1025- The samplers are changed cloth to continue the samples collection.

1030- The SMO is preparing the coolers for the samples preservation.

1045- The samplers are preparing to exit the command post to collect the samples points CLI-SS-03 and CLI-SS-06.

Level C- booties, tyvex glores (nitrile, cotton and latex)

1055- Exit with the command Post.

1100- Arrived to Celia's Laundry

1104- Sampler Nitza Navarro is preparing the area to collect the sample point CLI-SS-06 (BG96).

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Celia's Laundry, Inc.

1106- Arrived to Celia's Laundry (*no proceed)
Collected the VOA's using an
Encore -5g
photo 1; roll #3. The sample
point is CLI-SS-06; BQQ-96.
0-6" inches
Soil Characteristics.
- loose
- many roots
- humid
- dark black

1107. Sampler Nitza Marrero
is homogenizing the soil in a
pan with a spoon to collect the VOA's in a
glass jar of 4-oz and
the Estactables for BNA's
and Pesticides/PCB's in a
glass jar of 8-oz.
0-12" inches

Coordinates: 18.4205° (CLI-SS-06)
66.0629'

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Celia's Laundry, Inc.

1115- Began to collect the inorganic
for total Metals and Cyanide
in a glass jar of 8-oz each.
photo #2, roll #3
CLI-SS-06 MBPA 95

1116. Finish to collect the sample
point CLI-SS-06

1122- Sampler Nitza Marrero
collected sample CLI-SS-05
Collected the VOA's with an
Encore 5g. 0-6" inches
CLI-SS-05 BQQ 95
Soil Characteristics.
- many rocks
- humid
- dark brown
- many debris
photo #3, roll #3
At this point observed that
there is stressed vegetation

M. Ortiz
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1123. Nitza Marrero began to homogenized using a bowl and a spoon, for the VOA's in a glass jar of 4-oz and for the Extractables BNA's and Pesticides/PCB's in a glass jar of 8-oz each. 0-12" inches CLI-SS-05 BQG 95

1134. Collected the inorganics for total metals and cyanide in a glass jar of 8-oz each. CLI-SS-05 MBPA-94 photo #4 roll #3

1135. Finished to collect the sample point CLI-SS-05

Coordinates are:
18.4205°
66.0628°

1140. Exit the Site Celia's Laundry and finished the collection

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Celia's Laundry I

of the soil samples at the site.

1148. Arrived to the command post. Ernesto Rosario received the samples to be decon.

1155. Ernesto Rosario decon the personnel the were collecting the samples at the site.

12:30 Personnel of the PREQB take a launch Brake except the SMO Mercie Hernandez that continued working with the samples preservation.

1330. Loading the van and waiting for the SMO

1350. Mrs Mercedes Hernandez is in the proces to checking the coolers with the samples to be shipped to the labs.

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Celta's Laundry, Inc.

1400 - The SMO continue verifying the samples for each cooler. The Aqueous Organics are be sent to the Lab A-4 Scientific. For Soil Organics will be send to Ceimic Lab. And all Inorganic samples soil and aqueous are be sent for DESA lab.

1423 - Personnel of PREAB are sealing the coolers with fiberglass tape.

1445 Exit the Command Post

1115 These samples will be sent for UPS. At this hour arrived to UPS, a total of nine soil were sent to the labs for analysis as follow.

- USEPA Laboratory 4 Soil samples

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Celta's Laundry, Inc.

and one water sample. The nine samples will be analized for Inorganics (Total Metals and Cyanide) The water sample will be analyzed for Inorganic (Total Metals and cyanide).

The samples were sent under airbills #'s.

- CEIMIC: Nine soil samples were sent for organic soil analysis (VOA's, BNA's Pesticides/PCBs)

Airbill #

- A 4 Scientific: Two aqueous samples were sent for organic analysis. (VOA's, BNA's Pesticides/BN PCB's)

Airbill #

M. Ortiz 05/17/04 Case not Completed

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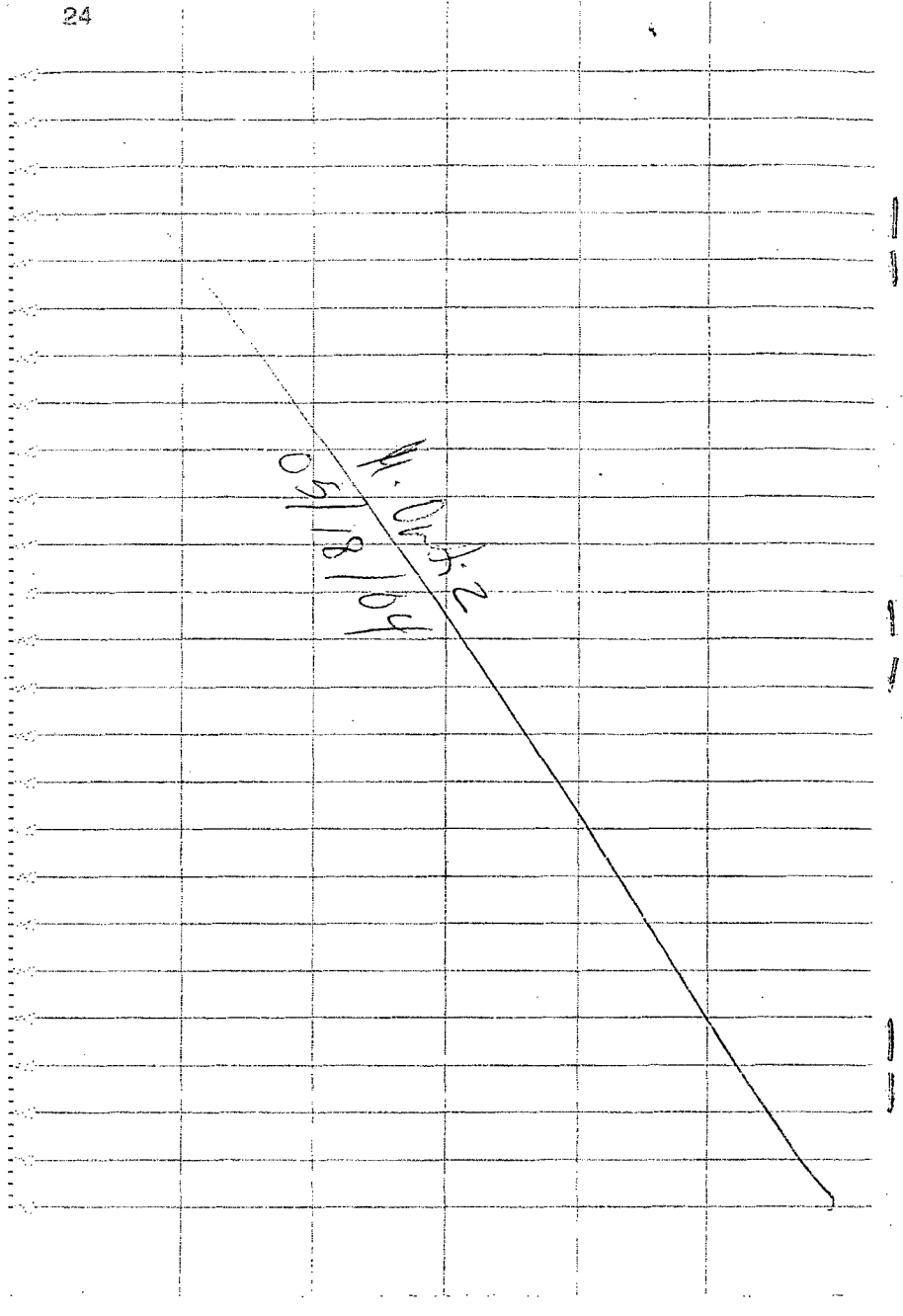
05/18/04



Celia's Laundry Inc.

Second Day 05/18/04

TDD # 02-04 01-39

247 Eleanor Roosevelt Street,
San Juan, P.R.

PR EQB Personnel	Initials	Position
Miriam Ortiz	MOT	Site Manager
Nereida Hernández	NHM	SMO
Frances Segarra	[illegible]	A&S/Sampler
Nitza Marrero	NM	Sampler
Ernesto Rosario	[illegible]	Sampler/Decon
Doraldina Coreano	DB	SSO Assist.

0545 - Arrived to the warehouse and get some ice for samples preservation.

0630 - Exit to the site
Temperature: 80°C
Sunny day
No wind

0640 - Arrived to the command Post.

M. Ortiz 05/18/04

Celia's Laundry Inc.

0645 Personnel of the PREQB began to setup the command post.

0650 Equipment to be used:
- Clorimeter
- Dosimeter - Model 3500
- 2-way radios
- Water Proof Camera
- Photografic Camera
- Cannon sure shot 35 mm
- JCA-13050
- JCA-13049
- GPS-Garmin III plus
- JCA-19216

0655 - Doraldina Coreano, SSO assistant began to monitoring the blood pressure and the temperature to the PREQB personnel.

0700 - Personnel of the PREQB have to wait for the

M. Ortiz 05/18/04

0748 - SMO collected the TB-02 BGB 06

AAA personnel to open the well Las Americas. Personnel of AAA told us that they will be at Las Americas Well not between 0830 and 0900 hrs.

0734 - SMO Brings the FB-01 (BGB 03)

0856 - Personnel of PREQB arrived to Las Americas Well. The personnel of AAA were not there yet.

0758 - SMO collected the TB-03 BGB 08

0905 - Personnel of AAA arrived to Las Americas Well.

0915 - Began to pulgate the well

Coordinates of the Sample Point CLI-GW-03
18.4027°
66.0754°

0920 - Nitza Marrero made the pH proof and ad 8 drops of HCl to obtain c. 2 pH.

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0921- Nitza Marrero made the Clorine proof. it was negative .2 or <.; for residual Cloride was negative too.

0935- finished to pulgate the Well.
Dosimeter readings - 0mR/hr

0935- Sampler Frances Segarra began with the VOA's and add 8 drops of ACl. The sample point is CLI-GW-03 She collected also the MS/MSD CLI-GW-03 (BQB02)
Photo #5 roll #3
These VOA's were collected in vials of 40ml (these glass vials with a septum)
For Extractables BNA's and Pesticides/PCBs collected in an amber glass gallon (~~smoke~~ not) - 8002

0950. Collected the total metals and Cyanide in a nitrile bottles.

M-Ortiz 05/18/04

Celia's Laundry, In
This Sample point is CLI-GW-03
Photo #6, roll #3 (MBPS-01)

0955. finished the collection of the Sample point CLI-GW-03

1005- Arrived the Command Post

1007- Changed cloth, gloves and booties and Exit the Command Post.

1015- Exit the Command post to the Sample point CLI-GW-01 and its duplicate; CLI-GW02.

1020- Arrived to the Hiram Bithorn

1035- Began to pulgate the Well.

1036- Nitza Marrero proceed with the pH proof.

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Celia's Laundry, Inc.

To obtain a pH under 2 have to add 15 drops of HCl.

1055 Frances Segarra began to collect the VOA's, for CLI-GW-01 photo #7 roll #3 BQB-00

1058 Collected the VOA's for CLI-GW-02 photo #8 roll #3 At this time also collected the Extractables for BNA's and Pesticides/PCB's, in an amber glass gallon of 80-02

1115 hrs. Collected the sample for inorganic CLI-GW-01; HBPA99 total metals and Cyanide in a polyethylene bottles (1L each) Dosimeter reading: 0mR/h photo #9 roll #3

1120 Collected the sample for

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Celia's Laundry, Inc.

inorganic CLI-GW-02, total metals and cyanide in a polyethylene bottles (1L each) photo #10 roll #3

1123 Finished to collect the samples CLI-GW-01 CLI-GW-02D.

1124 Exit the sample point CLI-GW-01 and CLI-GW-02.

1130 Arrived to the Command Post.

1135 Ernesto Rosario gave the samples collected to the SMO Nereida Hernández.

1140 The SMO continued working with the GW samples.

1200 hrs. Launch brake

1215 S.M. Miriam Ortiz was

M. Ortiz 05/18/04

Celtra's Laundry Inc.

checking the coolers with the samples.

The coolers are assign as follows:

- one cooler for DESA Lab with Inorganic Analysis

- two coolers for Az Scientific for all organic Analysis.

A total of three coolers are going to be sent for UPS.

1245 SMO keep working with the samples and its preservation.

1300 SMO continue preparing and preserving the samples.

1400 Continue preparing the coolers and the documentation, for the airbills

Celtra's Laundry Inc.

1420 Continue working with the coolers and the documentation.

1445 Personnel of the PREAB are sealing the coolers.

1500 Finished sealing the coolers

1510 Exit the Command Post to UPS office for the Shipment of Samples

1530 Arrived to UPS office in Santa Rey

The samples were sent as follows:

- DESA - 3 (three) aqueous Samples. for inorganic analysis (total metals and Cyanide)

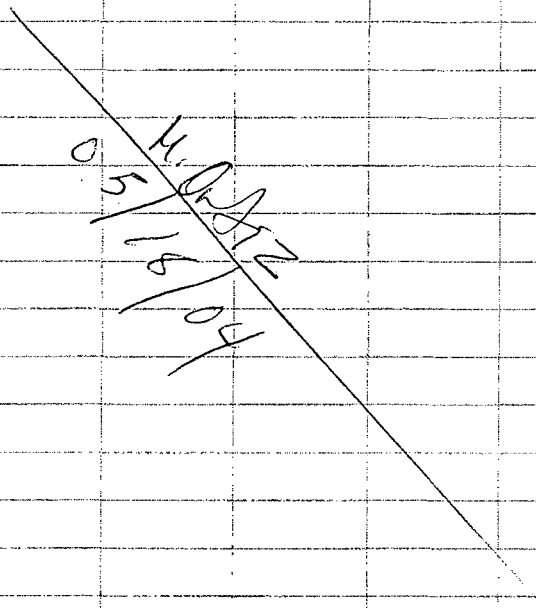
The Samples were sent under airbill #

05/18/14

Celia's Laundry, Inc.
- Ag Scientific
five (5) Water Samples were sent for Organic Analysis. for VOA's, BNA's and Pesticides/PCB's.

The samples were sent under airbill #'s:

Case 32903 Completed



REFERENCE: 24

PUERTO RICO ENVIRONMENTAL QUALITY BOARD

SUPERFUND PA/SI DIVISION

QUALITY ASSURANCE PROJECT PLAN

FOR

SCREENING SITE INSPECTIONS

REVISION 8

NOVEMBER 7, 2003

5.2.6 Duplicate Samples

A. Field Duplicates:

Field duplicate samples will be sent for laboratory analysis to evaluate the reproducibility of the laboratory and field sampling procedures. At a minimum, a rate of one duplicate in twenty samples will be obtained of each matrix. The duplicate samples will be assigned a different CLP number from the original sample and will be submitted blind to the laboratory. Soil and sediment matrices, for the purposes of the SSI project, are considered to be the same matrix. Duplicate samples will consist of the same amount and type of containers as their original samples (aqueous, soil or sediment). Aqueous duplicate samples are collected from successive volumes from the same sample source or device (e.g. bailers). Soil duplicates are collected using the same decontaminated sampling equipment (e.g. spoon and pan, auger) used for the collection of the original sample and from the same sampling location or source. Duplicate samples will be collected from areas that are known or suspected to be contaminated. The handling, preservation, and analysis of each one of these samples will be equal to those specified for the environmental samples.

B. Matrix Spike / Matrix Spike Duplicates (MS/MSD):

The MS/MSD will be collected to check the accuracy and precision of the organic and inorganic laboratory analyses. These samples will be collected from areas known or suspected to be contaminated and should be collected in the first round of sampling per matrix. The MS/MSD should be sent to the laboratory with the first shipment of samples. The sample and the MS/MSD collected at the same sample location or station number will have the same CLP number. In the USEPA TR/COC Form, the PREQB Superfund PA/SI Division COC Record Sheet, the sample container label, and the field logbook, it will be indicated which samples are the MS/MSD.

When collecting aqueous samples, the MS/MSD will consist of a triple sample volume. The handling, preservation, and analysis will be equal to those specified for the environmental samples (see Table 3). If a disposable volumetric sampler (e.g. En Core® sampler or equivalent) is being used to collect the soil samples, the MS/MSD will consist of three volumetric samplers. On the other hand,

when the disposable volumetric sampler (e.g. En Core® sampler or equivalent) is not available and 40-ml glass vials are used to collect the VOA fraction, the MS/MSD will consist of triple sample volume (i. e. six vials). These samples will be analyzed for TLC Volatiles only and the handling and preservation will be equal to those specified for the environmental samples (See Table 3).

5.2.7 Split Samples

Splitting of samples in the instance of an SSI would be performed when the site owner/operator wishes to compare the sample results. The responsibility of the PREQB is limited, however, to perform the split procedure correctly. It is not necessary to assess the site owner/operator laboratory performance or laboratory methods used, although these methods should be of equivalent performance. The site owner/operator will be informed that split samples are to be analyzed at their own expense. Documentation of split samples is shown on Figure 2.

Soil and sediment samples obtained for volatile analysis are not split. In this instance, samples must be collected as co-located grabs. Furthermore, it may be necessary to co-locate or depth integrate the sample collection so sufficient sample volume is obtained. When splitting aqueous samples, homogenization of the sample is only necessary if heterogeneity is suspected (i.e. leachate).

5.2.8 Background Samples

In order to accurately assess any potential contamination on the site, at least two background samples for each pathway matrix of concern will be collected. The handling, preservation, and analysis of each one of these samples will be equal to those specified for the environmental samples.

5.2.9 Data Quality Assessment and Validation

All the samples collected during the SI will be part of a sample delivery group (SDG) and will be analyzed through the CLP. Each SDG consist of all the samples sent to and received by the laboratory over a 7-day period regardless of contact turnaround time (see Appendix 3). The CLP laboratories will provide analytical data of known and documented quality that adheres to the USEPA

REFERENCE: 25

PUERTO RICO ENVIRONMENTAL QUALITY BOARD

SUPERFUND PA/SI DIVISION

QUALITY ASSURANCE PROJECT PLAN

FOR

SCREENING SITE INSPECTIONS

REVISION 8

NOVEMBER 7, 2003

notebook and on the Site Manager field logbook. In case that the equipment fails to calibrate, two more calibrations will be performed to corroborate procedures and account for extraordinary situations such as high temperature and humidity. If after three consecutive calibrations the equipment fails to calibrate it will be taken in for repairs. Under no circumstances an instrument that fails to calibrate will be used in the field. All equipment will be cleaned daily after field activities and stored according to manufacturers specifications. Spare parts, calibration gases and solutions will be available during all field activities and in the Superfund PA/SI Division office. All equipment and instruments will be stored following the manufacturer recommendations.

5.2 QA/QC Sample Collection

Field QC samples may include field duplicates samples, trip blanks, equipment blanks, and field blanks. The field QC samples should be prepared (i.e. preserved, labeled, packaged, and shipped to the assigned laboratory) in a manner identical to the primary field samples, and should remain "blind" to the laboratory to assure unbiased and reliable results. Each field QC sample receives a separate sample number.

Laboratory QC samples include matrix spikes (MS) and matrix spike duplicates (MSD) for organic samples (Target Compound List or TCL) and matrix spikes and sample duplicates for inorganic samples (Target Analyte List or TAL). The laboratory QC sample is an additional volume of an existing sample required by the laboratory's contract; the sampler must supply the additional volume. Samples should designate one sample per matrix per 20 samples as a "laboratory QC" sample.

5.2.1 Trip Blanks

A trip blank is collected at a frequency of one per cooler per each day when sampling for volatile organics in an aqueous matrix. A trip blank is an aliquot of demonstrated analyte-free water, which is sealed in 40 ml glass vials with

notebook and on the Site Manager field logbook. In case that the equipment fails to calibrate, two more calibrations will be performed to corroborate procedures and account for extraordinary situations such as high temperature and humidity. If after three consecutive calibrations the equipment fails to calibrate it will be taken in for repairs. Under no circumstances an instrument that fails to calibrate will be used in the field. All equipment will be cleaned daily after field activities and stored according to manufacturers specifications. Spare parts, calibration gases and solutions will be available during all field activities and in the Superfund PA/SI Division office. All equipment and instruments will be stored following the manufacturer recommendations.

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Laboratory QC samples include matrix spikes (MS) and matrix spike duplicates (MSD) for organic samples (Target Compound List or TCL) and matrix spikes and sample duplicates for inorganic samples (Target Analyte List or TAL). The laboratory QC sample is an additional volume of an existing sample required by the laboratory's contract; the sampler must supply the additional volume. Samples should designate one sample per matrix per 20 samples as a "laboratory QC" sample.

5.2.1 Trip Blanks

A trip blank is collected at a frequency of one per cooler per each day when sampling for volatile organics in an aqueous matrix. A trip blank is an aliquot of demonstrated analyte-free water, which is sealed in 40 ml glass vials with Teflon-lined septum caps prior to the initiation of fieldwork each day. This blank is applied in sample data validation to determine if any cross contamination has occurred between samples during shipment. These sealed bottles will be placed an adequate cooler (metal or plastic) before shipment.

Trip blanks will be collected in accordance with the procedure listed below:

1. Take an extra vial and fill it almost to the brim with demonstrated analyte-free water. Determine the amount of 1:1 hydrochloric acid (HCl) needed to lower the sample pH to less than 2, verifying with broad range pH paper. In the same manner fill almost to the brim two sample vials with demonstrated analyte-free water and add the predetermined volume of HCl.
2. Proceed to fill the two vials just to overflowing and put the lid on so that no air bubbles are trapped inside.
3. Place the vials in a sample cooler and cover with ice to maintain the temperature inside the cooler at 4 ° C. The ice should be packed inside double plastic bags since it must not come in direct contact with the sample container. Samples will be shipped to the designated CLP laboratory within 24 hours from the time of collection.
4. Write on the field logbook all the pertinent information and fill out the sample log sheet, custody seals, labels, Traffic Reports, and Chain-of-Custody forms. The Sample Management Officer (SMO) can fill certain parts of these forms, sheets, seals, and labels before the sampling activities begin.

5.2.2 Field Trip Blanks

When sampling for volatile organics, a field trip blank, consisting of demonstrated analyte free water sealed in 40 ml Teflon-lined septum vials, must be taken by the field personnel (samplers) to the sampling locations. It should be taken at a minimum frequency of one per day when volatile organics in an aqueous matrix are being collected. It is neither necessary nor required to take an aqueous field trip blank when a non-aqueous medium is being sampled. Field trip blank are used to determine if any on-site atmospheric contaminants are seeping into the sample vials. Trip blanks are only analyzed for volatile organics.

Field trip blanks will be collected following the procedure described on Section 5.2.1 of this plan.

5.2.3 Field Rinsate Blanks

A field rinsate blank will consist of pouring demonstrated analyte free water over a piece of decontaminated sampling equipment (e.g. bowl, bucket or auger) to evaluate potential cross contamination from inadequate decontamination. The frequency of the field rinsate blank collection is one per decontamination event per type of equipment (e.g. bowl, bucket or auger), not to exceed more than one per day. The field rinsate blanks will consist of the same number and type of containers as their original aqueous samples. For the purposes of an SSI, field rinsate blank collection will not exceed a total of three samples. Rinsate blanks will be taken at the beginning of each sampling day for all parameters of interest (excluding physical parameters) and shipped with the samples taken during that specific day.

Field rinsate blanks will be collected in accordance with the procedure listed below:

1. Decontaminate the sampling equipment using the procedure specified in Section 4.0 of this QAPP.
2. Pour deionized water over the sampling device and collect the rinsate in the appropriate sample containers. VOA * vials are filled and preserved in the same manner as trip blank vials.

   ***For VOA a separate rinse blank is to be collected for each piece of sampling equipment associated with a particular matrix.**
3. Preserve remaining samples as specified in Table 3 of this plan. Test pH by pouring a small portion of sample on broad range pH paper over a collection bowl.
4. Close the lid and place the containers in a sample cooler and cover with ice to maintain the temperature inside the cooler at 4°C. The ice should be packed inside double plastic bags since it must not come in direct contact with the sample container. Samples will be shipped to the designated CLP laboratory within 24 hours from the time of collection.
5. Write on the field logbook all the pertinent information and fill out the sample log sheet, custody seals, labels, Traffic Reports, and Chain-of-Custody forms. The Sample Management Officer (SMO) can fill certain parts of these forms, sheets, seals, and labels before the sampling activities begin.

5.2.4 Combined Field Rinsate Blanks

The combined field rinsate blank will consist of pouring demonstrated analyte free water over two different decontaminated pieces of sampling equipment (e.g. spoon and bowl, trowel and pan) that will be used for the same purpose and matrix collection, to evaluate potential cross contamination from inadequate decontamination. This method is used instead of collecting the field rinsate blank sample for each instrument separately. The collection frequency of the combined field rinsate blank will depend on the matrix sampled and type of equipment used in each SSI. The field rinsate blanks will consist of the same number and type of containers as their original aqueous samples. For the purpose of an SSI, field rinsate blank collection will depend on the matrix sampled and the sample equipment used, not exceeding a total of three samples per day.

Combined field rinsate blank will be collected following the procedure described on Section 5.2.3 of this plan.

5.2.5 Analyte-Free Water Blanks

Analyte free water blank will be collected prior to the sampling event and separately, whenever a new lot of demonstrated analyte free water is use for a sampling event. The same demonstrated analyte free water utilized for the trip and field blanks will be used to collected this blank. This blank will be analyzed for CLP TCL/TAL parameters. The analyte free water blanks will consist of the same number and type of containers of an aqueous sample.

The criteria to be demonstrated as analyte-free will be consistent with that specified in the USEPA Region 2 Quality Assurance Manual (October, 1989), and is as follows:

Purgeable organics	< 10 ppb
Semi volatile organics	< CRQL
Pesticides/PCB/aroclors	< CRQL
Inorganics	< CRDL

For specific common laboratory contaminants such as methylene chloride, acetone, toluene, 2-butanone and phthalates, the allowable limits are three times the respective CRQL's.

Data generated as a result of this analysis will be incorporated into the SSI report for the site. Additionally, a copy of each analyte free-water analysis will be maintained in a file at the PREQB Superfund PA/SI Division office in Hato Rey, PR.

Analyte free water blanks will be collected in accordance with the procedure listed below:

1. Take an extra vial and fill it almost to the brim with demonstrated analyte-free water. Determine the amount of 1:1 hydrochloric acid (HCl) needed to lower the sample pH to less than 2, verifying with broad range pH paper. In the same manner fill almost to the brim two sample vials with demonstrated analyte-free water and add the predetermined volume of HCl.
2. Proceed to fill the two vials just to overflowing and put the lid on so that no air bubbles are trapped inside. Place the vials in a sample cooler and cover with ice to maintain the temperature inside the cooler at 4 ° C. The ice should be packed inside double plastic bags since it most not come in direct contact with the sample container.
3. Preserve remaining samples as specified in Table 3 of this plan. Test pH by pouring a small portion of sample on broad range pH paper over a collection bowl.
4. Close the lid and place the containers in a sample cooler and cover with ice to maintain the temperature inside the cooler at 4 ° C. The ice should be packed inside double plastic bags since it must not come in direct contact with the sample container. Samples will be shipped to the designated CLP laboratory within 24 hours from the time of collection.
5. Write on the field logbook all the pertinent information and fill out the sample log sheet, custody seals, labels, Traffic Reports, and Chain-of-Custody forms. The Sample Management Officer (SMO) can fill certain parts of these forms, sheets, seals, and labels before the sampling activities begin.

REFERENCE: 26

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

DATE: 6/16/2004
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section
TO: ESAT/RSCC

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: Celia's Laundry Inc. CASE #: 32903

SAMPLER: PREQB SDG#: BQR04

PROJ. CODE: QB SITE SPILL #: ZZ #SAMPLES: 9 MATRIX: Water

LAB: A4 OLC OO

TURN-AROUND-TIME: 21 day

CERCLIS ID #: PROOO2196368 FRACTION: 4 VOA + 5 Full (All LC)

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	Date/Time	Signature	Date/Time
Robert L. Gatt	6/16/04	M Rosenberg	6-16-04
M Rosenberg	6-29-04	Hanif Shaikh	6-28-04
Hanif Shaikh	6-29-04	Robert L Gatt	6-29-04

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Number of Soil Samples : 0
Number of Water Samples : 9

Sample Number :	BQR00		BQR01		BQR02		BQR03		BQR04	
Sampling Location :	CLI-GW-01		CLI-GW-02		CLI-GW-03		CLI-FB-01		CLI-TB-01	
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/18/2004		5/18/2004		5/18/2004		5/18/2004		5/17/2004	
Time Sampled :	10:55		10:58		09:35		07:34		08:36	
%Moisture :	N/A		N/A		N/A		N/A		N/A	
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Dichlorodifluoromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Vinyl Chloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromomethane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U
Chloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Trichlorofluoromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Acetone	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U
Carbon Disulfide	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methyl Acetate	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methylene Chloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
trans-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methyl tert-Butyl Ether	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
cis-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.46	J
2-Butanone	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U
Bromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloroform	0.50	U	0.50	U	0.50	U	0.50	U	0.22	J
1,1,1-Trichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Cyclohexane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
Carbon Tetrachloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Benzene	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
1,2-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Trichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	1.0	
Methylcyclohexane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
1,2-Dichloropropane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
Bromodichloromethane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
cis-1,3-Dichloropropene	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
4-Methyl-2-pentanone	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U
Toluene	0.50	U	0.50	U	0.50	U	0.50	U	0.28	J
trans-1,3-Dichloropropene	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
1,1,2-Trichloroethane	0.50	UJ	0.50	UJ	0.50	UJ	0.50	U	0.50	U
Tetrachloroethene	0.50	U	0.17	J	0.50	U	0.50	U	0.50	U
2-Hexanone	5.0	UJ	5.0	UJ	5.0	UJ	5.0	UJ	5.0	U
Dibromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dibromoethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	BQR00		BQR01		BQR02		BQR03		BQR04	
Sampling Location :	CLI-GW-01		CLI-GW-02		CLI-GW-03		CLI-FB-01		CLI-TB-01	
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/18/2004		5/18/2004		5/18/2004		5/18/2004		5/17/2004	
Time Sampled :	10:55		10:58		09:35		07:34		08:36	
%Moisture :	N/A		N/A		N/A		N/A		N/A	
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Chlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Ethylbenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Xylenes (total)	0.50	U	0.50	U	0.50	U	0.50	U	0.16	J
Styrene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromoform	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Isopropylbenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1,2,2-Tetrachloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,3-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,4-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dibromo-3-chloropropane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2,4-Trichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2,3-Trichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/29/2004

Sample Number :	BQR05		BQR06		BQR07		BQR08		VBLKP4	
Sampling Location :	CLI-FRB-01		CLI-TB-02		CLI-AFB-01		CLI-TB-03			
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/17/2004		5/18/2004		5/17/2004		5/18/2004			
Time Sampled :	09:22		07:48		07:10		07:58			
%Moisture :	N/A		N/A		N/A		N/A			
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Dichlorodifluoromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloromethane	0.50	U	0.21	J	0.50	U	0.31	J	0.50	U
Vinyl Chloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromomethane	0.50	U	0.50	UJ	0.50	UJ	0.50	UJ	0.50	UJ
Chloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Trichlorofluoromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Acetone	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Carbon Disulfide	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methyl Acetate	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methylene Chloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
trans-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methyl tert-Butyl Ether	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
cis-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
2-Butanone	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Bromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Chloroform	0.44	J	0.50	U	0.88	U	0.58		0.50	U
1,1,1-Trichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Cyclohexane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Carbon Tetrachloride	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Benzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Trichloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methylcyclohexane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dichloropropane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromodichloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
cis-1,3-Dichloropropene	0.50	UJ	0.50	U	0.50	U	0.50	U	0.50	U
4-Methyl-2-pentanone	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Toluene	0.18	J	0.50	U	0.50	U	0.58		0.50	U
trans-1,3-Dichloropropene	0.50	UJ	0.50	U	0.50	U	0.50	U	0.50	U
1,1,2-Trichloroethane	0.50	UJ	0.50	U	0.50	U	0.50	U	0.50	U
Tetrachloroethene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
2-Hexanone	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Dibromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dibromoethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U

Analytical Results (Qualified Data)

Case #: 32903
Site :
Lab. :
Reviewer :
Date :

SDG : BQR04
CELIA'S LAUNDRY INC.
A4
D. ROSENBERG
06/23/2004

Sample Number :	BQR05		BQR06		BQR07		BQR08		VBLKP4	
Sampling Location :	CLI-FRB-01		CLI-TB-02		CLI-AFB-01		CLI-TB-03			
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/17/2004		5/18/2004		5/17/2004		5/18/2004			
Time Sampled :	09:22		07:48		07:10		07:58			
%Moisture :	N/A		N/A		N/A		N/A			
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Chlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Ethylbenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Xylenes (total)	0.50	U	0.50	U	0.50	U	0.52		0.50	U
Styrene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Bromoform	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Isopropylbenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1,2,2-Tetrachloroethane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,3-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,4-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2-Dichlorobenzene	0.50	U	0.28	J	0.50	U	0.50	U	0.50	U
1,2-Dibromo-3-chloropropane	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,2,4-Trichlorobenzene	0.50	U	0.17	J	0.50	U	0.50	U	0.50	U
1,2,3-Trichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	VBLKP7		VBLK6W		VBLK6X		VHBLK01			
Sampling Location :										
Matrix :	Water		Water		Water		Water			
Units :	ug/L		ug/L		ug/L		ug/L			
Date Sampled :										
Time Sampled :										
%Moisture :										
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0			
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Dichlorodifluoromethane	0.50	U	0.50	U	0.50	U	0.50	U		
Chloromethane	0.50	U	0.50	U	0.50	U	0.50	U		
Vinyl Chloride	0.50	U	0.50	U	0.50	U	0.50	U		
Bromomethane	0.50	U	0.50	U	0.50	UJ	0.50	U		
Chloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
Trichlorofluoromethane	0.50	U	0.50	U	0.50	U	0.50	U		
1,1-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U		
1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U	0.50	U	0.50	U	0.50	U		
Acetone	5.0	U	5.0	U	5.0	UJ	5.0	U		
Carbon Disulfide	0.50	U	0.50	U	0.50	U	0.50	U		
Methyl Acetate	0.50	U	0.50	U	0.50	U	0.50	U		
Methylene Chloride	0.50	U	0.50	U	0.50	U	1.3			
trans-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U		
Methyl tert-Butyl Ether	0.50	U	0.50	U	0.50	U	0.50	U		
1,1-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
cis-1,2-Dichloroethene	0.50	U	0.50	U	0.50	U	0.50	U		
2-Butanone	5.0	U	5.0	U	5.0	UJ	5.0	U		
Bromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U		
Chloroform	0.50	U	0.50	U	0.50	U	0.20	J		
1,1,1-Trichloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
Cyclohexane	0.50	U	0.50	U	0.50	U	0.50	U		
Carbon Tetrachloride	0.50	U	0.50	U	0.50	U	0.50	U		
Benzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,2-Dichloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
Trichloroethene	0.50	U	0.50	U	0.50	U	0.50	U		
Methylcyclohexane	0.50	U	0.50	U	0.50	U	0.50	U		
1,2-Dichloropropane	0.50	U	0.50	U	0.50	U	0.50	U		
Bromodichloromethane	0.50	U	0.50	U	0.50	U	0.50	U		
cis-1,3-Dichloropropene	0.50	U	0.50	U	0.50	U	0.50	U		
4-Methyl-2-pentanone	5.0	U	5.0	U	5.0	UJ	5.0	U		
Toluene	0.50	U	0.50	U	0.50	U	0.50	U		
trans-1,3-Dichloropropene	0.50	U	0.50	U	0.50	U	0.50	U		
1,1,2-Trichloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
Tetrachloroethene	0.50	U	0.50	U	0.50	U	0.50	U		
2-Hexanone	5.0	U	5.0	U	5.0	UJ	5.0	U		
Dibromochloromethane	0.50	U	0.50	U	0.50	U	0.50	U		
1,2-Dibromoethane	0.50	U	0.50	U	0.50	U	0.50	U		

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	VBLKP7		VBLK6W		VBLK6X		VHBLK01			
Sampling Location :										
Matrix :	Water		Water		Water		Water			
Units :	ug/L		ug/L		ug/L		ug/L			
Date Sampled :										
Time Sampled :										
%Moisture :										
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0			
Volatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Chlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U		
Ethylbenzene	0.50	U	0.50	U	0.50	U	0.50	U		
Xylenes (total)	0.50	U	0.50	U	0.50	U	0.50	U		
Styrene	0.50	U	0.50	U	0.50	U	0.50	U		
Bromoform	0.50	U	0.50	U	0.50	U	0.50	U		
Isopropylbenzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,1,2,2-Tetrachloroethane	0.50	U	0.50	U	0.50	U	0.50	U		
1,3-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,4-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,2-Dichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,2-Dibromo-3-chloropropane	0.50	U	0.50	U	0.50	U	0.50	U		
1,2,4-Trichlorobenzene	0.50	U	0.50	U	0.50	U	0.50	U		
1,2,3-Trichlorobenzene	0.50	UJ	0.50	U	0.50	U	0.50	UJ		

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC. Number of Soil Samples : 0
Lab. : A4 Number of Water Samples : 5
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	BQR00		BQR01		BQR02		BQR05		BQR07	
Sampling Location :	CLI-GW-01		CLI-GW-02		CLI-GW-03		CLI-FRB-01		CLI-AFB-01	
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/18/2004		5/18/2004		5/18/2004		5/17/2004		5/17/2004	
Time Sampled :	10:55		10:58		09:35		09:22		07:10	
%Moisture :	N/A		N/A		N/A		N/A		N/A	
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Semivolatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Benzaldehyde	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Phenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
bis-(2-Chloroethyl) ether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Methylphenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,2'-oxybis(1-Chloropropane)	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Acetophenone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Methylphenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
N-Nitroso-di-n-propylamine	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Hexachloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Nitrobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Isophorone	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Nitrophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4-Dimethylphenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
bis(2-Chloroethoxy)methane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4-Dichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Naphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Chloroaniline	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Hexachlorobutadiene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Caprolactam	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Chloro-3-methylphenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Methylnaphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Hexachlorocyclopentadiene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4,6-Trichlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4,5-Trichlorophenol	20	U	20	U	20	U	20	U	20	U
1,1'-Biphenyl	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chloronaphthalene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Nitroaniline	20	U	20	U	20	U	20	U	20	U
Dimethylphthalate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,6-Dinitrotoluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Acenaphthylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
3-Nitroaniline	20	U	20	U	20	U	20	U	20	U
Acenaphthene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4-Dinitrophenol	20	U	20	U	20	U	20	U	20	U
4-Nitrophenol	20	U	20	U	20	U	20	U	20	U
Dibenzofuran	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2,4-Dinitrotoluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U

Analytical Results (Qualified Data) Page 2 of 4

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	BQR00		BQR01		BQR02		BQR05		BQR07	
Sampling Location :	CLI-GW-01		CLI-GW-02		CLI-GW-03		CLI-FRB-01		CLI-AFB-01	
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/18/2004		5/18/2004		5/18/2004		5/17/2004		5/17/2004	
Time Sampled :	10:55		10:58		09:35		09:22		07:10	
%Moisture :	N/A		N/A		N/A		N/A		N/A	
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Semivolatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Diethylphthalate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Fluorene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Chlorophenyl-phenylether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Nitroaniline	20	U	20	U	20	U	20	U	20	U
4,6-Dinitro-2-methylphenol	20	U	20	U	20	U	20	U	20	U
N-Nitrosodiphenylamine	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2,4,5-Tetrachlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
4-Bromophenyl-phenylether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Hexachlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Atrazine	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pentachlorophenol	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Phenanthrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Anthracene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Di-n-butylphthalate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Fluoranthene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Pyrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Butylbenzylphthalate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
3,3'-Dichlorobenzidine	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzo(a)anthracene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chrysene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
bis(2-Ethylhexyl)phthalate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Di-n-octylphthalate;	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzo(b)fluoranthene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzo(k)fluoranthene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzo(a)pyrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Indeno(1,2,3-cd)pyrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibenzo(a,h)anthracene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Benzo(g,h,i)perylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	SBLK8Y									
Sampling Location :										
Matrix :	Water									
Units :	ug/L									
Date Sampled :										
Time Sampled :										
%Moisture :										
pH :										
Dilution Factor :	1.0									
Semivolatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Benzaldehyde	5.0	U								
Phenol	5.0	U								
bis-(2-Chloroethyl) ether	5.0	U								
2-Chlorophenol	5.0	U								
2-Methylphenol	5.0	U								
2,2'-oxybis(1-Chloropropane)	5.0	U								
Acetophenone	5.0	U								
4-Methylphenol	5.0	U								
N-Nitroso-di-n-propylamine	5.0	U								
Hexachloroethane	5.0	U								
Nitrobenzene	5.0	U								
Isophorone	5.0	U								
2-Nitrophenol	5.0	U								
2,4-Dimethylphenol	5.0	U								
bis(2-Chloroethoxy)methane	5.0	U								
2,4-Dichlorophenol	5.0	U								
Naphthalene	5.0	U								
4-Chloroaniline	5.0	U								
Hexachlorobutadiene	5.0	U								
Caprolactam	5.0	U								
4-Chloro-3-methylphenol	5.0	U								
2-Methylnaphthalene	5.0	U								
Hexachlorocyclopentadiene	5.0	U								
2,4,6-Trichlorophenol	5.0	U								
2,4,5-Trichlorophenol	20	U								
1,1'-Biphenyl	5.0	U								
2-Chloronaphthalene	5.0	U								
2-Nitroaniline	20	U								
Dimethylphthalate	5.0	U								
2,6-Dinitrotoluene	5.0	U								
Acenaphthylene	5.0	U								
3-Nitroaniline	20	U								
Acenaphthene	5.0	U								
2,4-Dinitrophenol	20	U								
4-Nitrophenol	20	U								
Dibenzofuran	5.0	U								
2,4-Dinitrotoluene	5.0	U								

Case #: 32903
SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	SBLK8Y									
Sampling Location :										
Matrix :	Water									
Units :	ug/L									
Date Sampled :										
Time Sampled :										
%Moisture :										
pH :										
Dilution Factor :	1.0									
Semivolatile Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
Diethylphthalate	5.0	U								
Fluorene	5.0	U								
4-Chlorophenyl-phenylether	5.0	U								
4-Nitroaniline	20	U								
4,6-Dinitro-2-methylphenol	20	U								
N-Nitrosodiphenylamine	5.0	U								
1,2,4,5-Tetrachlorobenzene	5.0	U								
4-Bromophenyl-phenylether	5.0	U								
Hexachlorobenzene	5.0	U								
Atrazine	5.0	U								
Pentachlorophenol	5.0	U								
Phenanthrene	5.0	U								
Anthracene	5.0	U								
Di-n-butylphthalate	5.0	U								
Fluoranthene	5.0	U								
Pyrene	5.0	U								
Butylbenzylphthalate	5.0	U								
3,3'-Dichlorobenzidine	5.0	U								
Benzo(a)anthracene	5.0	U								
Chrysene	5.0	U								
bis(2-Ethylhexyl)phthalate	5.0	U								
Di-n-octylphthalate	5.0	U								
Benzo(b)fluoranthene	5.0	U								
Benzo(k)fluoranthene	5.0	U								
Benzo(a)pyrene	5.0	U								
Indeno(1,2,3-cd)pyrene	5.0	U								
Dibenzo(a,h)anthracene	5.0	U								
Benzo(g,h,i)perylene	5.0	U								

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Number of Soil Samples : 0
Number of Water Samples : 5

Sample Number :	BQR00		BQR01		BQR01MS		BQR01MSD		BQR02	
Sampling Location :	CLI-GW-01		CLI-GW-02		CLI-GW-02		CLI-GW-02		CLI-GW-03	
Matrix :	Water		Water		Water		Water		Water	
Units :	ug/L		ug/L		ug/L		ug/L		ug/L	
Date Sampled :	5/18/2004		5/18/2004		5/18/2004		5/18/2004		5/18/2004	
Time Sampled :	10:55		10:58		10:58		10:58		09:35	
%Moisture :	N/A		N/A		N/A		N/A		N/A	
pH :										
Dilution Factor :	1.0		1.0		1.0		1.0		1.0	
Pesticide/PCB Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
alpha-BHC	0.010	UJ	0.010	UJ	0.010	UJ	0.010	UJ	0.010	UJ
beta-BHC	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
delta-BHC	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
gamma-BHC (Lindane)	0.010	UJ	0.010	UJ	0.095	J	0.097	J	0.010	UJ
Heptachlor	0.010	U	0.010	U	0.091	J	0.090	J	0.010	U
Aldrin	0.010	U	0.010	U	0.086		0.088	J	0.010	U
Heptachlor epoxide	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Endosulfan I	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Dieldrin	0.020	U	0.020	U	0.21		0.21		0.020	U
4,4'-DDE	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
Endrin	0.020	U	0.020	U	0.24		0.24		0.020	U
Endosulfan II	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
4,4'-DDD	0.020	UJ	0.020	UJ	0.020	UJ	0.020	UJ	0.020	UJ
Endosulfan sulfate	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
4,4'-DDT	0.020	U	0.020	U	0.20		0.21		0.020	U
Methoxychlor	0.10	U	0.10	U	0.10	U	0.10	U	0.10	U
Endrin ketone	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
Endrin aldehyde	0.020	U	0.020	U	0.020	U	0.020	U	0.020	U
alpha-Chlordane	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
gamma-Chlordane	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
Toxaphene	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
Aroclor-1016	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Aroclor-1221	0.40	U	0.40	U	0.40	U	0.40	U	0.40	U
Aroclor-1232	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Aroclor-1242	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Aroclor-1248	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Aroclor-1254	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Aroclor-1260	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U

Analytical Results (Qualified Data)

Case #: 32903 SDG : BQR04
Site : CELIA'S LAUNDRY INC.
Lab. : A4
Reviewer : D. ROSENBERG
Date : 06/23/2004

Sample Number :	BQR05		BQR07		PBLK1D					
Sampling Location :	CLI-FRB-01		CLI-AFB-01							
Matrix :	Water		Water		Water					
Units :	ug/L		ug/L		ug/L					
Date Sampled :	5/17/2004		5/17/2004							
Time Sampled :	09:22		07:10							
%Moisture :	N/A		N/A							
pH :										
Dilution Factor :	1.0		1.0		1.0					
Pesticide/PCB Compound	Result	Flag	Result	Flag	Result	Flag	Result	Flag	Result	Flag
alpha-BHC	0.010	UJ	0.010	UJ	0.010	UJ				
beta-BHC	0.010	U	0.010	U	0.010	U				
delta-BHC	0.010	U	0.010	U	0.010	U				
gamma-BHC (Lindane)	0.010	UJ	0.010	UJ	0.010	UJ				
Heptachlor	0.010	U	0.010	U	0.010	U				
Aldrin	0.010	U	0.010	U	0.010	U				
Heptachlor epoxide	0.010	U	0.010	U	0.010	U				
Endosulfan I	0.010	U	0.010	U	0.010	U				
Dieldrin	0.020	U	0.020	U	0.020	U				
4,4'-DDE	0.020	U	0.020	U	0.020	U				
Endrin	0.020	U	0.020	U	0.020	U				
Endosulfan II	0.020	U	0.020	U	0.020	U				
4,4'-DDD	0.020	UJ	0.020	UJ	0.020	UJ				
Endosulfan sulfate	0.020	U	0.020	U	0.020	U				
4,4'-DDT	0.020	U	0.020	U	0.020	U				
Methoxychlor	0.10	U	0.10	U	0.10	U				
Endrin ketone	0.020	U	0.020	U	0.020	U				
Endrin aldehyde	0.020	U	0.020	U	0.020	U				
alpha-Chlordane	0.010	U	0.010	U	0.010	U				
gamma-Chlordane	0.010	U	0.010	U	0.010	U				
Toxaphene	1.0	U	1.0	U	1.0	U				
Aroclor-1016	0.20	U	0.20	U	0.20	U				
Aroclor-1221	0.40	U	0.40	U	0.40	U				
Aroclor-1232	0.20	U	0.20	U	0.20	U				
Aroclor-1242	0.20	U	0.20	U	0.20	U				
Aroclor-1248	0.20	U	0.20	U	0.20	U				
Aroclor-1254	0.20	U	0.20	U	0.20	U				
Aroclor-1260	0.20	U	0.20	U	0.20	U				

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: E8774 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U J
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U J
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: E8774 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U J
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U J
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U J
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: E8774 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR01
DUPLICATE BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Lab File ID: E8775 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U J
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U J
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: 5024.002 Date Received: 05/19/2004
Lab File ID: E8775 Date Analyzed: 05/21/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U J
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U J
108-88-3	Toluene	0.50 ~~0.12~~	J U
10061-02-6	trans-1,3-Dichloropropene	0.50	U J
79-00-5	1,1,2-Trichloroethane	0.50	U J
127-18-4	Tetrachloroethene	0.17	J
591-78-6	2-Hexanone	5.0	U J
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Lab File ID: E8775 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Lab File ID: E8776 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U J
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U J
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: 5024.003 Date Received: 05/19/2004
Lab File ID: E8776 Date Analyzed: 05/21/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Lab File ID: E8776 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
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12					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR03

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: 5024.004 Date Received: 05/19/2004
Lab File ID: E8777 Date Analyzed: 05/21/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR03
FB-01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.004 Date Received: 05/19/2004

Lab File ID: E8777 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U J
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U J
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR03

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.004 Date Received: 05/19/2004

Lab File ID: E8777 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR04
TB-01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.002 Date Received: 05/18/2004

Lab File ID: E8762 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.46	J
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.22	J
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BQR04

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.002 Date Received: 05/18/2004

Lab File ID: E8762 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	1.0	
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.28	J
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.16	J
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR04

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.002 Date Received: 05/18/2004

Lab File ID: E8762 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 2

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		UNKNOWN	12.31	0.57	J
02	000526-73-8	Benzene, 1,2,3-trimethyl-	12.80	0.86	JN
03					
04					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR05
FRB-01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Lab File ID: E8763 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.44	J
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR05

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: 5013.003 Date Received: 05/18/2004
Lab File ID: E8763 Date Analyzed: 05/20/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U J
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.18	J
10061-02-6	trans-1,3-Dichloropropene	0.50	U J
79-00-5	1,1,2-Trichloroethane	0.50	U J
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR05

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Lab File ID: E8763 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	000108-67-8	Benzene, 1,3,5-trimethyl-	12 80	0.56	JN
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR06
TB-02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.005 Date Received: 05/19/2004

Lab File ID: F5974 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.21	J
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR06

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: 5024.005 Date Received: 05/19/2004
Lab File ID: F5974 Date Analyzed: 05/21/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.28	J
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.17	J
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR06

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.005 Date Received: 05/19/2004

Lab File ID: F5974 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
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11					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR07
AFB-01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: E8768 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.88	
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR07

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: E8768 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U J
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U J
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
BQR07

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: E8768 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
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1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR08
TB-03

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.006 Date Received: 05/19/2004

Lab File ID: F5975 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.31	J
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.58	
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BQR08

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.006 Date Received: 05/19/2004

Lab File ID: F5975 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.58	
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.52	
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BQR08

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.006 Date Received: 05/19/2004

Lab File ID: F5975 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 4

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01		UNKNOWN	8.88	0.72	J
02	000556-67-2	Cyclotetrasiloxane, octameth	12.23	1.0	JN
03	000611-14-3	Benzene, 1-ethyl-2-methyl-	12.36	0.76	JN
04	000108-67-8	Benzene, 1,3,5-trimethyl-	12.86	1.0	JN
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLK6W

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: EVBLK6W Date Received: _____

Lab File ID: E8748 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLK6W

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038
Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04
Lab Sample ID: EVBLK6W Date Received: _____
Lab File ID: E8748 Date Analyzed: 05/20/2004
Purge Volume: 25 (ML) Dilution Factor: 1.0
GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLK6W

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: EVBLK6W Date Received: _____

Lab File ID: E8748 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLK6X

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: EVBLK6X Date Received: _____

Lab File ID: E8767 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U J
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U J
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U J
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLK6X

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: EVBLK6X Date Received: _____

Lab File ID: E8767 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U J
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U J
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLK6X

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: EVBLK6X Date Received: _____

Lab File ID: E8767 Date Analyzed: 05/20/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLKP4

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP4 Date Received: _____

Lab File ID: F5963 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	UJ
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLKP4

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP4 Date Received: _____

Lab File ID: F5963 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKP4

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP4 Date Received: _____

Lab File ID: F5963 Date Analyzed: 05/21/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLKP7

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP7 Date Received: _____

Lab File ID: F6029 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	0.50	U
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.50	U
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

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LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VBLKP7

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP7 Date Received: _____

Lab File ID: F6029 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VBLKP7

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: FVBLKP7 Date Received: _____

Lab File ID: F6029 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
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24					
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26					
27					
28					
29					
30					

1LCA
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VHBLK01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.001 Date Received: _____

Lab File ID: F6035 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
75-71-8	Dichlorodifluoromethane	0.50	U
74-87-3	Chloromethane	0.50	U
75-01-4	Vinyl Chloride	0.50	U
74-83-9	Bromomethane	0.50	U
75-00-3	Chloroethane	0.50	U
75-69-4	Trichlorofluoromethane	0.50	U
75-35-4	1,1-Dichloroethene	0.50	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	0.50	U
67-64-1	Acetone	5.0	U
75-15-0	Carbon Disulfide	0.50	U
79-20-9	Methyl Acetate	0.50	U
75-09-2	Methylene Chloride	1.3	
156-60-5	trans-1,2-Dichloroethene	0.50	U
1634-04-4	Methyl tert-Butyl Ether	0.50	U
75-34-3	1,1-Dichloroethane	0.50	U
156-59-2	cis-1,2-Dichloroethene	0.50	U
78-93-3	2-Butanone	5.0	U
74-97-5	Bromochloromethane	0.50	U
67-66-3	Chloroform	0.20	J
71-55-6	1,1,1-Trichloroethane	0.50	U
110-82-7	Cyclohexane	0.50	U
56-23-5	Carbon Tetrachloride	0.50	U
71-43-2	Benzene	0.50	U
107-06-2	1,2-Dichloroethane	0.50	U

1LCB
LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
VHBLK01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.001 Date Received: _____

Lab File ID: F6035 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
79-01-6	Trichloroethene	0.50	U
108-87-2	Methylcyclohexane	0.50	U
78-87-5	1,2-Dichloropropane	0.50	U
75-27-4	Bromodichloromethane	0.50	U
10061-01-5	cis-1,3-Dichloropropene	0.50	U
108-10-1	4-Methyl-2-pentanone	5.0	U
108-88-3	Toluene	0.50	U
10061-02-6	trans-1,3-Dichloropropene	0.50	U
79-00-5	1,1,2-Trichloroethane	0.50	U
127-18-4	Tetrachloroethene	0.50	U
591-78-6	2-Hexanone	5.0	U
124-48-1	Dibromochloromethane	0.50	U
106-93-4	1,2-Dibromoethane	0.50	U
108-90-7	Chlorobenzene	0.50	U
100-41-4	Ethylbenzene	0.50	U
1330-20-7	Xylene (total)	0.50	U
100-42-5	Styrene	0.50	U
75-25-2	Bromoform	0.50	U
98-82-8	Isopropylbenzene	0.50	U
79-34-5	1,1,2,2-Tetrachloroethane	0.50	U
541-73-1	1,3-Dichlorobenzene	0.50	U
106-46-7	1,4-Dichlorobenzene	0.50	U
95-50-1	1,2-Dichlorobenzene	0.50	U
96-12-8	1,2-Dibromo-3-chloropropane	0.50	U
120-82-1	1,2,4-Trichlorobenzene	0.50	U
87-61-6	1,2,3-Trichlorobenzene	0.50	U

1LCF

LOW CONCENTRATION WATER VOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

VHBLK01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.001 Date Received: _____

Lab File ID: F6035 Date Analyzed: 05/27/2004

Purge Volume: 25 (ML) Dilution Factor: 1.0

GC Column: DB-624 ID: 0.20 (MM) Length: 25 (M)

Number TICs found: 1

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01	000556-67-2	Cyclotetrasiloxane, octameth	12.22	0.72	JN
02					
03					
04					
05					
06					
07					
08					
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1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: G1964 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: G1964 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Lab File ID: G1964 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
08					
09					
10					
11					
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29					
30					

1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
BQR01
Dup BQR04

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Lab File ID: G1965 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Lab File ID: G1965 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

BQR01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Lab File ID: G1965 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
04					
05					
06					
07					
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1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Lab File ID: G1966 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Lab File ID: G1966 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Lab File ID: G1966 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
03					
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1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
BQR05
FRB-01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Lab File ID: G1962 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BQR05

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Lab File ID: G1962 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

BQR05

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Lab File ID: G1962 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
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1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
BQR07

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: G1963 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR07
AFB-a

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: G1963 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS
DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

BQR07

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Lab File ID: G1963 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
02					
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1LCC
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS
ANALYSIS DATA SHEET

EPA SAMPLE NO.
SBLK8Y

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: SVOB8Y Date Received: _____

Lab File ID: G1961 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
100-52-7	Benzaldehyde	5.0	U
108-95-2	Phenol	5.0	U
111-44-4	bis(2-Chloroethyl)ether	5.0	U
95-57-8	2-Chlorophenol	5.0	U
95-48-7	2-Methylphenol	5.0	U
108-60-1	2,2'-oxybis(1-Chloropropane)	5.0	U
98-86-2	Acetophenone	5.0	U
106-44-5	4-Methylphenol	5.0	U
621-64-7	N-Nitroso-di-n-propylamine	5.0	U
67-72-1	Hexachloroethane	5.0	U
98-95-3	Nitrobenzene	5.0	U
78-59-1	Isophorone	5.0	U
88-75-5	2-Nitrophenol	5.0	U
105-67-9	2,4-Dimethylphenol	5.0	U
111-91-1	bis(2-Chloroethoxy)methane	5.0	U
120-83-2	2,4-Dichlorophenol	5.0	U
91-20-3	Naphthalene	5.0	U
106-47-8	4-Chloroaniline	5.0	U
87-68-3	Hexachlorobutadiene	5.0	U
105-60-2	Caprolactam	5.0	U
59-50-7	4-Chloro-3-methylphenol	5.0	U
91-57-6	2-Methylnaphthalene	5.0	U
77-47-4	Hexachlorocyclopentadiene	5.0	U
88-06-2	2,4,6-Trichlorophenol	5.0	U
95-95-4	2,4,5-Trichlorophenol	20	U
92-52-4	1,1'-Biphenyl	5.0	U
91-58-7	2-Chloronaphthalene	5.0	U
88-74-4	2-Nitroaniline	20	U
131-11-3	Dimethylphthalate	5.0	U
606-20-2	2,6-Dinitrotoluene	5.0	U
208-96-8	Acenaphthylene	5.0	U
99-09-2	3-Nitroaniline	20	U
83-32-9	Acenaphthene	5.0	U

1LCD
LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
SBLK8Y

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: SVOB8Y Date Received: _____

Lab File ID: G1961 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
51-28-5	2,4-Dinitrophenol	20	U
100-02-7	4-Nitrophenol	20	U
132-64-9	Dibenzofuran	5.0	U
121-14-2	2,4-Dinitrotoluene	5.0	U
84-66-2	Diethylphthalate	5.0	U
86-73-7	Fluorene	5.0	U
7005-72-3	4-Chlorophenyl-phenylether	5.0	U
100-01-6	4-Nitroaniline	20	U
534-52-1	4,6-Dinitro-2-methylphenol	20	U
86-30-6	N-Nitrosodiphenylamine (1)	5.0	U
95-94-3	1,2,4,5 Tetrachlorobenzene	5.0	U
101-55-3	4-Bromophenyl-phenylether	5.0	U
118-74-1	Hexachlorobenzene	5.0	U
1912-24-9	Atrazine	5.0	U
87-86-5	Pentachlorophenol	5.0	U
85-01-8	Phenanthrene	5.0	U
120-12-7	Anthracene	5.0	U
84-74-2	Di-n-butylphthalate	5.0	U
206-44-0	Fluoranthene	5.0	U
129-00-0	Pyrene	5.0	U
85-68-7	Butylbenzylphthalate	5.0	U
91-94-1	3,3'-Dichlorobenzidine	5.0	U
56-55-3	Benzo(a)anthracene	5.0	U
281-01-9	Chrysene	5.0	U
117-81-7	bis(2-Ethylhexyl)phthalate	5.0	U
117-84-0	Di-n-octylphthalate	5.0	U
205-99-2	Benzo(b)fluoranthene	5.0	U
207-08-9	Benzo(k)fluoranthene	5.0	U
50-32-8	Benzo(a)pyrene	5.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	5.0	U
53-70-3	Dibenzo(a,h)anthracene	5.0	U
191-24-2	Benzo(g,h,i)perylene	5.0	U

(1) Cannot be separated from Diphenylamine

1LCG

LOW CONCENTRATION WATER SEMIVOLATILE ORGANICS ANALYSIS

DATA SHEET TENTATIVELY IDENTIFIED COMPOUND

EPA SAMPLE NO.

SBLK8Y

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: SDG No.: BQR04

Lab Sample ID: SVOB8Y Date Received: _____

Lab File ID: G1961 Date Extracted: 05/23/2004

Sample Volume: 1000 (ML) Date Analyzed: 05/29/2004

Concentrated Extract Volume: 1000 (UL) Dilution Factor: 1.0

Injection Volume: 1.0 (UL)

Number TICs found: 0

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC. (UG/L)	Q
01					
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1LCE
LOW CONCENTRATION WATER PESTICIDE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR00

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: 5024.001 Date Received: 05/19/2004

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/07/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

1LCE
LOW CONCENTRATION WATER PESTICIDE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR01

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: 5024.002 Date Received: 05/19/2004

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/07/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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LOW CONCENTRATION WATER PESTICIDE ORGANICS ANALYSIS
DATA SHEET

EPA SAMPLE NO.
BQR02

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: 5024.003 Date Received: 05/19/2004

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/07/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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EPA SAMPLE NO.

BQR05

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: 5013.003 Date Received: 05/18/2004

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/06/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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EPA SAMPLE NO.
BQR07

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: 5013.004 Date Received: 05/18/2004

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/07/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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EPA SAMPLE NO.
PBLK1D

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: PESB1D Date Received:

Sample Volume: 1000 (ML) Date Extracted: 05/22/2004

Concentrated Extract Volume: 2000 (UL) Date Analyzed: 06/06/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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LOW CONCENTRATION WATER PESTICIDE ORGANICS ANALYSIS

DATA SHEET

EPA SAMPLE NO.

PIBLK5M(1)

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: PIBLK5M Date Received: _____

Sample Volume: _____ (ML) Date Extracted: _____

Concentrated Extract Volume: _____ (UL) Date Analyzed: 06/06/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) Y N 6/9/04 (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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EPA SAMPLE NO.
PIBLK7M(2)

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: PIBLK7M Date Received: _____

Sample Volume: _____ (ML) Date Extracted: _____

Concentrated Extract Volume: _____ (UL) Date Analyzed: 06/06/2004

Injection Volume: 0.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) Y 06/08/04 (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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LOW CONCENTRATION WATER PESTICIDE ORGANICS ANALYSIS

DATA SHEET

EPA SAMPLE NO.

PIBLK5N(1)

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: PIBLK5N Date Received: _____

Sample Volume: _____ (ML) Date Extracted: _____

Concentrated Extract Volume: _____ (UL) Date Analyzed: 06/07/2004

Injection Volume: 1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) N 6/8/04 (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

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EPA SAMPLE NO.

PIBLK7N(2)

Lab Name: A4 SCIENTIFIC, INC. Contract: 68W01038

Lab Code: A4 Case No.: 32903 Client No.: _____ SDG No.: BQR04

Lab Sample ID: PIBLK7N Date Received: _____

Sample Volume: _____ (ML) Date Extracted: _____

Concentrated Extract Volume: _____ (UL) Date Analyzed: 06/07/2004

Injection Volume: ~~0~~1.0 (UL) Dilution Factor: 1.0

Sulfur Cleanup: (Y/N) ~~Y~~N 6/8/01 (UL) Extraction: (Sepf/Cont) SEPF

CAS NO.	COMPOUND	CONCENTRATION UNITS: (UG/L)	Q
319-84-6	alpha-BHC	0.010	U J
319-85-7	beta-BHC	0.010	U
319-86-8	delta-BHC	0.010	U
58-89-9	gamma-BHC (Lindane)	0.010	U J
76-44-8	Heptachlor	0.010	U
309-00-2	Aldrin	0.010	U
1024-57-3	Heptachlor epoxide	0.010	U
959-98-8	Endosulfan I	0.010	U
60-57-1	Dieldrin	0.020	U
72-55-9	4,4'-DDE	0.020	U
72-20-8	Endrin	0.020	U
33213-65-9	Endosulfan II	0.020	U
72-54-8	4,4'-DDD	0.020	U J
1031-07-8	Endosulfan sulfate	0.020	U
50-29-3	4,4'-DDT	0.020	U
72-43-5	Methoxychlor	0.10	U
53494-70-5	Endrin ketone	0.020	U
7421-93-4	Endrin aldehyde	0.020	U
5103-71-9	alpha-Chlordane	0.010	U
5103-74-2	gamma-Chlordane	0.010	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.20	U
11104-28-2	Aroclor-1221	0.40	U
11141-16-5	Aroclor-1232	0.20	U
53469-21-9	Aroclor-1242	0.20	U
12672-29-6	Aroclor-1248	0.20	U
11097-69-1	Aroclor-1254	0.20	U
11096-82-5	Aroclor-1260	0.20	U

I. Functional Guidelines for Evaluating Organic Analysis

CASE # 32903 **SDG #** BQR04
LAB: A4 **SITE:** Celia's Laundry, Inc

The current Functional Guidelines for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "N" (presumptive evidence for the presence of the material), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Analytical data qualified as "JN" or "R" may not be used to demonstrate compliance with Toxicity Characteristic or Land Ban Regulations.

Reviewer's Signature David Rosenberg **Date:** 06 / 24 / 2004

Verified By: Hanif Sheikh **Date:** 6/29/2004

1. HOLDING TIMES:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following analytes in the samples shown were qualified because of holding time:

Qualification: Holding Time **Protocol: VOA**

No defects found.

Qualification: Holding Time **Protocol: BNA**

No defects found.

Qualification: Holding Time **Protocol: PES**

No defects found.

Note: If properly preserved, aqueous samples maintained at 4°C must be analyzed within fourteen (14) days of collection. If unpreserved, aqueous samples must be analyzed within seven (7) days for aromatic hydrocarbons. Soil/Solid samples must be analyzed within ten (10) days of collection.

2. BLANK CONTAMINATION:

Quality Assurance (QA) blanks [i.e., method, trip, field or rinse blanks] are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method Blank Contamination

Qualification: Laboratory Blanks **Protocol: VOA**

DC-19 The following volatile samples are associated with a contaminated storage blank. Hits are qualified "U" and non-detects are not flagged.

~~Chloroform~~
~~BQR04, BQR05, BQR07, BQR08~~ Field/Trip blanks, not qualified.

Qualification: Laboratory Blanks
Protocol: BNA

No defects found.

Qualification: Laboratory Blanks
Protocol: PES

No defects found.

2. BLANK CONTAMINATION (continued):

B) Field or Rinse Blank Contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

no problems found

C) Trip Blank Contamination

VOA - The following compounds were qualified as non-detected "U" in the associated samples due to trip blank contamination:

Compound	Associated Samples
Toluene	**BQR01**

3. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl-phosphine (DFTPP).

If the mass calibration is in error or missing, all associated data will be classified as unusable "R". The following samples shown were qualified with "R" because of tuning:

Qualification: IPC/Tune **Protocol: VOA**

No defects found.

Qualification: IPC/Tune
Protocol: BNA

No defects found.

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

Response Factor:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the VOA/BNA Target Compound List (TCL) must be ≥ 0.05 in both the initial and continuing calibrations. A value ≤ 0.05 indicates a serious detection and quantitation problem (poor sensitivity). If the mean RRF of the initial calibration or the continuing calibration has a response factor <0.05 for any analyte, those analytes detected in environmental samples will be qualified as estimated "J". All non-detects for those compounds will be rejected "R". The following analytes in the samples shown were qualified because of response factor:
Initial Calibration

no problems found

5. CALIBRATION:

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 30% and % D must be < 25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If % RSD and % D grossly exceed QC criteria, non-detects data may be qualified "R".

The following analytes in the samples shown were qualified for %RSD and %D:

Initial Calibration

Qualification: Calibrations **Protocol: VOA**

DC-7 The following volatile samples are associated with a continuing calibration whose corr esponding initial calibration has percent relative standard deviation (%RSD) outside primary criteria. Hits are qualified "J" and non-detects are not flagged.

Acetone
BQR06, BQR08, VBLKP4, VBLKP7, VHBLK01

1,2,3-Trichlorobenzene
BQR06, BQR08, VBLKP4, VBLKP7, VHBLK01

Qualification: Calibrations Protocol: BNA

No defects found.

Qualification: Calibrations
Protocol: PES

DC-3 The following pesticide samples are associated with a three point initial calibration in which the % RSD of calibration factors for a target compound exceeded primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

alpha-BHC
BQR00, BQR01, BQR01MS, BQR01MSD, BQR02, BQR05, BQR07, PBLK1D

gamma-BHC (Lindane)
BQR00, BQR01, BQR01MS, BQR01MSD, BQR02, BQR05, BQR07, PBLK1D

4,4-DDD
BQR00, BQR01, BQR01MS, BQR01MSD, BQR02, BQR05, BQR07, PBLK1D

Continuing Calibration:

VOA - The following compounds were qualified as estimated "J" because the Continuing Calibration %D is between 25-90% when the RRF50 is > 0.05:

DC-8 The following volatile samples are associated with either a continuing or a dual purpose calibration percent difference (%D) outside primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

Bromomethane
BQR00, BQR01, BQR02, BQR03, BQR06, BQR07, BQR08, VBLK6X, VBLKP4

Acetone
BQR00, BQR01, BQR02, BQR03, BQR07, VBLK6X

2-Butanone
BQR00, BQR01, BQR02, BQR03, BQR07, VBLK6X

4-Methyl-2-pentanone
BQR00, BQR01, BQR02, BQR03, BQR07, VBLK6X

2-Hexanone
BQR00, BQR01, BQR02, BQR03, BQR07, VBLK6X

1,2,3-Trichlorobenzene

VBLKP7, VHBLK01

6. SURROGATES/SYSTEM MONITORING COMPOUNDS (SMC):

All samples are spiked with surrogate/SMC compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate/SMC concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below. The following analytes for the samples shown were qualified because of surrogate/SMC recovery:

Qualification: DMC Protocol: VOA

DC-4 The following volatile samples have one or more DMC/SMC recovery values below the lower limit of the criteria window. Hits are qualified "J" and non-detects are qualified "UJ".

BQR00

Cyclohexane, Benzene, Methylcyclohexane, 1,2-Dichloropropane, Bromodichloromethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane

BQR01

Cyclohexane, Benzene, Methylcyclohexane, 1,2-Dichloropropane, Bromodichloromethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane

BQR02

Cyclohexane, Benzene, Methylcyclohexane, 1,2-Dichloropropane, Bromodichloromethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane

BQR05

cis-1,3-Dichloropropene, trans-1,3-Dichloropropene, 1,1,2-Trichloroethane

Qualification: DMC
Protocol: BNA

No defects found.

Qualification: Surrogate
Protocol: PES

No defects found.

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to 100%) from the associated continuing calibration standard. If the area count is outside the -50% to 100% range of the associated standard, then all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects as "UJ".

If the IS area is > 25% (a severe loss of sensitivity) then all non-detects associated with that IS are qualified as "R" and all positive results for compounds quantitated using that IS are qualified as estimated "J".

The retention time of the internal standard must not vary more than ± 30 seconds from the associated continuing calibration standard. If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction. The following analytes in the samples shown were qualified because of internal standard performance:

VOA The following compounds were either qualified as estimated "J" or rejected "R" in the associated samples due to exceeding Internal Standard (IS) QC criteria (within -50% to +100% of the Continuing Calibration 12-hour standard):

Qualification: Internal Standards **Protocol: VOA**

No defects found.

Qualification: Internal Standards **Protocol: BNA**

No defects found.

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound, and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the Tentatively Identified Compounds (TICs) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. The following analytes in the samples shown were qualified for compound identification:

The following compounds were qualified as estimated "J" in the indicated samples because they could not be chromatographically resolved:

Fraction	Compounds	Samples

No problems were found.

9. LABORATORY CONTROL SAMPLE:

The LCS data are generated to determine the long-term precision and accuracy of the analytical method. The LCS may be used in conjunction with other QC criteria for some additional qualification of the data. The following analytes, for the samples shown, were qualified because of LCS:

Qualification: Laboratory Control SampleProtocol: VOA

No defects found.

Qualification: Laboratory Control Sample
Protocol: BNA

No defects found.

Qualification: Laboratory Control Sample
Protocol: PES

No defects found.

10. OTHER QC DATA OUT OF SPECIFICATION:

VOA - The following compounds were qualified as estimated "J" in the associated aqueous and/or soil/sediment field duplicate samples because the Relative Percent Difference (RPD) between the sample and field duplicate sample is > 50% for aqueous samples, or > 100% for soil/sediment samples:

Compound	Matrix	% RPD	Associated Field Duplicate Samples

No problems found.

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT:

Due to professional judgement, the following compounds were not transferred from the indicated dilution sample analyses to the undiluted sample analyses because the reported values of these compounds are either diluted out in the associated dilution sample analyses or are qualified as non-detected "U" due to blank contamination QC criteria:

Qualification: System Performance **Protocol: PES**

No defects found.

12. CONTRACT PROBLEMS/NON-COMPLIANCE:

No problems found.

STANDARD OPERATING PROCEDURE

EPA Region II
Method: CLP/SOW, OLC03.2

Date: July , 2001
SOP HW-13, Revision 3

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 32903 LAB: A4

SITE NAME: Celia's Laundry SDG No(s).: BQRQ4

1.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? [✓]

ACTION: If no contact RSCC, or the TOPO to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples and all fractions? [✓]

ACTION: If no, contact either RSCC or ask the TOPO to obtain the necessary information from the prime contractor.

2.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? [✓]

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the data package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with the package? [✓]

2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report and Sample Tags? [✓]

YES NO N/A

ACTION: If yes, contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

3.1 Is the SDG Narrative or Cover Letter Present? [✓] ___ ___

3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, Section 2.5.1)? EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken? [✓] ___ ___

3.3 Does the Narrative contain the following information (see SOW, page B-12, section 2.5.1):

VOA: description or trap and column(s) used during sample analyses? [✓] ___ ___

BNA: description of column(s) used during sample analyses? [✓] ___ ___

PEST: description of columns used during sample analyses? [✓] ___ ___

NOTE: As stated in the SOW, page D-11/PEST, section 6.10.1.3.7, packed columns cannot be used.

3.4 Does the narrative, VOA and BNA sections, contain a list of all TICs identified as alkanes and their estimated concentrations? [ ] [✓] ___

3.5 Is the temperature indicator bottle present in the cooler? If not, did the Laboratory document in the SDG Narrative the alternative technique used to determine the cooler temperature? (Exhibit A/ p. A-7 sec. 4.2.1.2.3.3) [✓] ___ ___

	YES	NO	N/A
3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatiles analysis (SOW, page B-13, section 2.5.1.2)?	[/]		
3.7 Does the Case Narrative contain the "verbatim" statement as required on page B-12, section 2.5.1 of the SOW?	[/]		

ACTION: If "No", to any question in this section, contact the TOPO to obtain necessary resubmittals. If the information is unavailable, document under the Contract Problems/Non-Compliance section of the Data Assessment.

4.0 Data Validation Checklist

4.1 Check the package for the following (see SOW reporting requirements, section 2.1, page B-10):

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[/]		
b. Are all forms and copies legible?	[/]		
c. Is each fraction assembled in the order set forth in the SOW?	[/]		

The following checklist is divided into three parts. Part A is filled out if the data package contains any Low Concentration Volatile analyses, Part B for any Low Concentration Semivolatile analyses and Part C for Low Concentration Pesticide/Aroclors.

Does this package contain:

Low Concentration Volatiles Data?	/	
Low Concentration Semivolatiles Data?	/	

	YES	NO	N/A
Low Concentration Pesticides/Aroclors data?	✓		

ACTION: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Trip Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ [✓] ___

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [✓] ___

Technical Holding Times: The technical holding time criterion for water samples is 14 days from sample collection provided that samples are acid-preserved to pH 2 or below, and that they are stored in 4° C ± 2° C. If uncertain about preservation, notify the TOPO to contact the sampler and determine whether or not samples were preserved. 5/18 + 14; 5/32 = 6/1

ACTION: List sampling, VTSR, analysis dates and preservation for samples which missed holding time in the table below.

YES NO N/A

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample ID	Was Sample Preserved?	Date Sampled	Date Lab Received	Date Analyzed

ACTION: Qualify sample results using preservation and technical holding time information as follows:

a. If there is no evidence that the samples were properly preserved, but were analyzed within the technical holding time (14 days from sample collection), qualify all positive results for non-halogenated compounds (including ketones and aromatics) with "J" and non-detects "R".

b. If there is no evidence that the samples were properly preserved, but were analyzed within 14 days from sample collection, qualify all positive results for halogenated compounds with "J" and non-detects "UJ".

c. If there is no evidence that the samples were properly preserved, and the samples were analyzed beyond 14 days from sample collection, qualify positive results for all volatile compounds with "J" and non-detects "R".

d. If the samples were properly preserved, but were analyzed outside of the technical holding time (14 days from sample collection), qualify positive results for all volatile compounds with "J" and non-detects "R".

	YES	NO	N/A

NOTE: Contractual Holding Times: Sample must be analyzed within 10 days from validated time of sample receipt (VTSR) at the laboratory.

3.0 Deuterated Monitoring Compound (DMC) Recovery (Form II LCV)

3.1 Are the Volatile SMC Recovery Summaries (Form II LCV-1 and LCV-2) present?	[✓]	___	___

ACTION: Call the TOPO to obtain an explanation/resubmittal from the lab. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk?	[✓]	___	___

ACTION: Circle all outliers in red.

3.3 Were more than three of the fourteen (14) Deuterated Monitoring Compounds (DMC's) recoveries outside their corresponding limits?	___	[✓]	___
If yes, were samples re-analyzed?	[ ]	___	___
Were method blanks re-analyzed?	[ ]	___	___

ACTION: If any DMC is outside the required limits (see Table below), qualify their associated target compounds (See Table below) as follows:

VOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

YES NO N/A

Chloroethane-d5 Dichlorodifluoromethane Chloromethane Bromomethane Chloroethane Carbon Disulfide	**1,2-Dichloropropane-d6** Cyclohexane Methylcyclohexane 1,2-Dichloropropane Bromodichloromethane	**1,2-Dichlorobenzene-d4** Chlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene
Bromoform-d Dibromochloromethane 1,2-Dibromoethane Bromoform	**trans-1,3-Dichloropropene-d4** cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	**Chloroform-d** 1,1-Dichloroethane Bromochloromethane Chloroform
2-Butanone-d5 Acetone 2-butanone	**1,1-dichloroethene-d2** trans-1,2-Dichloroethene cis-1,2-Dichloroethene	**2-Hexanone-d5** 4-Methyl-2-pentanone 2-Hexanone
Vinyl Chloride-d3 Vinyl Chloride	**Benzene-d6** Benzene	**1,1,2,2-Tetrachloroethane-d2** 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane

YES NO N/A

1,2-Dichloroethane-d4	Toluene-d8	
Trichlorofluoromethane	Trichloroethene	
1,1-Dichloroethene	Toluene	
1,1,2-Trichloro-1,2,2-trifluoroethane	Tetrachloroethene	
Methyl Acetate	Ethylbenzene	
Methylene Chloride	Xylenes (total)	
Methyl tert-Butyl Ether	Styrene	
Carbon Tetrachloride	Isopropylbenzene	
1,2-Dichloroethane		

VOLATILE DEUTERATED MONITORING COMPOUND RECOVERY LIMITS

DMC	%RECOVERY LIMITS	DMC	%RECOVERY LIMITS
Vinyl Chloride-d3	49-138	1,2-Dichloropropane-d6	84-123
Chloroethane-d5	60-126	Toluene-d8	77-120
DMC	%RECOVERY LIMITS	DMC	%RECOVERY LIMITS
1,1-Dichloroethene-d2	65-130	trans-1,3-Dichloropropane-d4	80-128
2-Butanone-d5	42-171	2-Hexanone-d5	37-169
Chloroform-d	80-123	Bromoform-d	76-135
1,2-Dichloroethane-d4	78-129	1,1,2,2-Tetrachloroethane-d2	75-131
[redacted]nzene-d6	78-121	1,2-Dichlorobenzene-d4	50-150

YES NO N/A

1. For any recovery greater than the upper limit:

   a. Qualify "J" all positive associated target compounds.
   b. Do not qualify associated non-detects.

2. For any recovery greater than or equal to 20%, but less than the lower limit:

   a. Qualify "J" all positive associated target compounds.
   b. Qualify "UJ" associated non-detects.

3. For any recovery less than 20%:

   a. Qualify "J" all positive associated target compounds.
   b. Qualify "R" all associated non-detects.

NOTE: Up tp three (3) DMC's per sample may fail to meet the recovery limits. (SOW OLC03.2, sec. 11.4.4, p. D-41/VOA)
As per SOW, any sample which has more than 3 DMC's outside the limits, it must be reanalyzed (sec. 11.5.1 p. d-42/VOA).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if the Lab did not perform reanalysis.

3.4 Are there any transcription/calculation errors between raw data and form II? ___ [1] ___

ACTION: If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the data assessment.

4.0 Matrix Spike/Matrix Spike Duplicate Recovery (Form III LCV)

4.1 Is the MS/MSD Recovery Form (Form III LCV) present? [1] ___ /

4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples,

	YES	NO	N/A
whichever is more frequent) for the Low Concentration VOA method?	[ ]	___	___

ACTION: If any MS/MSD data are missing, take action as specified in section 3.1 above.

ACTION: No action is taken on MS/MSD data alone. However, Using professional judgement, the Validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Method Blanks (Form IV LCV)

		YES	NO	N/A
5.1	Is the Volatile Method Blank Summary (Form IV LCV) present?	[✓]	___	___
5.2	Frequency of Analysis: For the analysis of Low Concentration VOA TCL compounds, has a method blank been analyzed for each SDG or every 20 samples, whichever is more frequent?	[✓]	___	___
5.3	Has a VOA method blank been analyzed at least once every twelve hours for each GC/MS system used?	[✓]	___	___
5.4	Was a VOA instrument blank analyzed after each sample/dilution which contained a target compound at a concentration > 25 µg/ℓ, and ketones > 125 µg/ℓ (see SOW, page D-44/VOA, section 12.1.1.3)?	[ ]	___	✓

ACTION: If any method/instrument blank data are missing, notify the TOPO to obtain resubmittals or an explanation from the lab. If method blank data are unavailable, the reviewer may use professional judgement, or substitute field blank or trip blank data for missing method blank data.

If an instrument blank was not analyzed after a sample containing > 25 µg/ℓ, (ketones > 125 µg/ℓ) inspect the sample chromatogram acquired immediately after this sample

YES NO N/A

for possible carryover. Use professional judgement to determine if carryover occurred and qualify analyte(s) accordingly.

5.5 Was a storage blank analyzed once per SDG after all the samples were analyzed? [✓] ___ ___

ACTION: If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOW page B-30, section 3.3.7.3 for more information.)

Was the correct identification scheme used for all Low Concentration VOA blanks? [✓] ___ ___

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.7 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports, data system printouts and spectra.

Also compare the storage blank raw data with the method blank. Determine if contamination in the storage blank is also present in the method blank.

Is the chromatographic performance (baseline stability) for each instrument acceptable for Low Concentration VOAs? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, instrument and storage blanks less than the CRQL for that analyte? [ ] [✓] ___

BRH - TB 01
TCE = 1.0

YES NO N/A

Exception: Acetone and 2-butanone must be less than 2X times the CRQL, and Methylene Chloride and Cyclohexane must be less than 10X times its CRQL.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Does the storage blank contain positive results (TCL and/or TICs) for Low Concentration VOAs? ✓ [ ]

ACTION: If the storage blank contains target compounds at a concentration greater than the CRQL, positive sample results for those compounds should be flagged "J". If gross contamination occurred positive sample results for that compound may be rejected (R). MC chlorof. = 20

6.2 Do any method/reagent/instrument blanks contain positive results (including TICs) for Low Concentration VOAs? When applied as described in the table below, the contaminant concentration in these blanks are multiplied by the sample dilution factor. TCE in TB-01 cis 1,2 DCE " chlorof. ✓ [ ]

NOTE: Contaminated instrument blanks are unacceptable under this SOW (see page D-46/VOA, section 12.1.6.2).

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if a contaminated instrument blank was submitted.

YES NO N/A

ACTION: Sample analysis results after the high concentration sample must be evaluated for carryover. Sample must meet the maximum carryover criteria as listed in SOW sec. 11.4.9.2, p. D-42/VOA. ("the sample must not contain a concentration above the CRQL for the target compounds that exceeded the limit in the contaminated sample.")

6.3 Do any field/trip/rinse blanks have positive Low Concentration VOA results (including TICs)? ___ ✓ ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Field blanks & trip blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated sample data should be qualified unusable (R).

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Methylene Chloride **Cyclohexane**	Sample conc. is > CRQL, but < 10x blank value.	Sample conc. is < CRQL and < 10x blank value.	Sample conc. is > CRQL and > 10x blank value.
Acetone **2-Butanone**	Sample conc. is > CRQL, but < 2x blank value.	Sample conc. is < CRQL and < 2x blank value.	Sample conc. is > CRQL and > 2x blank value.

			YES	NO	N/A
Other contaminants	Sample conc. is > CRQL, but < 1x blank value.	Sample conc. is < CRQL and < 1x blank value.	Sample conc. is > CRQL and > 1x blank value.		

NOTE: Analytes qualified "U" for blank contamination are treated as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.4 Are there field/rinse/equipment blanks associated with every sample? [/] ___ ___

ACTION: Note in data assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V-LCV)

7.1 Are the GC/MS Instrument Performance Check Forms (Form V-LCV) present for Bromofluorobenzene (BFB)? [/] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift? [/] ___ ___

7.3 Has an instrument performance compound been analyzed for every twelve hours of sample analysis per instrument? [/] ___ ___

ACTION: List date, time, instrument ID and sample analyses for which associated GC/MS tuning data are missing.

YES NO N/A

DATE	TIME	INSTRUMENT ID	SAMPLE NUMBERS

ACTION: Notify the TOPO to obtain missing data from the lab. If the lab cannot provide missing data, reject (R) all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundances been normalized to m/z 95 (see SOW, page D-24/VOA)? [/] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable (R).

7.5 Have the ion abundance criteria been met for each instrument used? [/] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.) ___ [/] ___

	YES	NO	N/A
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given in the ion abundance criteria column on Form V LCV?	[/]		

ACTION: If large errors exist, take action as specified in section 3.1 above.

7.8 Is the spectrum of the mass calibration compound acceptable?	[/]		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

8.0 Target Compound List (TCL) Analytes (Form I LCV)

8.1 Are the Organic Analysis Data Sheets (Form I LCV) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[/]		
b. Laboratory Control/MS/MSD samples?	[ ]		/
c. Blanks?	[/]		
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[/]		
b. Laboratory Control/MS/MSD samples?	[ ]		/
c. Blanks?	[/]		

ACTION: If any data are missing, take action specified in 3.1 above.

	YES	NO	N/A
8.3 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: _____?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.4 Are lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 3.1 above. If lab does not generate their own standard spectra, make note under the "Contract Problems/Non-Compliance" section of the Data Assessment. If spectra are unavailable reject "R" the reported results.

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
8.7 Do sample and standard relative ion intensities agree to within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (presumptive evidence of the

YES NO N/A

presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in sections 8.4-8.7 above.

ACTION: When sample carry-over is suspected, use professional judgement to determine if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I LCV-TIC) present? Do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? [✓] ___ ___

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [ ] ___ ✓

b. Blanks? [ ] ___ ✓

b. Are Alkanes listed in/or part of the Case Narrative? [ ] ___ ✓

ACTION: If any TIC data are missing, take action specified in 3.1 above.

ACTION: Add "JN" qualifier to all chemically named TICs if missing.

9.3 Are any target compounds (from any fraction) listed as TICs? (Example: 1,2-dimethylbenzene is xylene - a VOA target analyte - and should not be reported as a TIC.) ___ [✓] ___

ACTION: Flag with "R" any target compound listed as a TIC.

	YES	NO	N/A
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[/]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%?	[/]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change its identification to "unknown" or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). (I.e., common lab contaminants such as CO_2 - M/E 44, Siloxanes - M/E 73, hexane, Aldol condensation products, solvent preservatives, and related by-products. See the National Functional Guidelines June 2001, pp. 34-35 for further guidance.)

10.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRFs were used to calculate Form I results.)	___	[/]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions?	[/]	___	___

ACTION: If errors are large, take action as specified in section 3.1 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs data from the diluted sample). Replace concentrations that exceed the calibration range in the original analysis by

YES NO N/A

crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's not to be used, including any in the data summary package.

11.0 Standards Data (GC/MS)

11.1 Are the reconstructed ion chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in section 3.1 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI LCV) present and complete for the volatile fraction at concentrations of 0.5, 1, 5, 10, and 25 µg/ℓ? [✓] ___ ___

ACTION: If any Initial Calibration forms are missing, take action as specified in section 3.1 above.

12.2 Are response factors stable for VOA's over the concentration range of the calibration (e.g., %RSD ≤ 30.0, ≤ 50 for poor performers)? [✓] ___ ___

ACTION: Circle all outliers in red.

NOTE: There are fourteen (14) compounds (see Table below) which are poor performers. The RRF for these compounds must be greater than or equal to 0.01. The %RSD must be less than or equal to 50%.

VOLATILE COMPOUNDS WITH POOR RESPONSE

Volatile Compounds

YES NO N/A

Acetone	1,2-Dichloropropane
2-Butanone	1,2-Dibromo-3-chloropropane
Carbon Disulfide	4-Methyl-2-pentanone
Chloroethane	2-Hexanone
Chloromethane	1,2-Dichloropropane-d6 (DMC)
Cyclohexane	2-Hexanone-d5 (DMC)
Chloroethane-d5 (DMC)	2-Butanone-d5 (DMC)

NOTE: Although 20 Low Conc. VOA compounds have no maximum %RSD and require only minimal $\overline{RRF}$ performance (see Table D-2, page D-53/VOA), the technical acceptance criteria are the same for all analytes.

ACTION: If %RSD > 30.0%, or > 50.0% for the poor performers, qualify associated positive results for that analyte "J" (estimated) and non-detects using professional judgement. If %RSD is > 90, flag all non-detects for that analyte "R" (unusable) and positive hits "J".

NOTE: Analytes previously qualified "U" for blank contamination are still treated as "hits" when qualifying for initial calibration criteria.

12.3 Are any $\overline{RRF}$s < 0.05 or < 0.01 for poor performers? — 14 —

ACTION: Circle all outliers in red.

ACTION: If any $\overline{RRF}$ values are < 0.05 or < 0.01 for poor performers, qualify associated non-detects unusable (R) and associated positive results estimated (J).

NOTE: Contract Requirements: The SOW allows up to two of the required analytes (see compounds marked with a "*" on Form VI and Table D-2, page D-53/VOA) to fail contractual %RSD and RRF criteria, provided the %RSD is ≤ 40.0 and RRF ≥ 0.010.

	YES	NO	N/A

ACTION: If more than two of the required analytes failed %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance.

12.4 Are there any transcription/calculation errors in the reporting of $\overline{RRF}$s, RRFs or %RSD values? (Check at least 2 values, but if errors are found, check more.) ___ [/] ___

ACTION: Circle errors in red.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration (Form VII LCV)

13.1 Are the Continuing Calibration Forms (Form VII LCV) present and complete for the volatile fraction? [/] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [/] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, ask the TOPO to obtain explanation/resubmittal from the laboratory. If continuing calibration data are unavailable, flag all associated sample data as unusable (R).

ACTION: List below all sample analyses that were not within twelve hours of the previous continuing calibration analysis.

_____

_____

13.3 Do any volatile compounds have a % Difference (%D) between the initial $\overline{RRF}$ and continuing RRF which exceeds the ± 30% , or ± 50% for the poor performers criteria? / [ ] ___

YES NO N/A

ACTION: Circle all outliers in red.

NOTE: Although 20 Low Conc. VOA compounds have no maximum %D and require only minimal RRF performance (see Table D-2, page D-53/VOA), the technical acceptance criteria are the same for all analytes.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When % D is above 90%, reject all non-detects for that analyte as unusable (R) and qualify positive results "J".

13.4 Do any volatile compounds have a RRF < 0.05 or < 0.01 for the poor performers? / [ ]

ACTION: Circle all outliers in red.

ACTION: If the RRF < 0.05, or < 0.01 for poor performers qualify associated positive results as estimated (J) and associated non-detects unusable (R).

NOTE: Contract Requirements: The SOW allows up to two of the required analytes (see compounds marked with a "*" on Form VI, or Table D-2, page D-53/VOA) to fail %D or RRF criteria, provided %D is within ±40.0 and RRF ≥ 0.010.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance if more than two of the required analytes failed the above acceptance criteria.

13.5 Are there any transcription/calculation errors in the reporting of RRFs, or %D between initial RRFs and continuing RRFs? (Check at least two values but if errors are found, check more.) [/]

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals from the lab. Document errors in the Contract Problems/Non-Compliance section of the Data Assessment.

14.0 Internal Standard (Form VIII LCV)

	YES	NO	N/A
14.1 Are the internal standard areas (Form VIII LCV) of every sample and blank within the upper and lower limits (± 40%) for each continuing calibration?	[/]	___	___
If no, was the sample reanalyzed?	[ ]	___	___

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

Sample #	Int. Std.	Area	Lower Limit	Upper Limit
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

(Attach additional sheets if necessary, or attach copies of Form VIIIs.)

ACTION: 1. If the internal standard area count is outside the **upper** limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when associated IS area counts are > +40%.

3. If the IS area is less than the lower limit (-40%), qualify "J" all positive results quantitated with this Internal Standard. Qualify "R" all non-detects.

INTERNAL STANDARDS ACTIONS FOR VOLATILES

YES NO N/A

CRITERIA	ACTION	
	Detected Associated Compounds	Non-detected Associated Compounds
Area counts > 40% of 12-hour standard	"J"	No Action
Area counts < 40% of 12-hour	"J"	"R"

14.2 Are the retention times of the internal standards within ±20 seconds of the associated calibration standard? 14 ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 20 seconds.

NOTE: Contract Requirements: The SOW (section 11.5.1 page D-41/VOA) states that any sample which fails the acceptance criteria for IS response must be reanalyzed.

ACTION: Document in the Data Assessment under Contract Problems/Non-Compliance any sample(s) which failed the above IS acceptance criteria.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration VOA analysis? 14 ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. If large differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

STANDARD OPERATING PROCEDURE

USEPA Region II
Method: CLP/SOW, OLC03.2

Date: July , 2001
SOP HW-13, Revision 3

32903

YES NO N/A

PART B: BNA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody records or SDG Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ [/] ___

ACTION: If samples were not iced or the ice west melted upon arrival at the laboratory and the temperature of the cooler was > 10° C, then flag all positive results with a "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any Low Concentration semivolatile technical holding times, determined from the date of collection to date of extraction, been exceeded? ___ [/] ___

Technical Holding Time: Continuous liquid-liquid extraction of BNA samples must begin within seven days of the date of collection. Extracts must be analyzed within 40 days from the extraction date.

Table of Holding Time Violations
(See Chain-of-Custody records)

Sample ID	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

YES NO N/A

ACTION: If technical holding times were exceeded, flag all positive results as estimated (J) and sample quantitation limits as estimated (UJ), and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results should be qualified "J" but the reviewer may determine that non-detect data are unusable (R). If holding times were exceeded by more than 28 days, qualify all non-detects unusable (R).

NOTE: Contractual Holding Times: Extraction of water samples must begin within 5 days VTSR. All laboratory extracts must be analyzed within 40 days of the VTSR.

ACTION: If contractual holding times were exceeded, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

3.0 Deuterated Monitoring Compound Recovery (Form II LCSV)

3.1 Are the Low Concentration Semivolatile Deuterated Monitoring Compound Recovery Summaries (Form II LCSV-1 and LCSV-2) present and complete for all samples? [/] ___ ___

ACTION: Ask the TOPO to obtain explanations/resubmittals of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.2 Were outliers marked correctly with an asterisk? [/] ___ ___

ACTION: Circle all outliers in red.

3.3 Were more than four, two from each fraction, of the sixteen (16) Deuterated Monitoring Compounds

	YES	NO	N/A
(DMC's) recoveries outside their corresponding limits?	___	16	___
If yes, were samples reanalyzed?	[ ]	___	___
Were method blanks reanalyzed?	[ ]	___	___

ACTION: If any DMC is outside the required limits(See Table below), qualify their associated target compounds (See Table below) as follows:

SEMIVOLATILE DMC AND THEIR ASSOCIATED TARGET COMPOUNDS

Phenol-d5 Benzaldehyde Phenol	**2-Chlorophenol-d4** 2-Chlorophenol	**2-Nitrophenol-d4** Isophorone 2-Nitrophenol
bis-(2-Chloroethyl)ether-d8 bis-(2-Chloroethyl)ether 2,2'-oxybis(1-Chloropropane) bis(2-Chloroethoxy)methane	**4-Methylphenol-d8** 2-Methylphenol 4-Methylphenol 2,4-Dimethylphenol	**4-Chloroaniline-d4** 4-Chloroaniline Hexachlorocyclo-pentadiene 3,3'-Dichlorobenzidine
Nitrobenzene-d5 Acetophenone N-Nitroso-di-n-propylamine Hexachloroethane Nitrobenzene 2,6-Dinitrotoluene 2,4-Dinitrotoluene N-Nitrosodiphenylamine	**2,4-Dichlorophenol-d3** 2,4-Dichlorophenol Hexachlorobutadiene 4-Chloro-3-methylphenol 2,4,6-Trichlorophenol 2,4,5-Trichlorophenol 1,2,4,5-Tetrachlorobenzene Pentachlorophenol	**Dimethylphtalate-d6** Caprolactam 1,1'-Biphenyl Dimethylphthalate Diethylphthalate Di-n-butylphthalate Butylbenzylphthalate bis(2-Ethylhexyl)phthalate Di-n-octylphthalate

Fluorene-d10 Dibenzofuran Fluorene 4-Chlorophenyl-phenylether 4-Bromophenyl-phenylether	**Anthracene-d10** Hexachlorobenzene Atrazine Phenanthrene Anthracene	**Pyrene-d10** Fluoranthene Pyrene Benzo(a)anthracene Chrysene
Acenaphthylene-d8 Naphthalene 2-Methylnaphthalene 2-Chloronaphthalene Acenaphthylene Acenaphthene	**4-Nitrophenol-d4** 2-Nitroaniline 3-Nitroaniline 2,4-Dinitrophenol 4-nitrophenol 4-Nitroaniline	**Benzo(a)pyrene-d12** Benzo(b)fluoranthene benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenzo(a,h)anthracene Benzo(g,h,i)perylene
4,6-Dinitro-2-methylphenol-d2 4,6-Dinitro-2-methylphenol		

SEMIVOLATILE DEUTERATED MONITORING COMPOUND LIMITS

COMPOUND	% RECOVERY
Phenol-d5	10-110
bis-(2-Chloroethyl)ether-d8	41-94
2-Chlorophenol-d4	33-110
4-Methylphenol-d8	38-95
Nitrobenzene-d5	35-114
2-Nitrophenol-d4	40-106
2,4-Dichlorophenol-d3	42-98
4-Chloroaniline-d4	8-70
Dimethylphthalate-d6	62-102

YES NO N/A

Acenaphthylene-d8	49-98
4-Nitrophenol-d4	9-181
Fluorene-d10	50-97
4,6-Dinitro-2-methylphenol-d2	53-153
Anthracene-d10	55-116
Pyrene-d10	47-114
Benzo(a)pyrene-d12	54-120

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [/] ___

ACTION: .If large errors exist, ask the TOPO to obtain an explanation/resubmittal from the lab, make any necessary corrections and note errors in the Data Assessment.

ACTION: 1. For any recovery greater than the upper limit:

a. Qualify "J" all positive associated target compounds
b. Do not qualify associated non-detects.

2. For any recovery less than the lower limit:

a. Qualify "J" all positive associated target compounds
b. Qualify "UJ" all non-detects if recoveries are ≥ 10% except for 4-Chloroaniline-d4 and 4-Nitrophenol-d4.
c. Qualify "R" all non-detects if recoveries are < 10% except for 4-Chloroaniline-d4 and 4-Nitrophenol-d4.
d. For 4-Chloroaniline-d4 and 4-Nitrophenol-d4 qualify "R" all non-detects if recoveries are less than their lower limit.

NOTE: Up to four DMC's (two per fraction) per sample may fail to meet the recovery limits (SOW OLC03.2, sec. 11.6.4, p. D-34/SV). As per SOW, any sample that fails the technical criteria, must be reanalyzed (sec. 11.7.4 p. D-35/SV).

ACTION: Note in the Data Assessment under Contract Problems/ Non-Compliance if he Lab did not perform reanalysis.

4.0 Laboratory MS/MSD (Form III LCSV)

	YES	NO	N/A
4.1 Is the Semivolatile MS/MSD Recovery Form (Form III LCSV) present?	[ ]		✓
4.2 Was the MS/MSD analyzed at the required frequency (once per SDG, or every 20 samples)?	[ ]		✓

ACTION: If any MS/MSD data are missing, take action as specified in 3.1 above.

ACTION: No action is taken on MS/MSD alone. However, using professional judgement, the Validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Blanks (Form IV LCSV)

5.1 Is the Method Blank Summary Form (Form IV LCSV) present?	[✓]		
5.2 Frequency of Analysis: For the analysis of Low Concentration semivolatile TCL compounds, has a method blank been analyzed and reported for each SDG, every 20 samples or each extraction batch, whichever is more frequent?	[✓]		
5.3 Was a Low Concentration semivolatile method blank analyzed for each GC/MS system used? (See SOW page D-36/SV, section 12.1.2.2)	[✓]		

ACTION: If any method blank data are missing, ask the TOPO to obtain an explanation/resubmittal from the laboratory. If method blank data is unavailable, reject (R) all associated positive results. However, the data reviewer may, based on professional judgement, substitute field blank data for missing method blank data.

5.4 The validator should verify that the correct identification scheme for EPA blanks was used. (See SOW page B-30, section 3.3.7.3 for more information.) Was the correct identification scheme used for all Low Concentration Semivolatile blanks?	[✓]		

	YES	NO	N/A

ACTION: Contact the TOPO to obtain corrections from the lab, or make the necessary corrections. Document in the "Contract Problems/Non-Compliance section of the Data Assessment all corrections made by the validator.

5.5 Chromatography: Review the blank raw data - chromatograms (RICs), quant reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) acceptable for each instrument? [ ] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.6 Are all detected hits for target compounds less than the CRQL for that analyte in all method blanks? [ ] ___ ___

Exception: Phthalate esters must be less than five times (5X) the CRQL.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method blanks have positive results (TCL and/or TICs) for Low Concentration Semivolatiles? ___ [/] ___

6.2 Do any field/rinse blanks have positive results for Low Concentration Semivolatiles (TCL and/or TIC)? ___ [/] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, spectral, instrument performance or calibration QC problems.

YES NO N/A

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable (R).

NOTE: When applied as described below, the contaminant concentration in these blanks is multiplied by the sample dilution factor.

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification needed when:
Common Pthalate-Esters	Sample conc. is > CRQL, but < 5x blank value.	Sample conc. is < CRQL and < 5x blank value.	Sample conc. is > CRQL and > 5x blank value.
Other Conta-minants	Sample conc. is > CRQL, but < 1x blank value.	Sample conc. is < CRQL and < 1x blank value.	Sample conc. is > CRQL and > 1x blank value.

NOTE: Analytes qualified "U" for blank contamination are still treated as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R", unusable.

6.3 Are there field/rinse/equipment blanks associated with every sample? [/] ___ ___

ACTION: Note in the Data Assessment that there is no associated field/rinse/equipment blank.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V LCSV)

		YES	NO	N/A
7.1	Are the GC/MS Instrument Performance Check Forms (Form V LCSV) for Decafluorotriphenylphosphine (DFTPP) present?	[/]	___	___
7.2	Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	[/]	___	___
7.3	Has an instrument performance check solution been analyzed for every twelve hours of sample analyses per instrument?	[/]	___	___

ACTION: List samples, date, time and instrument ID for which no associated GC/MS tuning data are available.

SAMPLE ID	DATE	TIME	INSTRUMENT ID
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: If lab cannot provide missing data, reject (R) all data generated outside an acceptable twelve hour calibration interval.

7.4	Have the ion abundances been normalized to m/z 198?	[/]	___	___

NOTE: All ion abundance ratios must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may up to 110% that of m/z 198.

ACTION: If mass assignment is in error, flag all associated sample data as unusable (R).

7.5	Have the ion abundance criteria been met for each instrument used?	[/]	___	___

ACTION: If ion abundance criteria are not met, professional Judgement may be applied to determine to what extent the data may be utilized.

	YES	NO	N/A
7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values but if errors are found, check more.)		✓	
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column on Form V LCSV?	✓		

ACTION: If large errors exist, notify the TOPO to obtain an explanation/resubmittal, make necessary corrections and document effect in data assessments.

7.8 Is the spectrum of the mass calibration compound acceptable?	✓		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified or rejected.

8.0 Target Compound List (TCL) Analytes (Form I LCSV)

8.1 Are the Organic Analysis Data Sheets (Form I LCSV-1, 2) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	✓		
b. Laboratory Control/MS/MSD Samples?			✓
c. Blanks?	✓		
8.2 Are the Low Concentration Semivolatile reconstructed ion chromatograms, the mass spectra for the identified compounds, and the data system printouts (Quant Reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	✓		
b. Laboratory Control Sample(s) and MS/MSD?			✓
c. Blanks	✓		

ACTION: If any data are missing, take action as specified in 3.1 above.

	YES	NO	N/A
8.3 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other: _____?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.4 Are the lab-generated standard mass spectra of identified Low Concentration semivolatile compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.1 above. If lab does not generate their own standard spectra, make note in "Contract Problems/Non-Compliance". If spectra are missing, reject the reported result(s).

8.5 Is the RRT of each reported compound within ± 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
8.7 Do sample and standard relative ion intensities agree within ± 20%?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of the data. If it is determined that incorrect identifications were made, all such data should be rejected (R) flagged "N" (Presumptive evidence of the presence of the compound) or changed to not detected (U) at the calculated detection limit. In order to be positively identified, the data must comply with the qualitative identification criteria listed in SOW section 11.1, page D-29/SV.

YES NO N/A

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

9.0 Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I LCSV-TIC) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier? [ ] ___ /

9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [ ] ___ ___

b. Blanks? [ ] ___ ___

ACTION: If any TIC data are missing, take action specified in 3.1 above.

ACTION: Add "JN" qualifier to all chemically named TICs.

9.3 Are any TCL compounds (from any fraction) listed as TIC compounds (example: 1,2- dimethylbenzene is xylene a VOA TCL and should not be reported as a TIC)? ___ [ ] ___

ACTION: Flag "R" any TCL compound listed as a TIC.

9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum? [ ] ___ ___

9.5 Do TIC and "best match" standard relative ion intensities agree within ± 20%? [ ] ___ ___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change identification to "unknown" or to some less specific identification (example: "C3 substituted

YES NO N/A

benzene") as appropriate. In order to be positively identified, the data must comply with the criteria listed in SOW section 11.2, page D-30/SV.

Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable (R). Common lab contaminants could be solvent preservatives, such as Cyclohexene. Related by-products include Cyclohexanone, Cyclohexanol, Chlorocyclohexene and Chlorocyclohexanol. Aldol reaction products of Acetone include 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten--2-one, and 5,5-dimethyl-2-(5H)-furanone.

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result. Were any errors found? ___ [/] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions? [/] ___ ___

ACTION: If errors are large, notify the TOPO to obtain an explanation/resubmittal, make any necessary corrections and document effect in data assessments.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and it's associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red " X" across the entire page of all Form I's that should not be used, including any in the summary package.

YES NO N/A

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (Quant, Reports) present for initial and continuing calibration? [Y] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.1 above.

12.0 GC/MS Initial Calibration (Form VI LCSV)

12.1 Are the Initial Calibration Forms (Form VI LCSV-1 & -2) present and complete for the Low Concentration Semivolatile fraction at concentrations of 5, 10, 20, 50 and 80 ug/l? [Y] ___ ___

NOTE: Seven compounds, 2,4-Dinitrophenol, 2,4,5-Trichlorophenol 2-Nitroaniline, 3-Nitroaniline, 4-Nitroaniline 4-Nitrophenol, 4,6-Dinitro-2-methylphenol, require calibration at 20, 50, 80, 100 and 120 ug/l.

ACTION: If any calibration standard forms are missing, take action specified in 3.1 above.

NOTE: There are nineteen (19) semivolatile compounds (see Table below) which are poor performers. The RRF for these compounds must be greater than or equal to 0.01 The %RSD must be less than or equal to 50%. The %RSD must be less than or equal to 30% for 2,4-Dinitrotoluene, 2-Nitrophenol, and 2,4-Dimethylphenol, and less than or equal to 20.5% for all other compounds and DMC's.

SEMIVOLATILE COMPOUNDS WITH POOR RESPONSE

SEMIVOLATILE COMPOUNDS	
2,2'oxybis(1-Chloropropane)	Benzaldehyde
4-Chloroaniline	Pentachlorophenol
Hexachlorobutadiene	4-Nitroaniline
Hexachlorocyclopentadiene	4,6-Dinitro-2-methylphenol
2-nitroaniline	N-Nitrosodiphenylamine
3-nitroaniline	3,3'-Dichlorobenzidine

YES NO N/A

2,4-Dinitrophenol	4-Chloroaniline-d4 (DMC)
4-Nitrophenol	4,6-Dinitro-2-methylphenol-d2 (DMC)
Acetophenone	4-Nitrophenol-d4 (DMC)
Caprolactam	

12.2 Are response factors stable (%RSD ≤ 20.5, ≤ 50 for poor performers and ≤ 30 for 2,4-Dinitrotoluene, 2-Nitrophenol, and 2,4-Dimethylphenol) for Semivolatiles over the entire concentration range of the calibration? [/] ___ ___

ACTION: Circle all outliers in red.

NOTE: Although 24 Low Concentration semivolatile compounds have a minimum RRF and no maximum %RSD, the technical acceptance criteria are the same for all analytes.

ACTION: If the %RSD exceeds the above criteria, qualify positive results for that analyte "J" and non-detects using professional judgement. When %RSD > 90%, flag all non-detects for that analyte "R", and positive hits as "J".

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

12.3Are any RRFs ≤ 0.05, ≤ 0.01 for poor performers? ___ [/] ___

ACTION: Circle all outliers in red.

ACTION: If any RRF < 0.05, or < 0.01 for poor performers:

1. Flag "R" all non-detects.

2. Flag "J" all positive results.

12.4 Are there any transcription/calculation errors in the reporting of, RRFs, RRFs or % RSD values? (Check at least two values but if errors are found, check more.) ___ [/] ___

YES NO N/A

ACTION: If errors are large, take action as specified in section 3.1 above.

NOTE: Contract Requirements: The SOW allows up to four (see sec. 9.3.5.4, p. D-21/SV) of the required analytes to fail contractual %RSD or RRF criteria, provided the %RSD is ≤ 40.0 and RRF is ≥ 0.010. (See Table D-4, page D-48, 49/SV and analytes marked with a "*" on Form VI LCSV for a list of required analytes and contractual criteria.

ACTION: If more than four analytes fail %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance.

13.0 GC/MS Continuing Calibration (Form VII LCSV)

13.1 Are the Continuing Calibration Forms (Form VII LCSV-1 & -2) present and complete for the semivolatile fraction? [/] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [/] ___ ___

ACTION: List below all sample analyses that were not within twelve hours of a continuing calibration analysis for each instrument used.

_____

_____

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, notify the TOPO to obtain explanation/resubmittals. If continuing calibration data are not available, flag all associated sample data as unusable (R).

13.3 Do any semivolatile compounds have a %D between the initial $\overline{RRF}$ and continuing RRF which exceeds the ± 25.0% criteria? ___ [/] ___

ACTION: Circle all outliers in red.

	YES	NO	N/A

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated (J). When %D is > 90%, reject all non-detects for that analyte (R) unusable and positive results "J".

13.4 Do any semivolatile compounds have a RRF < 0.05, <0.001 for the poor performers? ___ [1] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, < 0.01 for the poor performers, qualify associated positive results estimated (J) and non-detects unusable (R).

13.5 Are there any transcription/calculation errors in the reporting of continuing RRFs or %D between initial RRFs and continuing RRFs? (Check at least two values, but if errors are found check more.) ___ [1] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, notify the TOPO to obtain explanation/resubmittals, make any necessary corrections and document the effect in the data assessment.

14.0 Internal Standards (Form VIII LCSV)

14.1 Are the Internal Standard Area and RT Summary Forms (Form VIII LCSV-1 & -2) present and complete for the semivolatile fraction? [1] ___ ___

14.2 Are the internal standard areas for every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [1] ___ ___

ACTION: Circle errors with red pencil.

ACTION: List all the outliers below.

Sample #	Internal Std	Area	Lower Limit	Upper Limit

YES NO N/A

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag all positive results and non-detects quantitated with this internal standard "J" and "UJ", respectively.

2. Do not qualify non-detects associated with IS areas > 100%.

3. If the IS area is < 50%, qualify all associated non-detects estimated "R".

INTERNAL STANDARDS ACTIONS FOR SEMIVOLATILES

CRITERIA	ACTION	
	Detected Associated Compounds	Non-Detected Associated Compounds
Area counts > 100% of 12-hour standard	"J"	No Action
Area counts < 50% of 12-hour standard	"J"	"R"

14.3 Are the retention times of the internal standards within 20 seconds of the associated calibration standard? [/] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 20 seconds.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for Low Concentration semivolatile analysis? [/] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. If large

YES NO N/A

differences exist, contact the TOPO to confirm identification of field duplicates with the sampler.

STANDARD OPERATING PROCEDURE

US EPA Region II
Method: CLP/SOW OLM03.2

Date: June 1996
SOP HW-6, Rev. 11

32903

YES NO N/A

PART C: PESTICIDE/PCB ANALYSIS

.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records or SDG Narrative indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data? ___ [/] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be qualified as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, all data should be qualified as unusable "R".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory, and the temperature of the cooler was elevated > 10° C, flag all positive results "J" and all non-detects "UJ".

ACTION: Check aqueous extraction log for sample pH, if adjustment was needed, it should have been noted in the SDG Narrative. If more information is needed, notify the WAM to contact the lab.

.0 Holding Times

2.1 Have any PEST/PCB technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [/] ___

NOTE: Technical Holding Times: Water and soil samples for PEST/PCB analysis must be extracted within 7 days of the date of collection. Extracts must be analyzed within 40 days of the date extraction.

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits "UJ" and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the

YES NO N/

reliability of the data and the effects of additional storage on the sample results. At a minimum, all the data should at least be qualified "J", but the reviewer may determine that non-detects are unusable "R".

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

NOTE: Contractual Holding Times: Extraction of water samples must be completed within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Extracts of water and soil/sediment samples must be analyzed within 40 days following start of extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

3.0 Surrogate Recovery (Form II)

3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [1] ___ ___

b. Soil? [ ] ___ /

3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summary for each of the following matrices:

	YES	NO	N/A
a. Low Water?	[ ]	___	___
b. Soil?	[ ]	___	___

ACTION: Contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[ ]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Were surrogate recoveries of TCX or DCB outside of the contract specification for any sample, method blank or sulfur clean-up blank (30-150%)?	___	[ ]	___

ACTION: In the absence of matrix interference, qualification of the data is not required in the following three situations:

1. When surrogates on both columns are diluted out.

2. When one surrogate on one column was outside (either above or below) the contract limits but above 10%.

3. When the same surrogate on both columns is above the contract limit.

If the same surrogate on both columns is below the contract limit but above 10%, check chromatograms for interference. The reviewer may use professional judgement, and qualify only those analytes which elute in the region of the GC chromatogram where interference was observed.

If the same surrogate on both columns is below the contract limit but above 10% (with no interference), qualify non-detects and positive hits "J" (estimated).

If recoveries for both surrogates on both columns are below the contract limit but above 10%, flag positive results and non-detects for that sample "J".

YES NO N/

If recoveries are above the contract limit for both surrogates on both columns, then qualify positive values "J".

If both surrogates on one column are below the contract limit but above 10%, then use the data from the other column, providing both surrogates on that column are within contract limits. The validator must check from which column the concentration is reported for each analyte. If the value is reported from the failed column, then cross it out and use the value from the other column. Document this change in the Data Assessment.

If recovery is below 10% for either surrogate on any column, qualify positive results "J" and flag non-detects "R".

3.5 Were surrogate retention times (RT) within the windows established during the initial 3-point analysis of Individual Standard Mixture A (see Form VI Pest-1)? [/] ___ ___

ACTION: If the RT limits are not met, positive results and non-detects for that sample may be qualified unusable, "R", based on professional judgement.

3.6 Are there any transcription/calculation errors between raw data and Form II? ___ [/] ___

ACTION: If large errors exist, contact the WAM to obtain an explanation or resubmittal of corrected deliverables from the laboratory. Make any necessary corrections and document the effect in the Data Assessment.

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [/] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices (one MS/MSD must be performed for every 20 samples of similar matrix or concentration level):

a. Low Water? [/] ___ ___

	YES	NO	N/A
b. Soil?	[ ]		✓

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

ACTION: Circle all outliers with red pencil.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

BQR01

Water (A)	Soil
3 out of 12 (B: 0/12)	✓ ____ out of 12

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soil
2 out of 6 (0/6)	✓ ____ out of 6

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present?	[✓]		
5.2 Frequency of Analysis: Has a reagent/method blank been analyzed for each SDG, every 20 samples of similar matrix and concentration level or each extraction batch, whichever is more frequent?	[✓]		

ACTION: If any blank data are missing, take action as specified above in section 3.2. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method

	YES	NO	N/A
blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required?	[ ]	___	___

ACTION: If sulfur clean-up blank data and Form IV are missing, take action as specified in 3.2 above.

5.4 Has a PEST/PCB instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)?	[/]	___	___

ACTION: If any blank data are missing, take action as specified in section 3.2 above.

5.5 Was the correct identification scheme used for all Pest/PCB blanks? (See page B-33, sec. 3.3.7.3 of the SOW for further information.)	[/]	___	___

ACTION: Contact the WAM to obtain resubmittals or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.

5.6 Chromatography: review the blank raw data - chromatograms, quant. reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable?	[/]	___	___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "distilled water blanks" and "drilling water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent, instrument, or cleanup blanks show positive hits for pest/PCBs?	___	[/]	___
6.2 If any method blanks and/or sulfur clean-up blanks contain "hits" for target compounds, are these hits greater than the CRQL for that			

	YES	NO	N/A
analyte?	___	[✓]	___
6.3 In any instrument blanks, is the concentration of any target hit > 0.5 times CRQL for that analyte (see SOW, section 12.1.4.4.2, page D-77/PEST)?	___	[✓]	___

NOTE: Most labs will report 0.5 times CRQLs on the instrument blank Form I instead of the actual method CRQLs. If the lab reported the actual CRQLs, then check if any detected hits are above 0.5 times the CRQLs reported on the Form I.

ACTION: If yes to any of the above questions: note in the Data Assessment under Contract Problems/Non-Compliance if any method or clean-up blanks contain hits > the CRQL, or of instrument blank contained hits > 0.5 times CRQL for that analyte.

6.4 Do any field/rinse blanks have positive pest/PCB results?	___	[✓]	___

ACTION: Prepare a list of the samples associated with each contaminated blank. (Attach a separate sheet)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, and/or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

NOTE: When applied as directed in the table below, the contaminant concentration in method/instrument/reagent/cleanup blanks is multiplied by the sample dilution factor, where necessary.

If the laboratory has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate are used to prepare each soil reagent/method blank as instructed on page D-72/PEST, section 12.1.2.3.1. Ask the WAM

YES NO N/

to contact the laboratory if the soil blanks are not reported in soil units (µg/kg).

Flag sample result with a "U":	Report CRQL & qualify "U":	No qualification is needed:
Sample conc. > CRQL, but ≤ 5x blank.	Sample conc. < CRQL & is ≤ 5x blank value.	Sample conc. > CRQL & > 5x blank value.

NOTE: If gross blank contamination exists, all data in the associated samples should be qualified as "R", unusable.

6.5 Are there field/rinse/equipment blanks associated with every sample? [/] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentrations, use professional judgement to qualify these values and document in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data Systems Printouts for both columns present for all samples, blanks and MS/MSD:

a. Peak resolution check? [/] ___ ___

b. Performance evaluation mixtures? [/] ___ ___

c. Aroclor 1016/1260? [/] ___ ___

d. Aroclors 1221, 1232, 1242, 1248, 1254? [/] ___ ___

e. Toxaphene? [/] ___ ___

f. Low points individual mixtures A & B? [/] ___ ___

g. Med points individual mixtures A & B? [/] ___ ___

h. High points individual mixtures A & B? [/] ___ ___

	YES	NO	N/A
i. Instrument blanks?	✓		
j. Were the appropriate GC columns used as specified on pg. D-11/PEST, sections 6.23.3.1 to 6.23.3.7, in the SOW?	✓		
7.2 Do the chromatograms for all Individual Standard Mixtures and PEM analyses display single component analytes at > 10% but < 100% of full scale (see sections 9.3.5.8.1 thru 9.3.5.8.4, pages D-32 & 33/PEST)?	✓		
Have chromatograms for Individual Standard Mixtures and PEM analyses been replotted, showing scaling factor(s), to meet the above requirements when necessary?	✓		

NOTE: All standard chromatograms must clearly display all peaks at > 10% but < 100% of full scale, and replotted if necessary to accommodate peaks not properly scaled in the initial chromatogram(s). Both the initial and replotted chromatograms must be submitted with the data package.

ACTION: If all single component peaks are not clearly displayed on chromatograms for all Individual Standard Mixtures and PEM analyses, notify the WAM to obtain resubmittal of the necessary data.

7.3 Are Forms VI PEST 1-7 present and complete for each column and each analytical sequence?	✓		

ACTION: If no, take action as specified in 3.2 above.

7.4 Are there any transcription/ calculation errors between raw data and Forms VI?		✓	

ACTION: If large errors exist, take action as specified in section 3.6 above.

7.5 Do all standard retention times, including each pesticide in each level of Individual Mixtures A & B, fall within the windows established during the Initial Calibration (see Form VI PEST-1)?	✓		

ACTION: If no, all samples in the entire analytical sequence are potentially affected. Check to see if the chromatograms contain peaks within an expanded window surrounding the expected

YES NO N/

retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results "JN" and non-detects as unusable (R). For aroclors, the RT may be outside the window, but the aroclor may still be identified from its distinctive pattern.

7.6 Are the linearity criteria for the initial analyses of Individual Standards A & B within limits for both columns? (%RSD must be ≤ 25.0 for alpha and delta BHC, ≤ 30.0 for the two surrogates and ≤ 20% for all other analytes.) [ ] / ___

NOTE: Contractual requirements allow up to two single component TCL compounds, but not surrogates, on each column to exceed the criteria provided the %RSD is ≤ 30%. (See page D-28/Pest, sec. 9.2.5.7 in the SOW.) Technical criteria, however, are the same for all analytes.

ACTION: If technical criteria were not met, qualify all associated positive results generated during the entire analytical sequence "J" and all non-detects "UJ". When %RSD > 90%, flag all non-detect results for that analyte "R" (unusable).

ACTION: If more than two analytes failed %RSD, document in the Data Assessment Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary form.

7.7 Is the resolution between each pair of adjacent peaks in the Resolution Check Mixture ≥ 60.0% for both columns? (See Form VI PEST-4.) [/] ___ ___

ACTION: If no, qualify positive results for compounds that were not adequately resolved "J". Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable (R).

7.8 Is Form VI PEST-5 present and complete for each Performance Evaluation Mixture (PEM) standard used for <u>both initial and continuing</u> calibrations (see SOW section 3.12.4.4, page B-52)? [/] ___ ___

	YES	NO	N/A
ACTION: If no, take action as specified in section 3.2 above.			
7.9 For each PEM standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[✓]	___	___
ACTION: Qualify positive results for compounds not adequately resolved estimated (J). Qualify non-detects based on professional judgement.			
7.10 Have Forms VI PEST-6 & PEST-7 been completed for all midpoint Individual Standards A and B used for initial calibration?	[✓]	___	___
For each standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[✓]	___	___
ACTION: If no, qualify positive results for compounds that were not adequately resolved estimated (J). Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable "R".			
7.11 Is Form VII Pest-1 present and complete for each PEM standard analyzed during the analytical sequence for both columns?	[✓]	___	___
Was the %Breakdown of DDT and Endrin calculated using the equations given on page D-26/PEST, sec. 9.2.4.8 in the SOW?	[✓]	___	___
Were all pesticides and surrogates in each PEM standard within the RT windows established during the Initial Calibration?	[✓]	___	___
ACTION: If no, take action as specified in 3.2 above.			
7.12 Has the individual percent breakdown for DDT/Endrin exceeded 20.0% in any PEM on either column? (See Form VII PEST-1.)			
- for 4,4'-DDT?	___	[✓]	___
- for Endrin?	___	[✓]	___
Has the combined percent breakdown for DDT/Endrin			

YES NO N/

exceeded 30.0% in any PEM on either column (required for all PEM analyses)? ___ r/1 ___

ACTION: 1. If any percent breakdown has failed the QC criteria in either PEM in steps 2 and 17 in the initial calibration sequence (page D-28/Pest, sec. 9.2.5.6 in the SOW), qualify all samples in the entire analytical sequence as described in sections 2.a, b and c below.

2. If any percent breakdown failed the QC criteria in a PEM calibration verification analysis, review data beginning with the samples which followed the last in-control standard until the next acceptable PEM and qualify the data as described below.

a. 4,4'-DDT Breakdown: If DDT breakdown was > 20.0%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT unusable, "R".

ii. Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

b. Endrin Breakdown: If endrin breakdown was > 20.0%:

i. Qualify all positive results for endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN".

c. Combined Breakdown: If the combined 4,4'-DDT and endrin breakdown is greater than 30.0%:

i. Qualify all positive results for DDT and Endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for endrin as unusable

	YES	NO	N/A

"R". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN". Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

7.13 Are all percent difference (%D) values for PEM analytes and surrogates on both columns ≥ -25% and ≤ +25.0%? (See Form VII PEST-1.) [✓] ___ ___

ACTION: If no, qualify all associated positive results generated during the analytical sequence "J" and sample quantitation limits "UJ".

NOTE: If the failing PEM is part of the initial calibration, all samples are potentially affected. If the offending standard is a calibration verification, the associated samples are those which followed the last in-control standard until the next passing standard.

7.14 Is Form VII Pest-2 present and complete for each INDA and INDB calibration verification analyzed? [✓] ___ ___

ACTION: If no, take action specified in 3.2 above.

7.15 Are there any transcription/calculation errors between raw data and Form VII Pest-2? ___ [✓] ___

ACTION: If large errors exists, take action as specified in section 3.6 above.

7.16 Do all standard retention times for each INDA and INDB calibration verification fall within the RT windows established during the initial calibration sequence? (See Form VII PEST-2.) [✓] ___ ___

ACTION: If no, beginning with the samples which followed the last in-control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised

YES NO N/A

RT window, qualify all positive results and non-detects as unusable (R).

7.17 Are all %D values for INDA and INDB calibration verification compounds ≥ -25.0% and ≤ +25.0%? [✓] ___ ___

ACTION: If the %D is outside the ±25.0% range for any compound(s), qualify associated positive results for that compound "J" and non-detects "UJ". The "associated samples" are those which followed the last in-control standard up to the next passing standard containing the analyte(s) in question. If the %D is > 90%, flag all non-detects for that analyte "R" (unusable).

8.0 Analytical Sequence Check (Form VIII-PEST)

8.1 Is Form VIII present and complete for each column and each period of analyses? [✓] ___ ___

ACTION: If no, take action specified in 3.2 above.

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/EC instrument used.? (See SOW pages D-23 & D-38/PEST.) [✓] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Were all samples analyzed within a 12 hour time period beginning with the injection of an instrument blank and bracketed by acceptable analyses of the proper standards? [✓] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Document in the Data Assessment under Contract Problems/Non-Compliance and Organic Regional Data Assessment Summary.

8.4 If a multi-component analyte was detected in a sample, was a matching multi-component standard analyzed within 72 hours of the injection of the

	YES	NO	N/A
sample and within a valid 12 hour sequence?	[ ]	___	✓

NOTE: This additional standard is for identification purposes only. Positive results for Arcclors and Toxaphene are quantitated from the initial calibration.

ACTION: If no, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

9.0 Cleanup Efficiency Verification (Form IX)

9.1 Is Form IX PEST-1 present and complete for each lot of Florisil Cartridges used? (Florisil Cleanup is required for all Pest/PCB extracts.)	[✓]	___	___
Are all samples listed on the Pesticide Florisil Cartridge Check Form?	[✓]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests florisil clean-up was not performed, document in the Data Assessment under the Contract Non-compliance section.

9.2 Are percent recoveries (%REC) of the pesticide and surrogate compounds used to check the efficiency of the florisil clean-up procedure within QC limits of 80 - 120%?	[✓]	___	___

ACTION: Qualify only the analyte(s) which failed the recovery criteria as follows:

If %REC is < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 120%.

NOTE: Sample data should be evaluated for potential interferences if recovery of 2,4,5-trichlorophenol was > 5% in the Florisil Cartridge Performance Check analysis. Document any problems found in the Data Assessment under the Contract Problems/Non-Compliance section.

	YES	NO	N/A
9.3 If GPC Cleanup was performed (mandatory for all soil sample extracts), is Form IX Pest-2 present?	[ ]	___	✓
Are all soil samples listed on Form IX Pest-2?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests GPC clean-up was not performed when required, document in the Data Assessment under the Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary.

Are the %REC values for all pesticides in the GPC calibration solution between 80 - 110%?	[ ]	___	✓

ACTION: Qualify only those analytes which failed the recovery criteria as follows:

If %REC are < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 110%.

NOTE: An Aroclor mixture containing Arcclors 1016 and 1260 is also analyzed during GPC calibration; however, Aroclor data is not listed on Form IX PEST-2. The raw GPC data for Arcclors 1016/1260 must be evaluated for pattern similarity with previously analyzed Aroclor standards.

9.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-35, sec. 3.3.7.8 and 3.3.7.9 of the SOW for further information.			
Was the correct identification scheme used for GPC and Florisil blanks?	[✓]	___	___

10.0 Pesticide/PCB Identification

10.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[✓]	___	___

ACTION: If no, take action specified in 3.2 above.

	YES	NO	N/A
10.2 Are all sample chromatograms properly scaled, attenuated, etc. as required for proper identification of single and multi-component analytes? (Refer to SOW sections 11.3.7.1 thru 11.3.7.8, page D-70/Pest for specific details.)	[/]		

NOTE: Proper verification of Pest/PCB results depends on clear, legible presentation of the raw data. Single component pesticides and all peaks chosen for quantitation of multi-component analytes must appear at less than full scale. Toxaphene and PCB patterns must be clearly visible to enable comparison with standard chromatograms.

ACTION: If retention times or apex of peaks cannot be verified, or if multi-component peak patterns cannot be discerned, contact the WAM to obtain rescaled chromatograms from the lab.

10.3 Are there any transcription/calculation errors between raw data and Forms 10A and 10B?		[/]	

ACTION: If large errors exist, take action as specified in section 3.6 above.

10.4 Are RTs of sample compounds within the established RT windows for analyses on both columns?	[/]		
Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/ml in the final extract)?	[ ]		/

ACTION: Use professional judgement to qualify positive results which were not confirmed by GC/MS analysis. Qualify as unusable (R) all positive results which were not confirmed on a second GC column. Also qualify as unusable (R) all positive results which do not meet RT window criteria, unless associated standard compounds are similarly biased. Use professional judgement to assign an appropriate quantitation limit.

10.5 Is the percent difference (%D) calculated for the positive sample results on both columns > 25.0%?		[/]	

ACTION: If the reviewer finds neither column shows interference for the positive hits, the data should be flagged as follows:

YES NO N/

% Difference	Qualifier
0 - 25%	None
25 - 70%	"J"
70 - 100%	"JN"
> 100%	"R"
100 - 200% (Interference detected)*	"JN"
> 50% (Pesticide value is < CRQL)**	"U"

* When the reported %D is 100 - 200%, but interference is detected on either column, qualify the data with "J".

** When the reported pesticide value is lower than the CRQL, and the %D is > 50%, raise the value to the CRQL and qualify "U", undetected.

NOTE: For Aroclors, if the %D is > 50%, but the pattern of GC peaks on both columns indicates a specific Aroclor is present, qualify that Aroclor "J".

NOTE: The lower of the two values is reported on Form I. If using professional judgement, the reviewer determines that the higher result was more acceptable, the reviewer should replace the value and indicate the reason for the change in the Data Assessment.

10.6 Check chromatograms for false negatives, especially the multiple-peak compounds (Toxaphene and the PCBs). Were there any false negatives? ___ [/] ___

ACTION: Use professional judgement to decide if the compound should be reported. If the appropriate PCB standards were not analyzed within 72 hrs. of the sample(s) in question, qualify the data unusable "R".

Also note in Data Assessment under Contract Problems/Non-Compliance if the lab failed to analyze Aroclor standards when required.

1.0 Target Compound List (TCL) Analytes

11.1 Are the Organic Analysis Data Sheets (Form I Pest) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate? [/] ___ ___

b. Matrix spikes and matrix spike duplicates? [/] ___ ___

	YES	NO	N/A
c. Blanks?	[✓]		
d. Instrument Blanks (per column & analysis)?	[✓]		
11.2 Are the Pest chromatograms and quant. reports included in the sample data package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]		
b. Matrix spikes and matrix spike duplicates?	[✓]		
c. Blanks?	[✓]		
d. Instrument Blanks (per column & analysis)?	[✓]		
ACTION: If any data are missing, take action specified in 3.2 above.			
11.3 Are the calibration factors shown in the quant. reports?	[✓]		
11.4 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]		
b. Resolution?	[✓]		
c. Peak shape?	[✓]		
d. Full-scale graph attenuation?	[✓]		
e. Other: _____?	[ ]		
11.5 Were any electropositive displacement (negative peaks) or unusual peaks seen?		[✓]	
ACTION: Use professional judgement to determine the acceptability of the data. Address comments under System Performance section of the Data Assessment.			

12.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
12.1 Are there any transcription/calculation errors in Form I results? Check at least two positive results. Were any errors found?		[✓]	

YES NO N/A

NOTE: Single-peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. Use professional judgement to decide whether a large discrepancy indicates the presence of an interfering compound. If an interfering compound is visible on the chromatogram, the lower of the two values should be reported and qualified as presumptively present at an approximated quantity "JN". This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has interfered with the evaluation of the second column confirmation.

12.2 Are the CRQLs adjusted to reflect sample dilutions? ✓ ___ ___

ACTION: If large errors exist, take action as specified in section 3.6 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs from the diluted sample). Replace concentrations which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

ACTION: Quantitation limits affected by large, off-scale peaks should be qualified as unusable (R). If the interference is on-scale, the reviewer may offer an approximated quantitation limit (UJ) for each affected compound.

NOTE: If a sample required greater than a 10 times dilution, then a 10 times more concentrated analysis must also be performed and submitted (see SOW, page D-60/PEST, section 10.2.3.5).

ACTION: If a more concentrated analysis is unavailable, document in the Contract Problems/Non-Compliance section of the Data Assessment. Use professional judgement to qualify non-detects and positive hits below the CRQL.

	YES	NO	N/A

13.0 Field Duplicates

13.1 Were any field duplicates submitted? [1] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

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Contract #: 68W01038	Case #: 32903	SDG #: BQR04

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SDG NARRATIVE

SAMPLE RECEIPT & LOGIN

The following samples were received on the dates listed against them. The samples were logged in for analysis as listed.

EPA SAMPLE #	LAB SAMPLE #	DATE /TIME RECEIVED	AIRBILL NO.	VOA	BNA	PEST	REMARKS
BQR00	5024.001	05/19/04 09:50	N2374861079	X	X	X	
BQR01	5024.002	05/19/04 09:50	N2374861079	X	X	X	
BQR02	5024.003	05/19/04 09:50	N2374861079, 42	X	X	X	
BQR03	5024.004	05/19/04 09:50	N2374861079	X			
BQR04	5013.002	05/18/04 10:15	N2374861060	X			
BQR05	5013.003	05/18/04 10:15	N2374861060	X	X	X	
BQR06	5024.005	05/19/04 09:50	N2374861079	X			
BQR07	5013.004	05/18/04 10:15	N2374861060	X	X	X	
BQR08	5024.006	05/19/04 09:50	N23748610042	X			

The cooler temperatures are listed against the coolers.

DATE RECEIVED	COOLER NO.	Temp (in °C)
05/13/04	1	4
05/19/04	1	3
05/19/04	2	2.5

For the sample BQR02 the number of containers are listed as 24, but the lab received only 16 containers. SMO was notified and resolution is enclosed.
No other discrepancies or issues were noted during sample receipt and login.

VOLATILES

Samples were analyzed using instrument **E-5973** and **F-5973**.

Instrument **E-5973** consisted of an Agilent 5973 GC/MS with a 25-meter long DB-624 (Agilent cat# 128-1324) column having a 0.2mm ID and 1.12µm film thickness, a Tekmar Purge and Trap Model LSC2000 with an Archon autosampler. The trap used was a K trap (Supelco Cat # 21066-U; VOCARB 3000) having 10cm of Carbopack B, 6cm of Carboxen 1000, and 1cm Carboxen 1001.

Instrument **F-5973** consisted of an Agilent 5973 GC/MS with a 25-meter long DB-624 (Agilent cat# 128-1324) column having a 0.2mm ID and 1.12µm film thickness, a Tekmar Purge and Trap Model LSC2000 with an Archon autosampler. The trap used was a K trap (Supelco Cat # 21066-U; VOCARB 3000) having 10cm of Carbopack B, 6cm of Carboxen 1000, and 1cm Carboxen 1001.

Secondary ions are used for the quantitation of 1,1-Dichloroethene-d_2, Chloroform-d, and 2-Hexanone-d_5 to minimize the interferences from the associated target compounds and common non-target compounds.

TIC around RT of 7.8 min is a contaminant (cis isomer of 1,3-Dichloropropene-d4) from the DMC solution supplied by Cambridge Isotope Limited (CIL). According to CIL trans-1,3-Dichloropropene-d4 is manufactured as cis and trans mix and

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therefore the DMC solution that they supply contains both the isomers. The concentration of this contaminant is between 2µg/L to 4µg/L.

All VOA samples had the pH characteristic verified. The reading is listed below.

EPA SAMPLE #	LAB SAMPLE #	pH
BQR00	5024.001	≤ 2
BQR01	5024.002	≤ 2
BQR02	5024.003	≤ 2
BQR03	5024.004	≤ 2
BQR04	5013.002	≤ 2
BQR05	5013.003	≤ 2
BQR06	5024.005	≤ 2
BQR07	5013.004	≤ 2
BQR08	5024.006	≤ 2

Manual integrations were performed for the following samples for the compounds listed against them.

BQR04 – Xylene (total)
BQR08 – Xylene (total)

These manual integrations were necessary because the software failed to accurately integrate the entire peak. In all the above instances, the quantitation reports are flagged with "m". A hard copy printout of the manual integration, the scan ranges, and initials of the analyst or manager is included in the data package.

SEMI-VOLATILES

Samples were extracted using the required continuous liquid-liquid extraction method on 05/23/2004. No problems were encountered during extraction.

All samples were analyzed on a HP5973 GC-MS using a 30-meterHP-5MS column (Agilent cat#19091S-433) having a 0.25mm ID and a 0.25µm film thickness. A 1µL injection was used.

Manual integrations were performed for the following samples for the compounds listed against them.

SSTD020FC–Caprolactam
SSTD050FC–Caprolactam
SSTD080FC–Caprolactam
SSTD020FD–Caprolactam

These manual integrations were necessary because the software failed to accurately integrate the entire peak. In all the above instances, the quantitation reports are flagged with "m". A hard copy printout of the manual integration, the scan ranges, and initials of the analyst or manager is included in the data package.

PESTICIDES

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SDG NARRATIVE

Samples were extracted using separatory funnel extraction method on 05/24/2004. No problems were encountered during extraction.

Samples were analyzed using instrument **C-6890.**

Instrument C-6890 consisted of a dual inlet, dual ECD Agilent 6890 GC/ECD instrument with the following two columns manufactured by Restek. A 1µL injection was used on each column

Coulmn 1= RTX-PEST: Cat # 11140, 30m long, 0.53mm ID, 0.5µm film thickness (Instrument ID: C-6890A).
Column 2 = RTX-PEST2: Cat # 111340, 30m long, 0.53mm ID, 0.42µm film thickness (instrument ID: C-6890B)

A 1µL injection was used on each column.

Manual integrations were performed for the following compounds for the samples listed against them.

COMPOUND	*EPA SAMPLE ID (Inst=C-6890A)*	*EPA SAMPLE ID (Inst=C-6890B)*
4,4'-DDD		INDAL7M
4,4'-DDT	PEM5M, PEM5N, INDAM5N	INDAL7M, INDBL7M
Aldrin		INDBL7M
Endrin	PEM5M, PEM5N	PEM7N
Alpha-BHC		INDAH7M
Beta-BHC		INDAH7M
Delta-BHC	INDBH5M	INDBH7M
Decachlorobiphenyl	PEM5M, AR12215M, AR12325M, INDAL5M, INDBM5N, PLCS1D, BQR00, BQR01MS, BQR01MSD, BQR02	AR12217M, AR12327M, INDAL7M, PLCS1D, BQR00, BQR01MS, BQR01MSD, BQR02
Endirn Ketone	PEM5N	
Endosulfan Sulfate	INDBL5M	
Methoxychlor	PEM5N	

These manual integrations were necessary because the software failed to accurately integrate the entire peak. In all the above instances, the quantitation reports are flagged with "m". A hard copy printout of the manual integration, the scan ranges, and initials of the analyst or manager is included in the data package.

The following equations are used for calculation of sample results from raw instrument output data:

Volatiles:

$$\text{Concentration } (\mu g/L) = \frac{(Ax)(Is)(Df)}{(Ais)(RRF)(Vo)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured.
A_{is} = Area of the characteristic ion (EICP) for the internal standard.
I_s = Amount of internal standard added in nanograms (ng).
[redacted] = the relative response factor from the continuing calibration method.
V_o = Total volume of water purged, in milliliters (mL).
Df = Dilution factor.

Semivolatiles:

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SDG NARRATIVE

$$\text{Concentration } (\mu g/L) = \frac{(Ax)(Is)(Vt)(Df)}{(Ais)(RRF)(Vo)(Vi)}$$

A_x = Area of the characteristic ion (EICP) for the compound to be measured.
A_{is} = Area of the characteristic ion (EICP) for the internal standard.
I_s = Amount of internal standard added in nanograms (ng).
RRF = the relative response factor from the continuing calibration method.
V_o = Total volume of water extracted, in milliliters (mL).
V_i = Volume of extract injected in microliters (µL).
V_t = Volume of concentrated extract in microliters (µL). (V_t = 1000µL).
Df = Dilution factor.

Pesticides:

$$\text{Concentration } (\mu g/L) = \frac{(Ax)(Vt)(Df)}{(CFmp)(Vi)(Vx)}$$

A_x = Response (peak area or height) of the compound to be measured.
CF_{mp} = Calibration factor for the mid-point from initial calibration standard (area per ng).
V_t = Volume of concentrated extract (µL). (This volume is 2000 µL).
V_i = Volume of extract injected in microliters (µL).
V_x = Volume of water extracted (mL).
Df = Dilution factor.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package and in the computer readable data submitted on diskette has been authorized by the laboratory manager or his/her designee, as verified by the following signature:

M Perez QC Coordinator — Signature and Title

6/8/04 — Date of Signature

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Sample Delivery Group(SDG) Cover Sheet

SDG Number: BQR04

Laboratory Name.: A4 SCIENTIFIC, INC. **Laboratory Code.:** A4

Contract No.: 68W01038 **Case No.:** 32903

Analysis Price: $390.00 **SDG Turnaround:** 21 days

EPA Sample Numbers in SDG(Listed in Numerical Order)

1)BQR00	7)BQR06	13)	19)
2)BQR01	8)BQR07	14)	20)
3)BQR02	9)BQR08	15)	21)
4)BQR03	10)	16)	22)
5)BQR04	11)	17)	23)
6)BQR05	12)	18)	24)

BQR04
First Sample in SDG

BQR08
Last Sample in SDG

05/18/2004
First Sample Receipt Date

05/19/2004
Last Sample Receipt Date

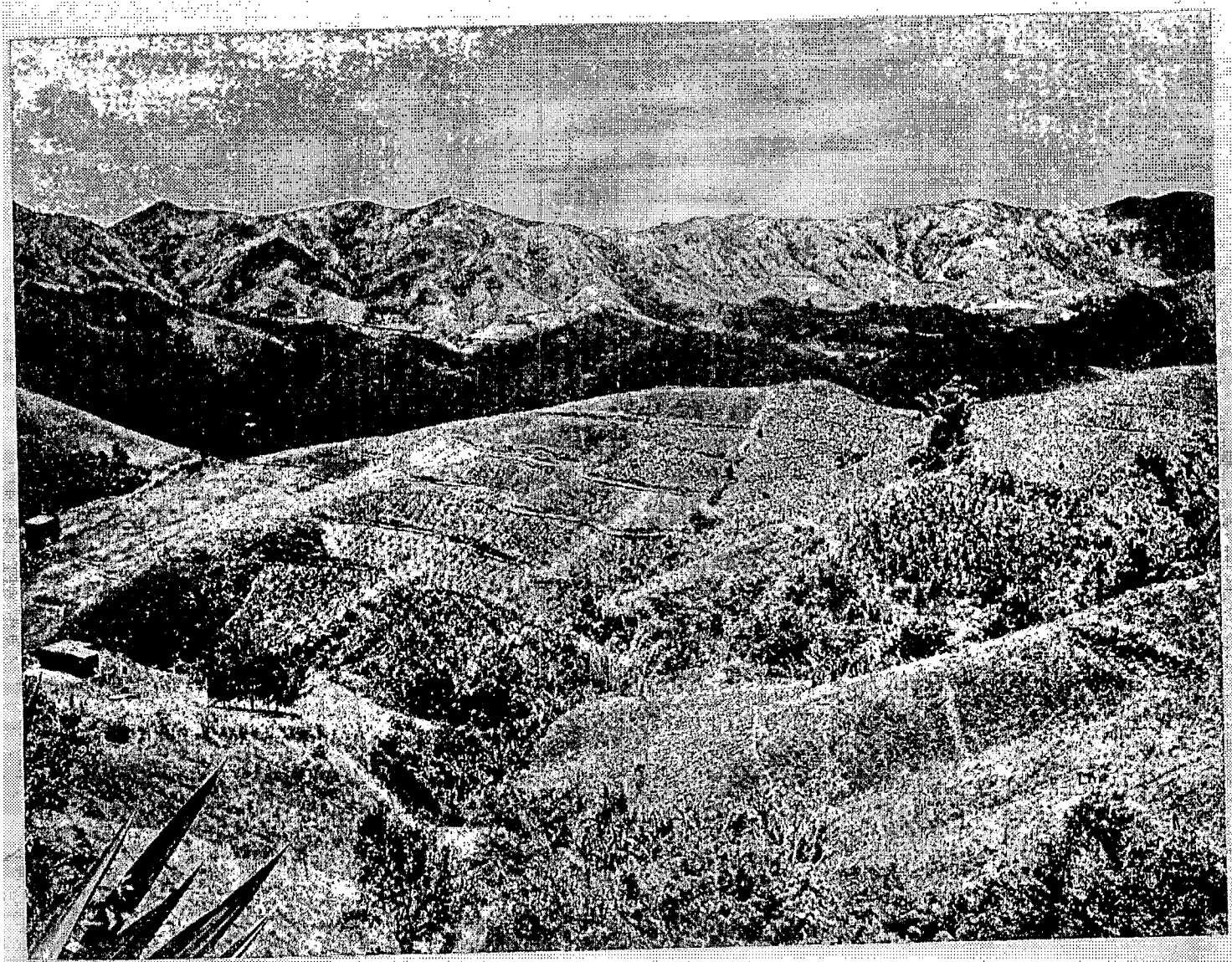
Note: There are a maximum of 20 samples (excluding PE sample) in SDG. Attach TRs to this form in alphanumeric order(the order listed above on this form).

Signature Samanaleddy /QC Coordinator **Date** 5/25/04

REFERENCE: 27

SOIL SURVEY OF

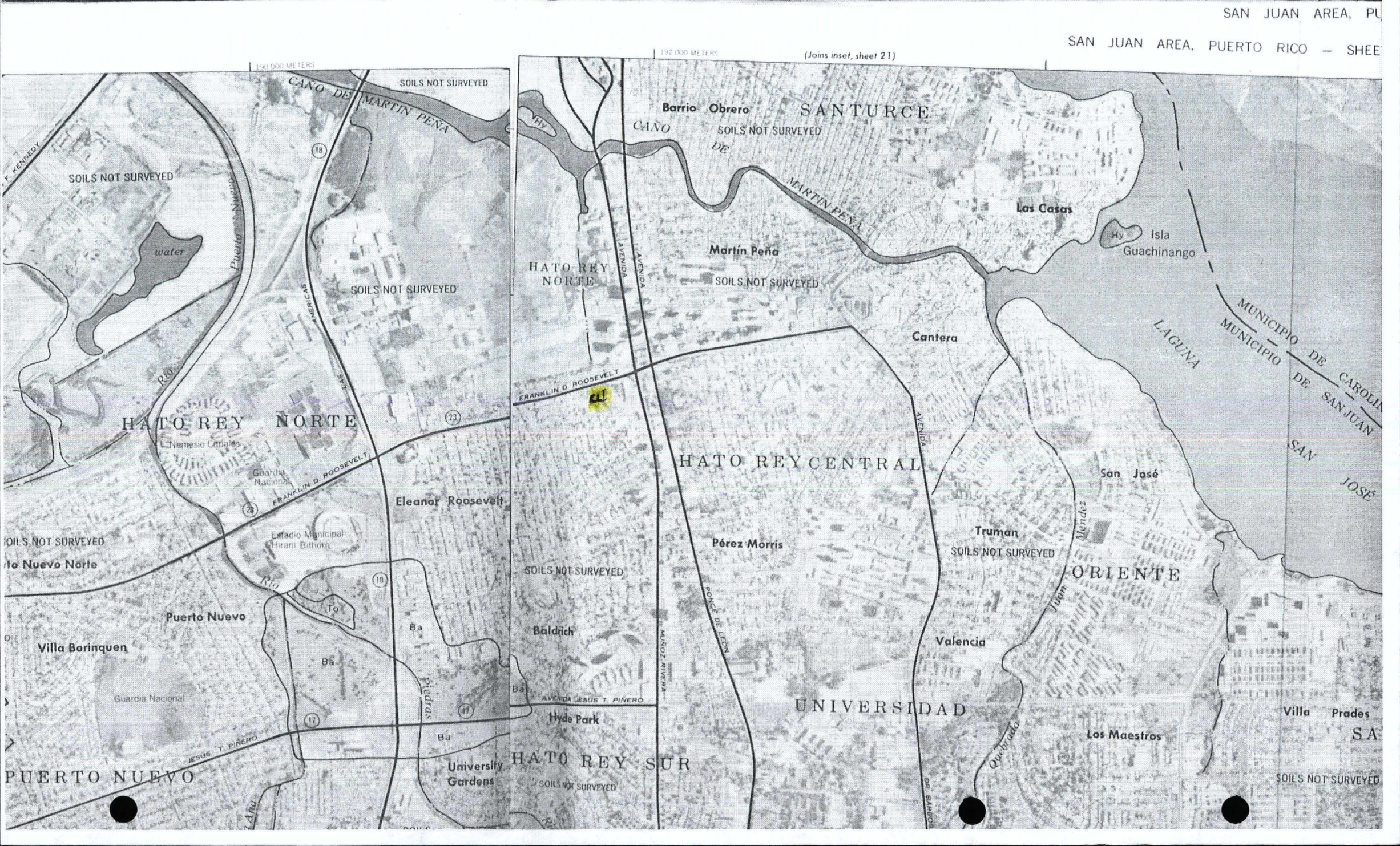
San Juan Area of Puerto Rico



United States Department of Agriculture
Soil Conservation Service

In cooperation with
University of Puerto Rico
Agricultural Experiment Station

SAN JUAN AREA, PUERTO RICO — SHEE



Included with this soil in mapping are small areas of Vega Alta, Matanzas, and Bayamon soils. The surface layer of the Vega Alta soils is dark yellowish brown clay loam; that of the Matanzas and Bayamon soils is dark reddish brown clay. These soils make up 10 to 20 percent of this mapping unit.

Permeability and the available water capacity are moderate. Runoff is medium. This soil is medium in natural fertility and has a deep root zone. It is difficult to work due to stickiness and plasticity of the clay. Crops respond well to heavy applications of lime and fertilizers. Controlling erosion is a major concern of management.

This soil has been used for sugarcane. It is suited to pangolagrass, stargrass, and Merker grass.

Proper stocking rates and deferred grazing, as well as liming and fertilizing, are chief management needs.

This soil is moderately limited for most urban uses because of its clayey nature. Capability subclass IIIe.

Ba—Bajura clay. This is a nearly level, poorly drained soil on river flood plains. Slopes are smooth and are 500 to 2000 feet long. The areas range from 20 to 1000 acres.

Typically the surface layer is dark brown, firm clay about 5 inches thick. The subsoil, about 7 inches thick, is dark gray, firm clay mottled with yellowish brown, very dark gray, and dark brown. The substratum, from a depth of 12 inches to 31 inches, is gray and yellowish brown, firm clay mottled with greenish gray. From 31 inches to 60 inches, the substratum is greenish gray, firm clay mottled with brownish yellow and bluish gray.

Included with this soil in mapping are small areas of the Coloso soils. The surface layer of the Coloso soils is dark brown silty clay loam. These soils make up 10 to 20 percent of this mapping unit.

Permeability is slow and the available water capacity is high. This soil is difficult to work due to stickiness and plasticity of the clay and wetness. It is fertile and has a deep root zone. When properly drained and managed, it is suited to crops (fig. 1).

This soil has been used for sugarcane. It is suited to pangolagrass, stargrass, and paragrass.

Proper stocking rates and deferred grazing, as well as fertilizing, are chief management needs.

This soil is limited for most urban uses because of drainage, flood hazard, and high shrink-swell potential. Capability subclass IIIw.

BmB—Bayamon clay, 2 to 5 percent slopes. This is a gently sloping, well drained soil on foot slopes and in small valleys between the limestone hills. Slopes are 500 to 1000 feet long. The areas range from 10 to 300 acres.

Typically the surface layer is dark reddish brown, friable clay about 8 inches thick. The subsoil, to a depth of 66 inches is weak red and red, firm to friable clay.

Included with this soil in mapping are small areas of Matanzas soils. The surface layer of the Matanzas soils is dark reddish brown clay. These soils make up 10 to 20 percent of this mapping unit.

Permeability and the available water capacity are moderate in this soil. Runoff is medium, and the hazard of erosion is slight to moderate. This soil is difficult to work because of the stickiness and plasticity of the clay. It is medium in natural fertility and has a deep root zone. Crops respond well to heavy applications of lime and fertilizers. Controlling erosion and maintaining natural fertility are the major concerns of management.

This soil has been used for sugarcane and pineapples. It is suited to pangolagrass, stargrass, and Merker grass (fig. 2).

Proper stocking rates and deferred grazing, as well as liming and fertilizing, are chief management needs.

This soil has slight to moderate limitations for most urban uses. If the soil is used for construction sites, temporary plant cover should be established quickly in denuded areas. Capability subclass IIe.

CaE—Caguabo clay loam, 20 to 40 percent slopes. This is a steep, well drained soil on side slopes and tops of strongly dissected uplands. Slopes are 500 to 1000 feet long. The areas range from 20 to 800 acres.

Typically the surface layer is dark grayish brown, friable clay loam about 4 inches thick. The next layer is brown, friable very gravelly clay loam about 6 inches thick. The substratum, beginning at a depth of 10 inches, is a mixture of weathered and partially weathered volcanic rocks. Consolidated rock is at a depth of 16 inches.

Included with this soil in mapping are small areas of Mucara, Naranjito, and Consumo soils and a few rocky hilltops. The surface layer of the Mucara soils is very dark grayish brown clay; that of the Naranjito soils is dark brown silty clay loam; and that of the Consumo soils is reddish brown clay. These soils make up 10 to 20 percent of this mapping unit.

Permeability is moderate in this soil, and the available water capacity is low. Runoff is rapid, and erosion is a hazard. Slippage is common in roadbanks, ditches, and drainageways. This soil is difficult to work because it is steep and shallow. Hillside ditches and diversions are difficult to lay out, establish, and maintain. This soil is fertile but has a shallow root zone. Controlling erosion is the major concern of management.

This soil has been used for tobacco and food crops such as sweet potatoes, bananas, and coffee. It is best suited to pangolagrass and stargrass.

Proper stocking rates and deferred grazing, as well as liming and fertilizing, are chief management needs.

This soil is suited to Honduras pine, eucalyptus, and mahogany trees. Production of Honduras pine is low, about 800 board feet per acre per year. The hazard of erosion and limitations on the use of equipment are the major concerns of management. Logging roads, skid trails, and planting should be on the contour to help control erosion. The use of logging equipment is restricted at times because the soil is soft and slippery when wet. Brush removal, careful hand planting, and fertilizing increase the survival of planted seedlings.

This soil is limited for most urban uses because it is steep, shallow, and subject to landslides. If the soil is used as construction sites, development should be on the con-

REFERENCE: 28

Temperature and Precipitation Normals for Puerto Rico

Click on blue dot for exact location and data for each station

Back to Home Page

STATION - **San Juan WFO** Elevation: 9 ft Lat/Lon: 18.26N 66.00W	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Precipitation:													
Normal	2.81	2.15	2.35	3.76	5.93	4.00	4.37	5.32	5.28	5.71	5.94	4.72	52.34
Median	2.58	1.68	1.82	2.80	5.44	3.32	4.11	5.13	4.85	5.09	5.17	3.93	50.56
Temperature:													
Normal Max	83.2	83.6	84.4	85.8	87.2	88.6	88.5	88.7	88.8	88.3	85.9	83.8	86.4
Normal Min	70.8	70.6	71.6	72.9	74.5	76.1	76.8	76.7	76.2	75.5	74.0	72.4	74.0

STATION - **Rio Piedras Exp Stn** Elevation: 86 ft Lat/Lon: 18.24N 66.03W	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Precipitation:													
Normal	5.03	3.52	3.94	6.39	8.43	6.71	7.00	9.11	8.35	8.93	8.88	7.34	83.63
Median	4.08	3.00	3.27	3.99	6.67	5.88	5.90	7.59	6.90	7.18	7.96	5.63	71.32
Temperature:													
Normal Max	83.3	83.8	84.7	86.0	87.2	88.6	88.5	88.7	88.8	88.6	86.3	84.1	86.6
Normal Min	65.8	65.8	66.6	68.1	70.5	71.9	72.6	72.5	72.2	71.5	69.8	67.3	69.6

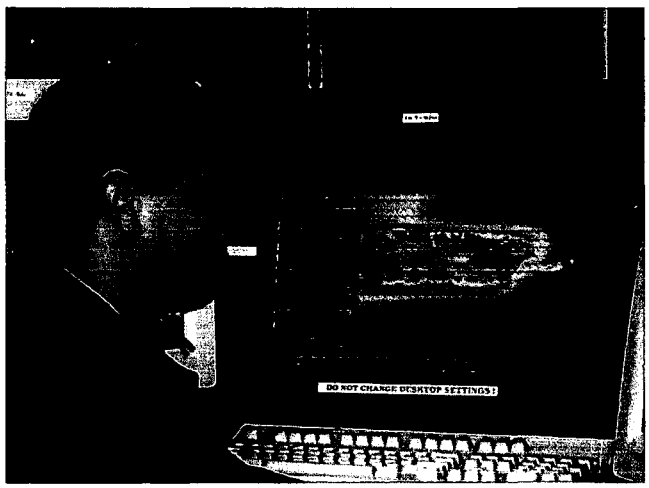
COOP NETWORK - PRECIPITATION (INCHES) ANNUAL SUMMARY - 2003

NORTH COAST

Shef ID	STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
BQN	BORINQUEN	5.70	0.63	0.53	10.73	4.36	3.93	3.49	5.20	6.44	11.01	10.47
DRD	DORADO	7.14	4.53	0.73	6.58	2.56	1.94	7.30	8.15	2.05	3.64	16.64
HTR	RIO PIEDRAS	1.89	2.71	1.65	9.04	5.04	4.68	3.89	8.12	10.44	3.85	
SJU	SAN JUAN	4.59	2.22	1.48	9.37	1.67	3.43	4.70	5.65	4.50	4.83	11.26
	DIVISION AVG	4.83	2.52	1.10	8.93	3.41	3.50	4.85	6.78	5.86	5.83	12.79
	NORMAL	3.67	2.96	3.13	4.73	6.66	4.78	4.87	6.26	5.49	6.03	6.63
	%	131.61	85.22	35.06	188.79	51.16	73.12	99.49	108.31	106.69	96.72	192.91
	ACCUMULATION	4.83	7.35	8.45	17.38	20.79	24.28	29.13	35.91	41.77	47.60	60.39
	NORMAL ACCUMULATION	3.67	6.63	9.76	14.49	21.15	25.93	30.80	37.06	42.55	48.58	55.21
	% ACCUMULATED	131.61	110.90	86.58	119.94	98.29	93.65	94.57	96.89	98.16	97.98	109.38

The NWS in San Juan, PR Goes Digital/Graphical!

The National Weather Service has entered the era of **graphical forecasts!** If you take a look at **http://www.srh.noaa.gov/data/ifps/sju/GFE/** you will see what I mean. You will be able to find them regularly on our home page under Graphical Forecasts in the left margin. Although graphical forecast images have been around a while, these detailed images are created by your local NWS meteorologists. What is even more exciting is that these images are merely representations of a digital database containing forecast weather elements at "gridpoints" separated by less than 1 mile. Having such high-resolution forecast data in digital, "gridded" format opens up a world of possibilities for our customers who have more sophisticated weather data needs.



The images on our web page are created by the meteorologists in the NWS office in San Juan using a new software package called the **Interactive Forecast Preparation System (IFPS)**. With this software, our meteorologists no longer spend time typing the words of the forecast. Instead, they use the extensive process of interacting with graphical depictions of specific weather elements, such as temperature, winds, clouds and precipitation, so they can focus on forecasting the weather. The meteorologists, for example, will draw images of how temperatures will look at various times across Puerto Rico and the U.S Virgin Islands (see picture at left). These images, along with those of other weather elements, will then appear on our web page.

Although graphics are great, we won't abandon our textual products. So who creates the words of the forecast text? *The software does that too, both in English and Spanish!* The images created by the meteorologists are actually maps of forecasted weather data assigned to specific geographical gridpoints at specific times. These data constitute a digital database of forecast weather elements. In other words, when a meteorologist has finished drawing the images of forecast temperatures, for example, the forecast temperature at every gridpoint (less than one mile apart) and at every hour (for up to seven days) are stored in a database. The **IFPS** uses this database to automatically generate the words of the weather forecasts you read on our web pages, hear on our NOAA Weather Radio, or see on television.

But this is just the beginning. In the world of computers, once you have weather data in a digital database, the possibilities are almost unlimited! The database, for example, can be downloaded from the NWS and input into computers used by weather-sensitive businesses and organizations to improve their own specific forecast models (e.g., models used to forecast crop growth, electric power usage, water resources, and even transportation). The applications are only limited by the imaginations of our customers. **In short, the NWS is bringing the prospect of greater efficiency and effectiveness to the sophisticated users of weather forecasts.**

I invite you to check our new graphical forecast pages periodically. We will be experimenting with new looks, new data, new formats, and new user interfaces - all in the hopes of delivering a better product to you! I welcome your comments and questions regarding this new era of digital and graphical forecasts of the National Weather Service. We've only just begun! Come join us!

Israel Matos
Meteorologist in Charge
israel.matos@noaa.gov

National Weather Service Forecast Office, San Juan, PR

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National Weather Service Radar Image

Puerto Rico/Virgin Islands Radar

Short Range Base Reflectivity

Local forecast by "City, St" or zip code City, St Go

Adjacent Radars

Base Reflectivity
- Short Range Loop
- Long Range Loop

Composite Reflectivity
- Short Range Loop
- Long Range Loop

Rainfall
- 1-Hour Total Loop
- Storm Total Loop

U.S. Views
- National Loop
- Alaska Loop
- Hawaii Loop
- Guam Loop
- Puerto Rico Loop
- Radars by State

Additional Links
- Radar Information
- Credits
- Disclaimer

San Juan, PR Homepage

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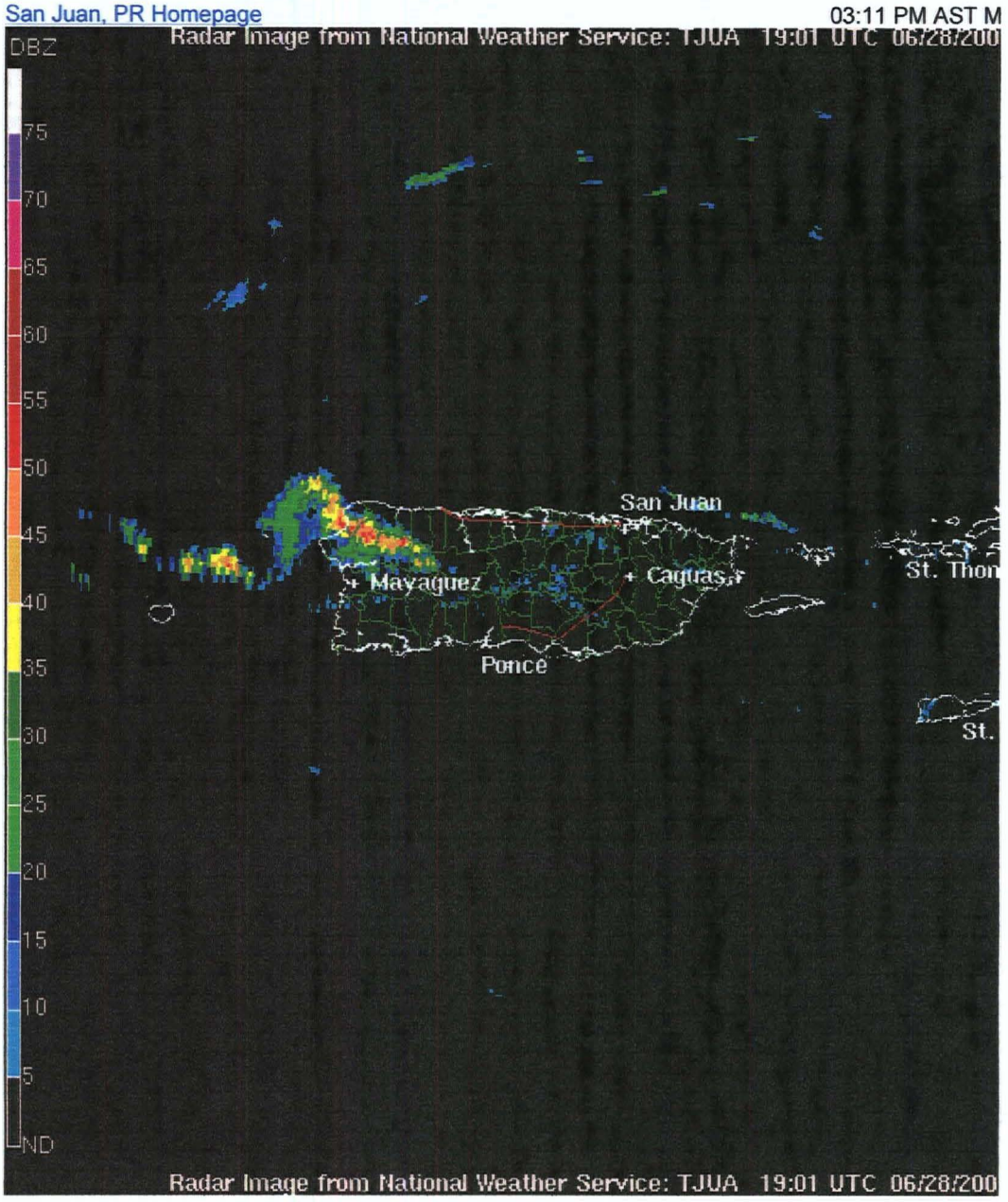

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National Weather Service, NOAA
1325 East-West Highway
Silver Spring, MD 20910

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Puerto Rico and U.S. Virgin Islands Weather Summary 2002

Mostly Tranquil Weather

It was a rather tranquil year across the Northeastern Caribbean. No Tropical Storms or Hurricanes affected Puerto Rico or the U.S. Virgin Islands...nor were there any widespread significant flood events this past year. Residents and visitors enjoyed plenty of warm, tropical sunshine.

2002 Temperature & Precipitaion Data

Here is a look at the monthly average High and Low Temperatures for San Juan in 2002, the Total Precipitation for each month, as well as the monthly Departure from Average of Precipitation. This data was taken from observations at the Luis Munoz Marin International Airport in San Juan, Puerto Rico.

Click on the Months in the table if you wish to view the Daily Observations for each month.

2002 San Juan, PR Temperature and Precipitation Data:

MONTH	AVG HIGH	AVG LOW	TOTAL PRECIP	DEPARTURE
JANUARY	84	72	3.33	+0.31
FEBRUARY	84	72	0.98	-1.32
MARCH	85	73	1.13	-1.01
APRIL	85	74	4.85	+1.14
MAY	87	75	3.82	-1.47
JUNE	89	77	1.82	-1.70
JULY	89	77	5.17	+1.01
AUGUST	89	77	6.70	+1.48

SEPTEMBER	90	77	7.45	+1.85
OCTOBER	88	76	4.81	-0.25
NOVEMBER	87	75	2.65	-3.52
DECEMBER	85	72	4.59	+0.02

More 2002 Temperature/Precipitation Data for San Juan:

Highest Temperature recorded: 94 Degrees (September 6th and 7th)

Lowest Temperature recorded: 69 Degrees (February 4th, 5th, 27th, 28th, March 15th, and December 29th)

Number of Days with a High Temperature less than 80 Degrees: 2 (February 26th and April 20th, with High's of 79 and 78 Degrees, respectively.)

Number of Days with a High Temperature greater than or equal to 90 Degrees: 58

Greatest 24 hour rainfall total: 3.24 Inches (August 30-31)

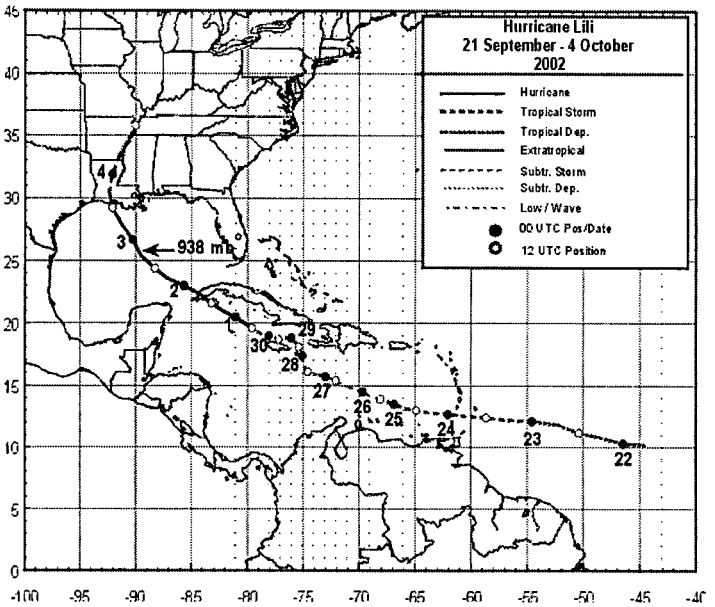
An Active Atlantic Hurricane Season...But Not Locally

The 2002 Atlantic Hurricane Season was an active one...with a total of 12 named Storms, of which 4 became Hurricanes. However, locally it was inactive...as most of the Storms in 2002 formed over the Western Caribbean and the Gulf of Mexico.

To obtain more information on the 2002 Atlantic Hurricane Season, clickhere.

"LILI" ...this was the storm that came closest to the local area. However, Lili had no direct impact on Puerto Rico or the Virgin Islands. Lili crossed the Windward Islands, continued moving westward well south of the area, and did not make a northward turn until it was south of Hispaniola. Lili briefly brought more clouds and squally weather to Puerto Rico and the U.S. Virgin Islands...but nothing of significance.

Lili became the first Hurricane to make landfall in the United States since "Irene" back in 1999.



In the picture: Lili's track. Lili became a Tropical Depression on September 21st east of the islands, crossed the Windward Islands as a developing Tropical Storm on the 23rd, and became a Hurricane on the morning of the 30th. As Lili crossed the Windward Islands, Barbados reported sustained winds of 47 mph, with gusts of up to 75 mph. Lili reached its peak intensity on October 3rd over the North Central Gulf of Mexico...with sustained winds of 125 mph. Lili then rapidly weakened to an 80 knot Hurricane as it made landfall along the central Louisiana coast.

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COOP NETWORK - PRECIPITATION (INCHES) ANNUAL SUMMARY - 2003

NORTH COAST

Shef ID	STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
BQN	BORINQUEN	5.70	0.63	0.53	10.73	4.36	3.93	3.49	5.20	6.44	11.01	10.47	2.80
DRD	DORADO	7.14	4.53	0.73	6.58	2.56	1.94	7.30	8.15	2.05	3.64	16.64	4.48
HTR	RIO PIEDRAS	1.89	2.71	1.65	9.04	5.04	4.68	3.89	8.12	10.44	3.85		5.61
SJU	SAN JUAN	4.59	2.22	1.48	9.37	1.67	3.43	4.70	5.65	4.50	4.83	11.26	5.25
	DIVISION AVG	4.83	2.52	1.10	8.93	3.41	3.50	4.85	6.78	5.86	5.83	12.79	4.54
	NORMAL	3.67	2.96	3.13	4.73	6.66	4.78	4.87	6.26	5.49	6.03	6.63	6.08
	%	131.61	85.22	35.06	188.79	51.16	73.12	99.49	108.31	106.69	96.72	192.91	74.59
	ACCUMULATION	4.83	7.35	8.45	17.38	20.79	24.28	29.13	35.91	41.77	47.60	60.39	64.92
	NORMAL ACCUMULATION	3.67	6.63	9.76	14.49	21.15	25.93	30.80	37.06	42.55	48.58	55.21	61.29
	% ACCUMULATED	131.61	110.90	86.58	119.94	98.29	93.65	94.57	96.89	98.16	97.98	109.38	105.93

SOUTH COAST

	STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
AVR	AGUIRRE CENTRAL	1.84	1.53	1.38	7.00	1.67	1.99	2.85	5.15	1.21	5.24	24.58	4.36
YUC	BOCA	0.95	0.99	1.87	13.79	1.27	0.81	0.68	3.13	2.22	7.74	23.30	5.88
CMO	COAMO		1.62		9.35	4.00	0.13	0.63	7.41	4.57	6.33	8.09	0.81
ENS	ENSENADA	0.48	0.25	0.82	14.98	0.42	1.32	0.00	3.29	2.35	6.40	21.63	8.71
LJS	LAJAS SUSTATION	2.80	1.91	3.35	13.01	1.54	0.41	2.07	3.84	4.08	7.98	19.04	7.07
LAJ	MAGUEYES ISLND	0.48	0.50	0.88	8.54	0.28	0.64		2.60	2.19	4.52	16.73	3.57
POC	PONCE 4E	2.04	1.95	2.68	10.37	0.51	0.26	2.73	3.85	3.24	7.14	14.51	6.10
STI	SANTA ISABEL	2.51	1.59	2.20	9.52	0.58	0.83	2.55	4.23	1.18	4.64	19.37	5.72
YCO	SANTA RITA	0.75	0.70	1.45	9.35	0.25	0.60	0.60	2.55	3.70	2.74	22.55	2.65
	DIVISION AVG	1.48	1.23	1.83	10.66	1.17	0.78	1.51	4.01	2.75	5.86	18.87	4.99
	NORMAL	1.00	0.85	1.21	1.84	3.45	2.26	2.20	4.16	5.17	6.46	4.15	1.44
	%	148.13	144.31	151.14	579.17	33.88	34.37	68.81	96.29	53.17	90.69	454.62	346.22
	ACCUMULATION	1.48	2.71	4.54	15.19	16.36	17.14	18.65	22.66	25.41	31.27	50.13	55.12
	NORMAL ACCUMULATION	1.00	1.85	3.06	4.90	8.35	10.61	12.81	16.97	22.14	28.60	32.75	34.19
	% ACCUMULATED	148.13	146.37	148.26	310.07	195.95	161.54	145.61	133.52	114.76	109.32	153.08	161.21

REFERENCE: 29

WORKPLAN

CELIA'S LAUNDRY (DML)

247 ELEANOR ROOSEVELT STREET

TDD 02-0401-39

PR0002196368

CASE # 32903

OBJECTIVE:

The United States Environmental Protection Agency (U.S. EPA) has tasked the Puerto Rico Environmental Quality Board (PREQB) Sampling Team to conduct a Site Inspection (SI) at the facility of Celia's Laundry, Inc. (CLI) located on #247 Eleanor Roosevelt Street, San Juan Puerto Rico 00917.

BACKGROUND INFORMATION

Celia's Laundry, Inc. (CLI) is located on the first floor of a two (2) stories building that is to the north of Eleanor Roosevelt Street and is surrounded by other commercial facilities. There is a residential apartment on the second floor. There are three (3) concrete buildings on the eastern, western, and northern sides of the property and there are no daycare centers or schools within 200 feet from the site. The site is rectangular in shape and consist of a concrete-covered parking area to the south, one concrete-covered area to the west of and besides the CLI building, another small concrete-covered area to the north and besides the CLI building, and a large area with exposed soil also to the north of the CLI building. This large area of exposed soil is in the backyard of the property and has small areas covered with vegetation or gravel (Figure 2).

Inside the CLI building there is a reception area, two large halls where the regular machine wash, drying, and ironing of clothing is performed, and a dry-cleaning area. The dry-cleaning area is in a room on the northern side of the building that opens into the property backyard. This room is covered by a metal roof and consists of a concrete platform with a primary containment system (i.e. ditch). The primary containment system is below the dry-cleaning machine and consists of a ditch covered by a metal screen, and was designed to collect any tetrachloroethylene accidentally released from the machine. All the solvent collected inside the ditch is then pumped back into a 55-gallon metal drum that is constantly connected to the dry-cleaning machine for reuse. Both the dry-cleaning machine and the 55-gallon drum are kept above the primary containment system. No secondary containment system exists at the site that will prevent any tetrachloroethylene accidentally released from this primary containment system from reaching the area of exposed soil in the backyard. The fact that there is a concrete ramp next to the primary containment system, which reaches the exposed soil in the backyard, may increase risk of any chemical from reaching the ground surface.

CLI have been engaged in the dry-cleaning, machine washing, drying, and ironing of clothing since 1978. Tailoring is also performed at the site. According to Mrs. Celia Aristy, Manager of CLI, Mrs. Noemí López, who also lives on the second floor, owns the property. Currently there are 10 employees working on site. CLI has an updated PREQB air emission permit (PFE-65-0101-0019-I-II-0) to operate a dry-cleaning machine, a boiler, and two electric dryers. The rinse water from the washing machines is discarded directly into the Puerto Rico Aqueduct and Sewers Authority (PRASA) sewer system.

The dry-cleaning process is performed using tetrachloroethylene (UN 1897). During an Off/On Site Reconnaissance performed on November 29, 2001, five corroded, 55-gallon metal drums were observed on the backyard of the property (northern side). Two of these drums were labeled as containing tetrachloroethylene and were located over an uncovered, outdoor concrete platform with no containment system. To the north and besides these two drums, there was another corroded drum, also labeled as containing tetrachloroethylene. This drum was partially buried directly into the ground, laying on its side and located over the exposed soil area on the backyard (Figure 2). In the area of exposed soil on the backyard, two additional corroded metal 55-gallon drums were observed next to and to the north of the three drums containing tetrachloroethylene. These drums were also partially buried directly into the ground and laying on their side (Figure 2). According to Mrs. Aristy, these drums were previously used to store kerosene. One of these drums was over the gravel area while the other was over the exposed soil (Figure 2)

Within a 4-mile radius from the site there are twenty-seven (27) PRASA drinking water wells. Two of these wells are within a 2-mile radius, are downgradient (Pozo Truman and Pozo Miguel Such), and were closed in 1987 due to contamination with volatile organic compounds (VOC's), including tetrachloroethylene, among others. There are also two other PRASA drinking water wells that are downgradient and within ½ - mile distance from the site (Pozo Extension Roosevelt and Pozo Parque Roosevelt). The fact that tetrachloroethylene is being used at the site for the dry-cleaning process since 1978, that there were four 55-gallon metal drums labeled as containing either tetrachloroethylene or kerosene laying on their side and directly over the ground at the site, and that there are two wells located downgradient from the site closed due to contamination with VOC's (including tetrachloroethylene), CLI represents a threat to other drinking water wells in the area.

SAMPLING STRATEGY: (describe sample location, amount, rationale, type of samples, QA/QC samples etc.)

Soil Samples: A total of nine (9) soil samples, including the duplicate, will be collected during this Site Inspection. Seven (7) onsite samples will be collected in order to determine the type and concentration of hazardous substances for attribution of contaminants, if any. Two (2) samples will be collected as background. The background samples will be collected on areas presumed to be out of the influence of site activities and contamination. At least one combined field rinsate blank will be collected for each day of sampling. For the location and rationale for each sample refer to Table B-1 and Figures 2-4.

Groundwater Samples: Three (3) groundwater samples will be collected during this Site Inspection. Three (3) samples (CLI-GW-01, CLI-GW-02D, CLI-GW-03) including the duplicate, will be collected from two (2) PRASA drinking water wells (Las Americas and Hiram Bithorn) located downgradient and within a 2-mile distance from the site. The MS/MSD sample will also be collected at one of these points for quality control purposes.
Refer to Table B-1 and Figures 2-4 for the description, rationale, and location of these samples.

Quality Assurance/ Quality Control (QA/QC) samples:

Field rinsate blanks will be collected daily by pouring demonstrated analyte free water over a piece of decontaminated sampling equipment (e.g. bowl, bucket or auger) to evaluate potential cross contamination from inadequate decontamination. The frequency of the field rinsate blank collection is one per decontamination event per type of equipment (e.g. bowl bucket or auger), not to exceed more than one per day. The field rinsate blanks will consist of the same number and type of containers as their original aqueous samples. Sample preservation will be as for all aqueous samples and as indicated in Sections 3.5.3 and 3.5.4 of the approved PREQB Superfund PA/SI QAAP for SSI (Revision 8, November 7, 2003). Field rinsate blanks will be taken at the beginning of each

sampling day for all parameters of interest (excluding physical parameters) and shipped with the samples taken during that specific day.

Field trip blanks will be prepared at the rate of one (1) per each day, when volatile organics in an aqueous matrix are being collected. Trip Blanks will be collected at the rate of one (1) per cooler per each day of organic sampling. Analyte free water blanks will be collected prior to the sampling event and separately, whenever a new lot of demonstrated analyte free water is used for a sampling event. The same demonstrated analyte free water utilized for the trip and field blanks will be used to collected this blank. This blank will be analyzed for CLP TCL/TAL parameters. The analyte free water blanks will consist of the same number and type of containers of an aqueous sample.

Additional Information on Sampling Strategy:

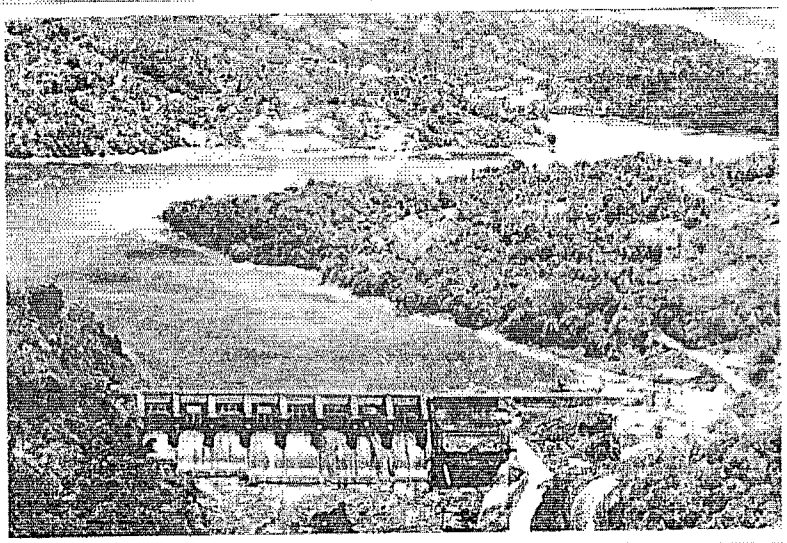
Continuous air monitoring will be conducted during all sampling activities using an FID and a PID (i.e. Foxboro TVA 1000B). Only grab samples will be taken during the sampling activities. All samples will be analyzed for Target Compound List (TCL) and Target Analyte List (TAL) contaminants, including cyanide. For a description and purpose of the samples, refer to Table B-1.

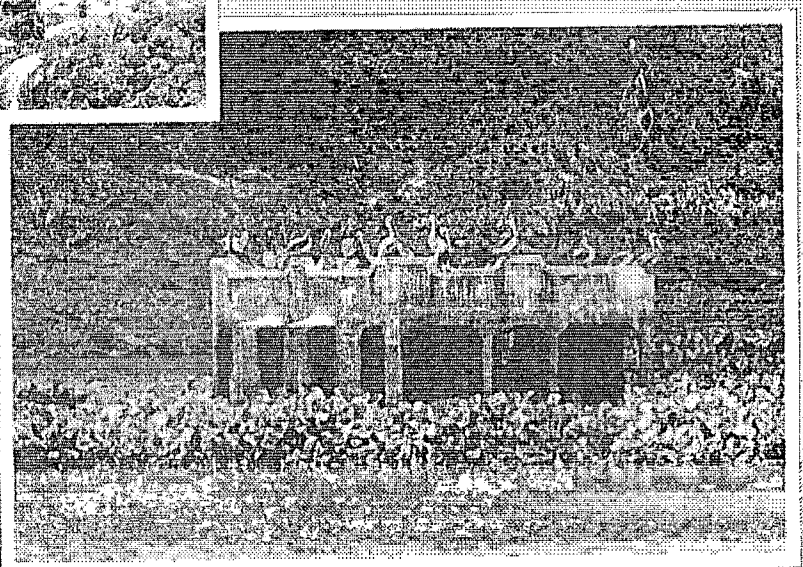
TABLE B-1: SAMPLES DESCRIPTION (CONT.)

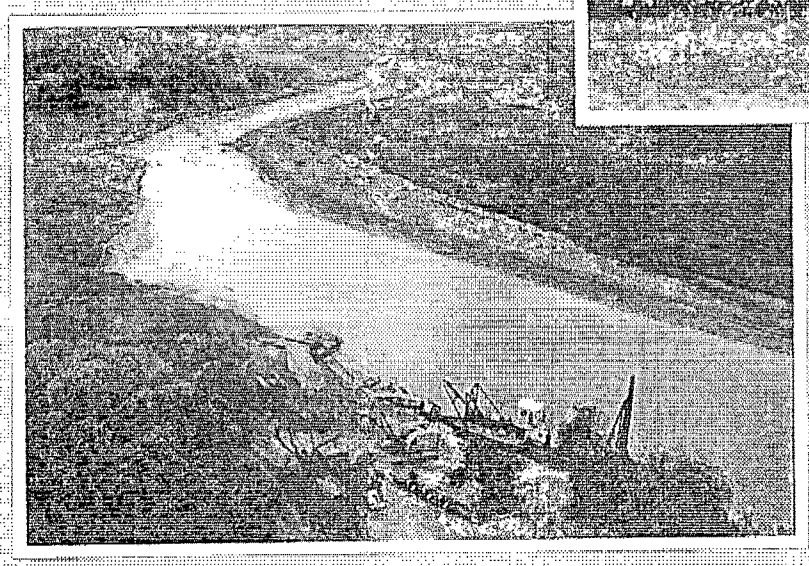
Matrix	Sample Number	Description
	CLI-GW-01	Groundwater sample to be collected from the downgradient PRASA drinking water well Hiram Bithorn to determine type, concentration, and possible migration of contaminants from the site to the ground water. This well is located to the southwest of and at approximately 2-mile radius from the site.
	CLI-GW-02D	Duplicate of sample CLI-GW-01.
	CLI-GW-03	Groundwater sample to be collected from a downgradient PRASA drinking water well Las Américas to determine possible migration of contaminants from the site to the groundwater and the Matrix Spike/Matrix Spike Duplicate. This well is located to the southwest of and within 2-mile radius from the site.
BLANKS	*CLI-FB-01*	Field Trip Blank for quality control purposes, when volatile organics in an aqueous matrix are being collected.
	CLI-FRB-01	Field Rinsate Blank for quality control purposes.
	CLI-FRB-02	Field Rinsate Blank for quality control purposes.
	CLI-AFB-01	Analyte Free Water Blank for quality control.
	CLI-TB-01	Trip Blank for quality control. One per cooler per each day of organic sampling.
	CLI-TB-02	Trip Blank for quality control. One per cooler per each day of organic sampling.
	CLI-TB-03	Trip Blank for quality control. One per cooler per each day of organic sampling.
	CLI-TB-04	Trip Blank for quality control. One per cooler per each day of organic sampling.

REFERENCE: 30

Sedimentation History of Lago Loíza, Puerto Rico, 1953-94







U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 97-4108

Prepared in cooperation with the

PUERTO RICO AQUEDUCT AND SEWER AUTHORITY

conclusions are presented in this report to document the volume and distribution of sediment deposited in Lago Loíza reservoir from its construction in 1953 through 1994.

CHARACTERISTICS OF THE LAGO LOÍZA BASIN

The Río Grande de Loíza watershed is the largest drainage basin in Puerto Rico (fig. 1). The Carraízo Dam is the outlet for the upper Río Grande de Loíza drainage basin with an area of 538 square kilometers. The reservoir lies at the end of two flood plains formed by the Río Gurabo and the Río Grande de Loíza with alluvium covering almost 100 square kilometers of the basin. The largest city in the basin, Caguas, was established on the flood plain and is bounded by steeply sloped mountains composed of igneous and volcanic rock. Approximately 180 square kilometers of the upper Río Grande de Loíza basin is underlain by the San Lorenzo Batholith, composed of granodiorite that weathers readily into clays and course sands, approximately 130 square kilometers is underlain by volcanoclastic rocks, and 120 square kilometers is underlain by submarine basalts and cherts.

Mean annual rainfall within the upper Río Grande de Loíza basin ranges from as much as 5,000 millimeters per year on the slopes of the Sierra de Luquillo mountains to about 1,600 millimeters per year in Juncos and Caguas which lie in the rain shadow of the mountain range (Calvesbert, 1970). The principal rivers draining into the reservoir are the Río Grande de Loíza, Río Gurabo, Río Cañas, and Río Bairoa. The combined mean annual discharge (9.80 cubic meters per second) of the Río Grande de Loíza and Río Gurabo constitute about 72 percent of the mean annual inflow to the reservoir. Assuming the same runoff rate for the rest of the basin, the long-term mean flow entering the reservoir is about 13.6 cubic meters per second. During periods when water is not being rationed, the average withdrawal for water use equals 4.4 cubic meters per second (100 million gallons per day). For water year 1994, the annual mean flow into Lago Loíza was 5.6 cubic meters per second; the seven-day minimum flow was 0.57 cubic meter per second for the Río Grande de Loíza and 0.16 cubic meter per second for the Río Gurabo (Díaz and others, 1995). While the average surface runoff amounts to more than three times the demand in a given year, the effective storage capacity is approximately one-tenth of the yearly demand.

The upper Río Grande de Loíza basin is one of the most highly developed watersheds in Puerto Rico with a population density of about 465 people per square kilometer (Department of Commerce, 1991). Within the basin are the towns of Aguas Buenas, Caguas, Gurabo, Juncos, Las Piedras, and San Lorenzo. Approximately 75 percent of the basin is steeply sloped with erodible soils (Iivari, 1981). Analysis of aerial photographs was used to determine that the agriculture land use accounted for 36 percent of the basin in 1950 but accounted for only 10 percent of the land use in 1987. Much of the cropland was abandoned and reverted to pasture and secondary forest during this period of time. The expected reduction in hillslope erosion resulting from the reversion to pasture and secondary forest has possibly been offset by increased erosion, due to construction activities as urban centers continue to expand in the Río Grande de Loíza drainage basin. Urban areas increased from 3 to 7 percent coverage of the basin from 1950 to 1987 (A. Gellis, USGS, personal commun., 1997).

CHARACTERISTICS OF CARRAÍZO DAM AND LAGO LOÍZA

The Río Grande de Loíza was impounded in March of 1953 with the completion of the Carraízo Dam 21.7 kilometers upstream from the river's outlet to the Atlantic Ocean. The dam and reservoir characteristics are given in table 1.

Lago Loíza was built to provide the San Juan metropolitan area with a municipal water supply. Although penstocks and turbines for power generation (3,000 kilowatts capacity) were originally included to provide an independent source of power for dam operations, hydroelectric power generation was later abandoned due to the infrequency of reservoir releases (Iivari, 1981). In 1977, flash boards were added to raise the maximum pool level from 40.14 meters above mean sea level (amsl) to 41.14 meters amsl. The additional storage capacity provided by the flash boards could be between 2.4 and 3.0 million cubic meters. The lower value is based on the 1994 bathymetry and the higher value on the 1947 topography. Sedimentation of small tributaries to the lake has reduced the surface area of the lake from 3.06

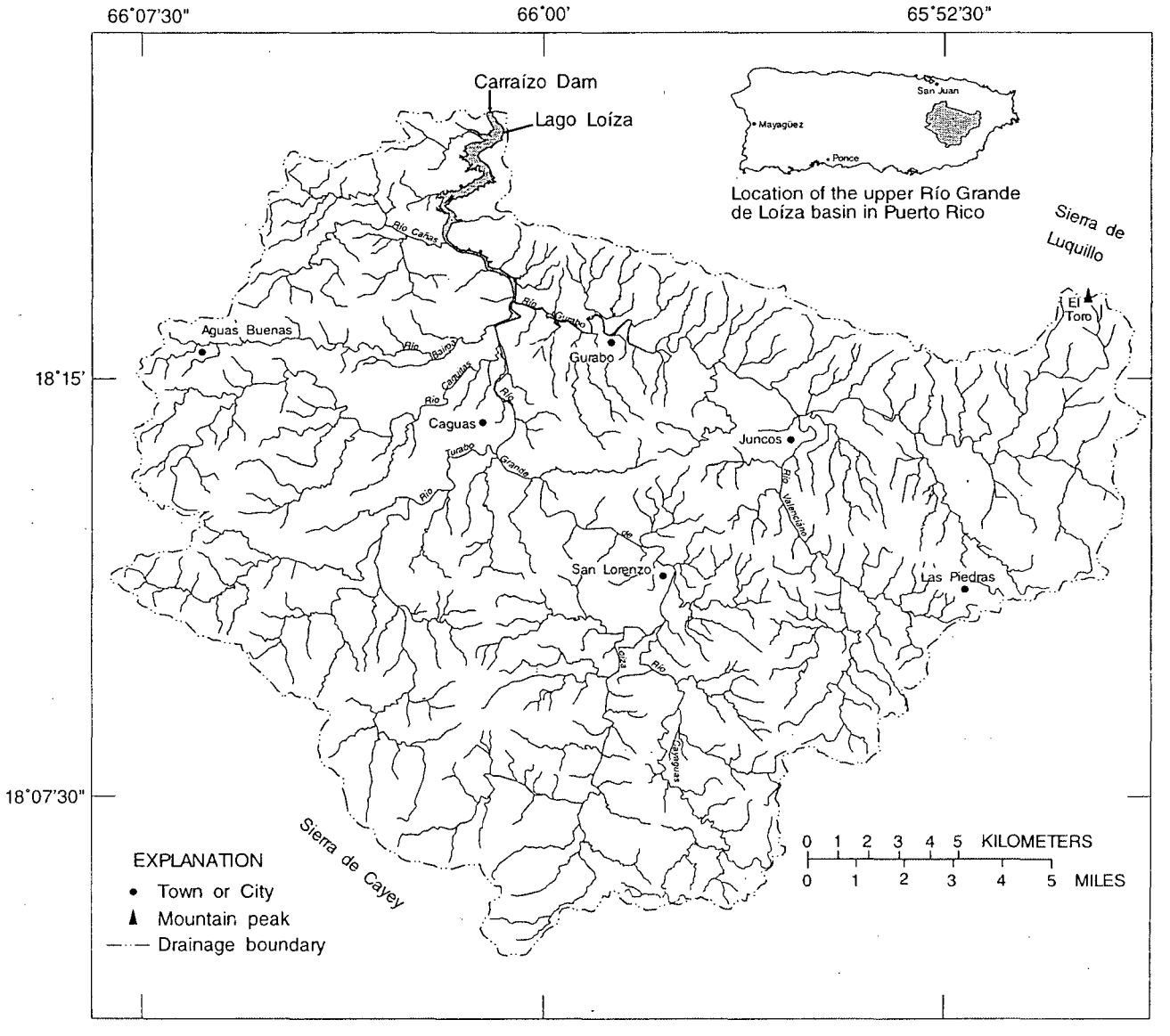


Figure 1. Location of Lago Loíza in the Río Grande de Loíza basin, Puerto Rico.

Table 1. Principal characteristics of Lago Loíza and Carraízo Dam

[Modified from Sheda and Legas, 1968; and the Puerto Rico Electric Power Authority, 1980; amsl, above mean sea level; TIN, Triangulated Irregular Network]

Total length of dam at top (spillway and non-overflow sections)	210 meters
Length of spillway section	95.1 meters
Elevations: (amsl)	
Top of dam	44.0 meters
Top of gates	41.14 meters
Spillway crest	31.0 meters
Crown of lowest water intake	30.0 meters
Invert of intake structure	28.0 meters
Maximum width at base	30.0 meters
Diameter of penstocks	1.67 meters
Installed power-generating capacity	3,000 kilowatts
Discharges with gates completely open	
Maximum normal pool (41.14 meters amsl)	6,590 cubic meters per second
Maximum design elevation (43.0 meters amsl)	8,835 cubic meters per second
Top of dam (44.0 meters amsl)	9,970 cubic meters per second
Maximum discharge recorded at dam site (September 6, 1960)	4,814 cubic meters per second
Storage at pool elevation of 41.14 meters from 1947 TIN	26.80[1] million cubic meters
Surcharge storage for flood control (from 41.14 to 43 meters)[2]	8.0 million cubic meters
Drainage area at dam site	538 square kilometers
Design flooded area (elevation of 43 meters)	Not available
Flooded area at 41.14 meters	2.67 square kilometers
Maximum pool elevation (top of gates)	41.14 meters
Maximum original depth of normal pool (pool elevation of 40.14 meters)	24 meters
Maximum depth during 1994 survey (pool elevation of 41.14 meters)	18 meters
Maximum length of normal pool[3]	10 kilometers

[1] Hunt (1976) reported the original volume as 26.85 million cubic meters at a pool elevation of 40.14 meters amsl.

[2] Assumes that the capacity between elevations of 41 and 44 meters above mean sea level has not changed since dam construction.

[3] To the confluence of the Río Grande de Loíza and the Río Gurabo, Puerto Rico.

to 2.67 square kilometers from 1953 to 1994 (at a pool elevation of 41.14 meters amsl). Three 48-inch-diameter silt sluice outlets in the overflow section of the dam (two at 22 meters and one at 17 meters amsl) were rendered inoperable in 1977 to prevent accidental discharges for the reservoir (Iivari, 1981).

METHOD OF SURVEY

The 1994 survey of Lago Loíza reservoir involved planning, data acquisition, and data processing. A geographic information system, Arc/Info[1] was used to plan the survey lines and to analyze the bathymetric data. Bathymetric survey lines (track lines) were established at a spacing of 50 to 100 meters (fig. 2). Data describing the reservoir cross-sections below the track lines were acquired with a Differential Global Positioning System (DGPS) combined with a depth sounder. The soundings were subsequently adjusted to represent depths below the maximum pool elevation (datum 41.14 meters above mean sea level). The corrected depths were then converted to elevations above mean sea level as established by the National Geodetic Vertical Datum 1929 (NGVD29). A bathymetric map[2] of the reservoir bottom was constructed with elevation contours drawn at 1-meter intervals from the deepest part of the reservoir (26 meters amsl) up to the maximum pool elevation of 41 meters above mean sea level. The contour lines were then converted into a surface model of the reservoir bottom by creating a triangulated irregular network (TIN). The TIN represents the lake bottom as thousands of adjoining triangles with x, y, and z coordinates assigned to all vertices. The volume of the reservoir was then calculated at incremental pool elevations. Cross sections and longitudinal sections were produced from the surface models. These sections were compared with the bathymetric data to verify that the model sections accurately reflect the reservoir bottom. To further describe the temporal variation in scour and fill in Lago Loíza since its impoundment, cross sections and longitudinal sections from surveys made in 1953, 1963, 1971, 1979, 1990, and 1994 are also presented. Finally, TINs created from the original reservoir bottom (from a 1:2000 scale topographic survey conducted prior to the impoundment) and the 1994 reservoir bottom were converted into geographically-registered grids with a 10-meter cell spacing. The difference in elevation between the two surveys for each cell was determined and used to construct a map showing the net amount of deposition or erosion in different areas of the reservoir since its impoundment.

Field Techniques

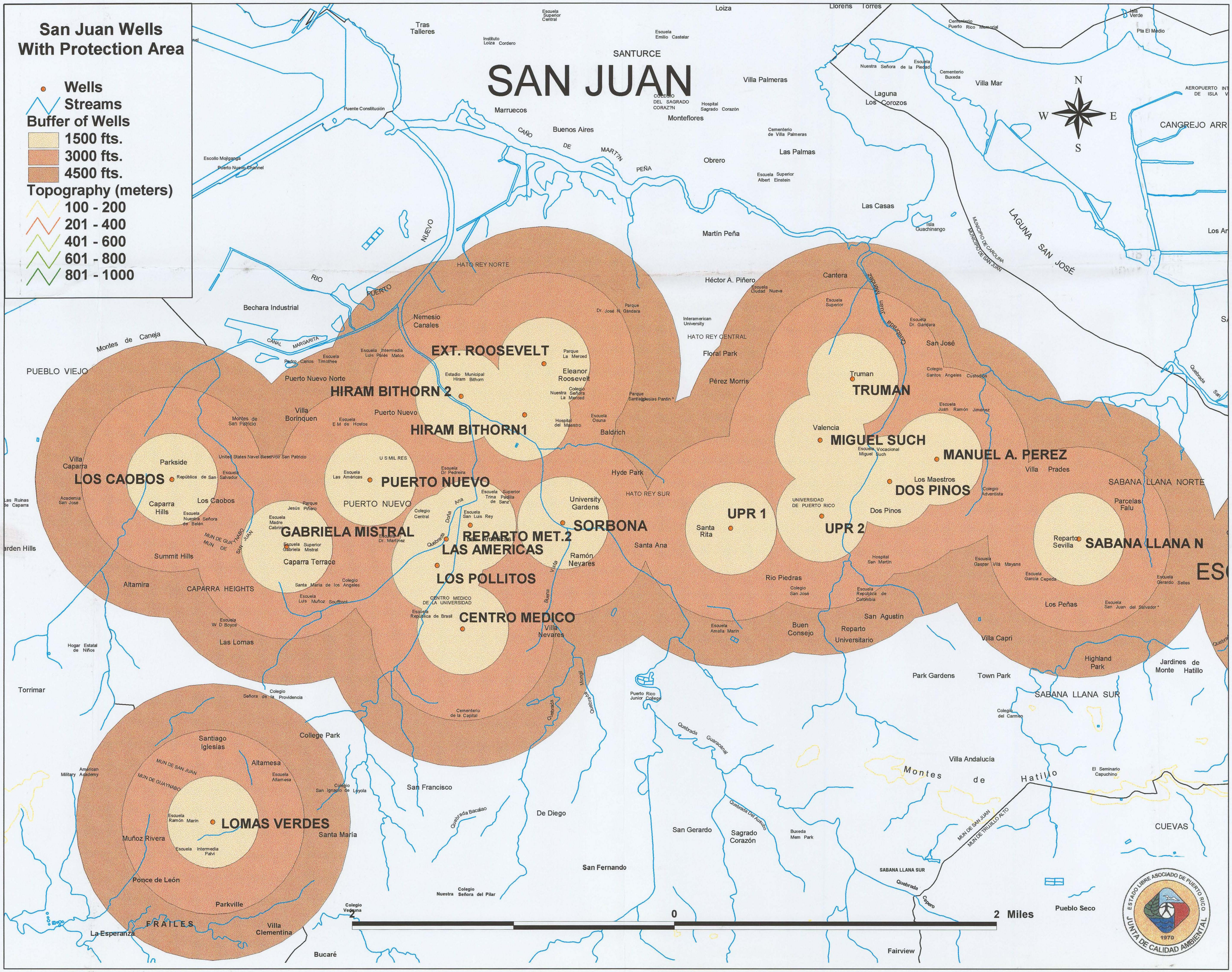
The bathymetric survey of Lago Loíza was conducted from November 1 to 15, 1994. Data were collected with the Bathymetric/Land Survey System (BLASS) developed by Specialty Devices Inc. The system uses two Motorola SixGun differential geographic positioning systems (DGPS) for horizontal positioning. The GPS units were first used in static survey mode to establish reference marks at sites near the reservoir. A reference station, CARRAIZO (18°19'40.7498"N, 66°00'58.106"W, 44.0 meters amsl), was established at the center of the dam using the USGS Benchmark MESAS (18°16'19.148"N, 66°03'13.408"W, 344.96 meters amsl). Because of the sinuous form of the reservoir, three additional reference stations were established. USGS benchmark SILLA (18°18'15.410"N, 65°59'16.219"W, 366.73 meters amsl) was used as the master station to establish reference stations at MARINA (18°17'43.36"N, 66°00'37.60"W, 317.0 meters amsl), TANQUE (18°17'58.45"N, 66°00'32.62"W, 336.9 meters amsl), and PAPA JUAN (18°17'57.54"N, 66°00'48.56"W, 300.2 meters amsl).

During the bathymetric survey, the reference station with the best visibility of the area to be surveyed was occupied as the master station to transmit GPS pseudorange corrections to the survey boat below. The GPS on board the survey boat independently calculated a position every second using the six satellites in view with the best geometry. Once every 5 seconds, the boat's GPS received a set of pseudorange corrections to maintain a positional accuracy of better than 2 meters.

[1] Use of trade names in this report is for identification purposes only and does not imply endorsement by the U.S. Government.

[2] For purposes of this report, the topographic map describing elevations of the lake bottom after impoundment will be referred to as a bathymetric map to convey the fact that the surveyed area is below water. A strict interpretation of the word bathymetry would require that the contours be isobaths, or lines of equal depth, rather than lines of equal elevation.

REFERENCE: 31


San Juan Wells
With Protection Area
Wells
Streams
Buffer of Wells
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3000 fts.
4500 fts.
Topography (meters)
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201 - 400
401 - 600
601 - 800
801 - 1000
SAN JUAN
EXT. ROOSEVELT
HIRAM BITHORN 2
HIRAM BITHORN1
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GABRIELA MISTRAL
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JUNTA DE CALIDAD AMBIENTAL
1970

REFERENCE: 32

ESTADO LIBRE ASOCIADO DE PUERTO RICO / OFICINA DEL GOBERNADO

Junta de Calidad Ambiental

INVENTARIO DE USOS DE LOS CUERPOS DE AGUA SUPERFICIALES DE PUERTO RICO

Mayo 1982

BORRADOR

RIO GRANDE DE LOIZA

Nace el Río Grande de Loíza en el Barrio Espino del Municipio de San Lorenzo. El río y sus tributarios pasan a través de los municipios de Loíza , Canóvanas, Carolina, San Juan, Guaynabo, Gurabo, Río Grande, Aguas Buenas, Trujillo Alto, Cidra , Juncos, Naguabo, Las Piedras, Caguas y San Lorenzo.

Tiene una longitud aproximada en 72.0 Kilómetros desde su nacimiento hasta su desembocadura en el Océano Atlántico.

Son sus tributarios la Quebrada Verraco, Quebrada Arenas, Quebrada Lajas, Río Emajagua, Quebrada Arenas, Chiquita, Quebrada Hondo, Quebrada Blanco, Quebrada Salva Tierra, Río Cayaguas, Quebrada Janer, Quebrada Las Bambúas, Río Turabo, Río Caguitas, Río Bairoa, Río Gurabo, Río Cañas, Quebrada Carraízo, Quebrada Colorada, Quebrada Grande, Quebrada Maracuto, Río Canovanillas, Quebrada Bocaforma, Río Canóvanas, Caño Carrasco, Caño Norberto, Canal Machicote, Caño Zequeira y Caño Gallardo.

Recibe las descargas de las siguientes Plantas de Tratamiento de Aguas Negras: San Lorenzo, Caguas, Gurabo, Juncos, Pueblito del Río, El Conquistador, Trujillo Alto, Lago Alto, Villa del Sol, Lomas de Carolina, Rosa María, Brisas de Loíza, Loíza Valley, Canóvanas, Canal Caracoles, Aguas Buenas, Loíza Aldea, Escuela Bo. Mangó en Juncos. Recibe además las descargas de las Plantas de Filtración de: Caguas, Juncos, San Lorenzo, Aguas Buenas, Barrazas, y Barrio Cubuy. Como otra fuente de contaminación están identificadas las siguientes descargas industriales: Compañía Fomento Industrial de Caguas, Las Piedras Container, RCA Borinquen Inc., Pamcor, Life Saver Manuf, Chees Brought Ponds., Las Piedras Fomento Inc., Eli Lilly, 3M de Puerto Rico, Warner Chilcott, Converse Rubber Co., Aluminum Estrusion Corp., Compañía de Fomento, Micro data Inc. y Ford Motor Co.

En el río y sus tributarios se encuentran quince tomas de agua potable. El sistema cuenta además con el Lago Loíza.

En el Río Grande de Loíza hay 5 estaciones de monitoría de aguas superficiales y 1 estación de monitoría de aguas costanera.

TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
1. Desde la desembocadura del río, hasta 6.4 kilómetros aguas arriba, en el límite de los Barrios Torrecilla Alta y Canóvanas, Municipio de Loíza.	Area de Recarga	1. Caño Gallardo 2. Caño Palúdica 3. Caño Zequeira 4. Caño San Isidro 5. Caño Norberto 6. Caño Carrasco		
- Desde la desembocadura del Río Canóvanas, hasta 3.75 kilómetros aguas arriba, en los límites del pueblo de Canóvanas.	Area de Recarga			
- Desde 4.0 kilómetros aguas arriba de la desembocadura del Río Canóvanas, hasta el nacimiento del río, Barrio Cubuy, Municipio de Loíza.	Agua Potable	1. Río Cubuy a. Quebrada de los Saltos		

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE
RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
- A lo largo del Canal del Medio y Canal de Tierra, en el límite de los Barrios Torrecillas Alta,y Torrecilas Bajo, Municipio de Loíza.	Area Ecológicamente Sensitiva	1. Canal del Medio	Aquí se encuentra parte del complejo Vacía Talega-Torrecilla Piñones. Hay varias especies de aves, que anidan en esta área entre las cuales se encuentra el pelícano marrón, especie protegida por agencias federales.	
- A lo largo del Canal Machicote, en el Barrio Torrecilla Alta del Municipio de Loíza.	Area Ecológicamente Sensitiva	1. Canal Machicote	Se encuentra parte del pántano Torrecilla Alta. Es una región contigua al complejo Vacía Talega-Torrecilla Piñones. Hay bosque Pterocarpus, el cual provee sostén a la paloma cabeciblanca, especie en peligro de extinción.	
6. Desde la desembocadura del río, hasta 9.5 kilómetros aguas arriba, en el límite del Barrio Canovanillas, Municipio de Carolina y Barrio Torrecilla Alta, Municipio de Loíza.	Estuario	—	Información obtenida a través de documento publicado por el Departamento de Recursos Naturales.	

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE
RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
4. Desde el kilómetro 27.75 aguas arriba, hasta el nacimiento del río, Barrio Espino, Municipio de San Lorenzo.	Agua Potable	1. Lago Carraízo	El Lago Carraízo se utiliza para la generación de energía eléctrica y suministro de agua potable. Alguna pesca de dajaos y chopas se pueden encontrar en este lago.	
		2. Quebrada Carraízo		
		3. Río Cañas	Hay pesca ocasional en el Río Cañas. Este río está contaminado con Bilharzia.	
		a. Quebrada Arenas		
		4. Río Gurabo	Hay pesca ocasional en el Río Gurabo. Este río está contaminado con Bilharzia.	
		a. Río Valenciano		
		1. Quebrada Don Víctor		
		2. Quebrada La Santa		
		3. Quebrada Los Muertos		
		a. Quebrada Montones		
		b. Quebrada Ceiba		
		c. Quebrada Arenas		
		d. Quebrada Honda		

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE
RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
		1. Quebrada Colorada		
		2. Quebrada de los Rábanos		
		5. Río Bairóa	Hay pesca ocasional en el Río Bairoa. Está contaminado moderadamente con Bilharzia	
		a. Quebrada de los Muertos		
		6. Río Caguitas		
		a. Río Cañaboncito		
		b. Quebrada Algarrobo		
		c. Quebrada del Horno		
		d. Quebrada Sanjelo		
		7. Río Turabo		
		a. Quebrada de las Quebradillas		
		b. Quebrada Beatriz		
		1. Quebrada Sonadora		

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE

RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
		c. Quebrada Naranjito		
		d. Quebrada Maracaí		
		1. Quebrada Morena		
		8. Quebrada Las Bambúas		
		9. Quebrada Janer		
		10. Río Cayaguas		
		a. Quebrada Grande		
		b. Río de las Vegas		
		11. Quebrada Salvatierra		
		a. Quebrada el Cangle		
		12. Quebrada Blanca		
		a. Quebrada Prieta		
		13. Quebrada Honda		
		14. Quebrada Arena Chiquita		
		15. Río Emajagua		
		16. Quebrada Lajas		
		17. Quebrada Arenas		
		18. Quebrada Verraco		

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE

RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
- Desde 8.6 kilómetros de la desembocadura del Río Turabo en el límite de los Barrios Turabo y Borinquen, Municipio de Caguas, hasta 12.4 kilómetros aguas arriba en el Río Turabo, en el límite de los Barrios Borinquen y San Salvador Municipio de Caguas.	Area Ecológicamente Sensitiva		Aquí se encuentra parte del Barrio Borinquen, región donde se puede localizar la paloma sabanera, especie en peligro de extinción.	
- Desde el kilómetro 70 aguas arriba en el río, Barrio Espino, Municipio de San Lorenzo hasta el nacimiento del río, Barrio Espino, Municipio de San Lorenzo	Area Ecológicamente Sensitiva		El Río Grande de Loíza nace en el Bosque Estatal de Carite. Esta reserva forestal provee habitat a nueve especies endémicas de aves.	

CONT. TABLA 6
CLASIFICACION POR SEGMENTOS POR USOS DE

RIO GRANDE DE LOIZA

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
3. Desde el kilómetro 9.5 aguas arriba, hasta el kilómetro 27.75, en el límite de los Barrios Carrafzo y La Gloria, Municipio de Trujillo Alto.	Segmento sin clasificar	1. Río Canovanillas a. Quebrada Cambute b. Quebrada Limones c. Quebrada Las Lajas d. Quebrada González 2. Quebrada Maracuto a. Quebrada Patrana b. Quebrada Hoya Fría 3. Quebrada Grande a. Quebrada Infierno 1. Quebrada Limones 2. Quebrada Collores b. Quebrada Naranjo 4. Quebrada Colorada		

REFERENCE: 33

Río Piedras

Tiene su origen en el Barrio Caimito del municipio de San Juan a una elevación entre los 426-590 pies (130-180 metros) sobre el nivel del mar. Este es un río corto que solo cruza por la jurisdicción de San Juan. Tiene una longitud apróximada de 9.9 millas (16 kilómetros) desde que se origina hasta que desemboca en la Bahía de San Juan al norte de Puerto Rico. Corre generalmente de sur a norte.

Tiene como tributarias a la Quebrada Las Curias, Quebrada Los Guanos, Quebrada Guaracanal, Quebrada Buena Vista, Quebrada Doña Ana, Canal Margarita, Quebrada Los Muertos.

Este río está canalizado en gran parte de su trayectoria.

Contaminación

Recibe contaminación de casas localizadas a lo largo de su trayectoria.

1. Quebrada Las Curias

Tiene su origen esta quebrada de la unión de dos quebradas en el Barrio Cupey de la municipalidad de San Juan a elevaciones que fluctuan entre los 394-459 pies (120-140 metros) sobre el nivel del mar. Tiene como 2.9 millas (4.6 kilómetros) de largo y corre de este a oeste. Forma el Lago Las Curias.

2. Quebrada Los Guanos

Nace esta quebrada al este del Barrio Cupey de la jurisdicción de San Juan a una elevación de 328 pies (100 metros) sobre el nivel del mar. Tiene una longitud apróximada de 2 millas (3.4 kilómetros) y corre de este a oeste.

3. Quebrada Guaracanal

Nace esta quebrada en el Barrio Montes del municipio de San Juan a una elevación apróximada de 164 a 262 pies (50-80 metros) sobre el nivel del mar. Tiene como 2.5 millas (4 kilómetros) de largo y corre de este a noroeste.

Tiene de tributarias a las Quebrada Cepero y Quebrada del Ausubo.

a) Quebrada Cepero

Nace esta quebrada en el Barrio Carraizo de Trujillo Alto a una elevación apróximada de 230 pies (70 metros) sobre el nivel del mar. Es una quebrada corta que corre de sur a noroeste.

b) Quebrada Ausubo

Nace esta quebrada en el Barrio Cupey del municipio de San Juan a una elevación apróximada de 164 pies (50 metros) sobre el nivel del mar. Es una quebrada corta que corre de sur a norte.

4. Quebrada Buena Vista

Tiene su origen esta quebrada en el Barrio Monacillo Urbano de San Juan a una elevación apróximada de 148 pies (45 metros) sobre el nivel del mar. Tiene una longitud apróximada de 2.5 millas (4 kilómetros) y corre de sur a norte.

Tiene de tributaria a la Quebrada Mongil.

a) Quebrada Mongil

Nace esta quebrada en el Barrio Monacillo Urbano de la municipalidad de San Juan a una elevación apróximada de 82 pies (25 metros) sobre el nivel del mar. Es una quebrada corta que corre de sur a norte.

Río Bayamón

Nace este río al norte del Barrio Beatriz de la municipalidad de Cidra a una elevación de 1,476 pies (450 metros) sobre el nivel del mar.

Tiene una longitud apróximada de 25 millas (41 kilómetros) desde su nacimiento hasta que desemboca en la Bahía de San Juan al norte de Puerto Rico. Tiene un área de captación de 105 millas cuadradas.

Cruza por los municipios de Cidra, Guaynabo, Toa Baja, Bayamón y Cataño.

Tiene de tributarios al Río Clavijo, Río Sabana, Quebrada Prieta, Quebrada La Zapera, Quebrada Solano, Quebrada Ceiba, Quebrada Jácana, Quebrada Vicente, Quebrada Grande, Quebrada Las Chorreras, Quebrada Sanadora, Quebrada Bello Gallón, Quebrada Damiana, Quebrada Santa Olaya, Quebrada El Marqués, Río Minillas, Río Guaynabo, Río Hondo, Caño de Quebrada Catalina, Caño El Hato y Caño Aguas Frías.

El Río Bayamón forma al Lago Cidra y la Represa San Juan.

El Río Bayamón junto al Río Guaynabo suplen el 90% de abasto de agua de la zona metropolitana.

Actualmente el Río Bayamón está siendo canalizado por lo que su trayectoria ha sido alterada.

Pesca

En este río hay buena pesca de sábalo y robalo.

Contaminación

La quebrada Santa Catalina y el Río Hondo tributarios del Río Bayamón pasan por el pueblo de Bayamón recibiendo contaminación de las casas cercanas a la trayectoria de estos.

1. Río Clavijo

Nace este río en el Barrio Beatriz de Cidra a una elevación apróximada de 1,476 pies (450 metros) sobre el nivel del mar. Es un rio corto que corre generalmente del sur hacia el norte, uniéndose al Río Bayamón al oeste del Barrio Beatriz del municipio de Cidra.

2. Río Sabana

Nace este río en el Barrio Arenas de Cidra a una elevación de 1,509 pies (460 metros) sobre el nivel del mar. Es un río corto que corre de este hacia el oeste hasta llegar al Lago de Cidra.

3. Quebrada Prieta

Nace esta quebrada al oeste del Barrio Cañaboncito de Caguas a una elevación de 1,410 pies (430 metros) sobre el nivel del mar. Es una quebrada corta que corre de este a suroeste hasta llegar al Lago Cidra.

4. Quebrada La Zapera

Nace al sur del Barrio Sumidero de Aguas Buenas a una elevación de 1,410 pies (430 metros) sobre el nivel del mar. Es una quebrada corta que corre de norte a suroeste hasta unirse al Río Bayamón al oeste del Barrio Sumidero de Aguas Buenas.

5. Quebrada Solano

Nace esta quebrada en el Barrio Ceiba de Cidra a una elevación de 1,674 pies (480 metros) sobre el nivel del mar. Tiene una longitud

Río Piedras

El Río Piedras tiene su orígen en el Barrio Caimito del Municipio de San Juan. El río pasa a través de los municipios de Trujillo Alto y San Juan.

Tiene una longitud aproximada de 17.0 kilómetros desde su nacimiento hasta su desembocadura en la Bahía de San Juan.

Los tributarios principales son los siguientes: Quebrada Las Curías, Quebrada Los Guanos, Quebrada Guaracanal, Quebrada Buena Vista, Quebrada Josefina, Quebrada Margarita, Quebrada Los Muertos, Río Puerto Nuevo y el Caño Martín Peña.

El río recibe las descargas de la Industrial Hormigonera, Better Road Asphalt Corporation y USI. En las márgenes del Río Piedras se encuentra el vertedero de San Juan. Además, recibe la descarga de la Planta de Filtración de Río Piedras.

En el Río Piedras hay (2) dos tomas de agua potable incluyendo el Aljibe Las Curías. En el río hay localizadas dos (2) estaciones de monitoría de aguas superficiales.

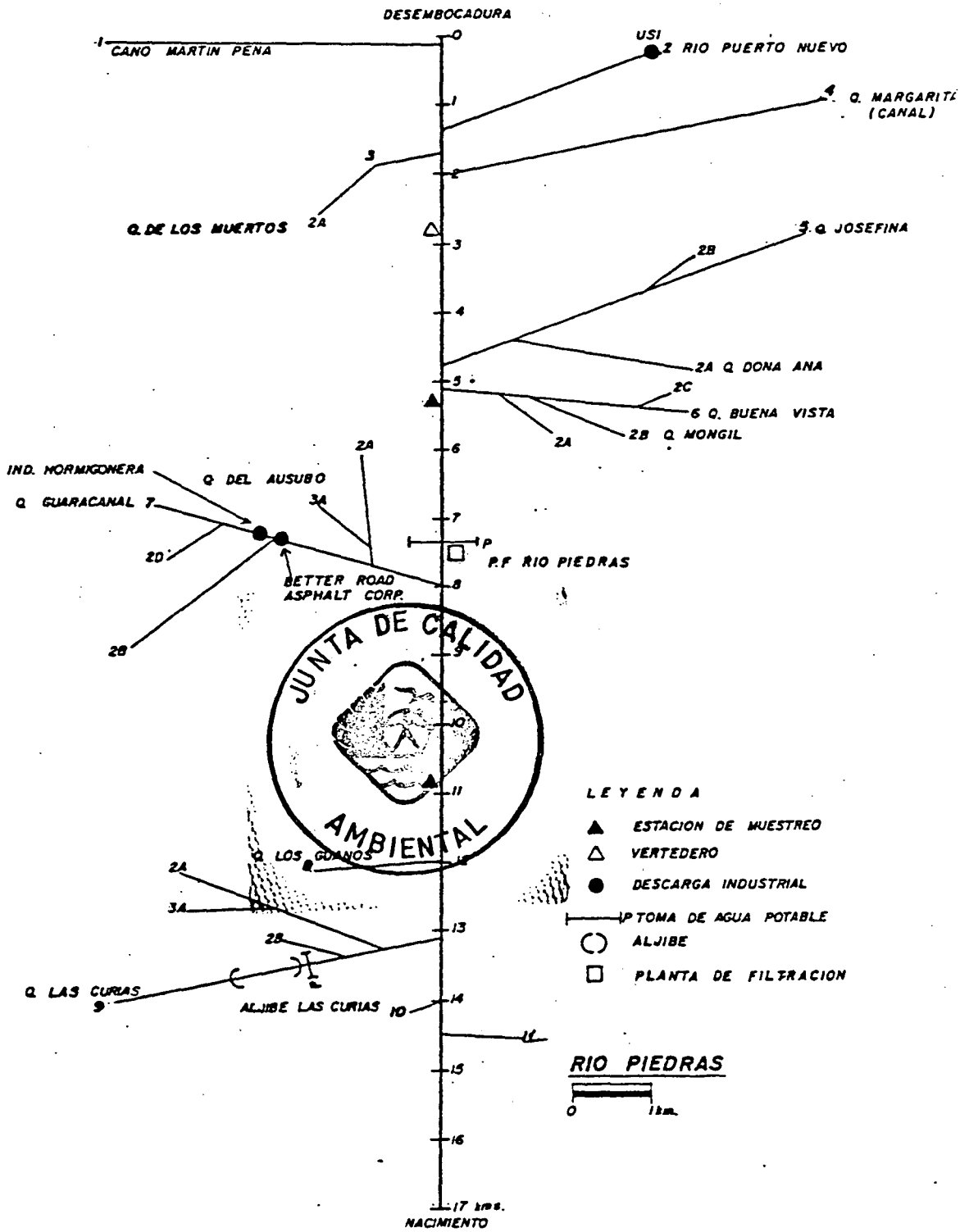
DESEMBOCADURA
0
1
CANO MARTIN PENA
USI
2 RIO PUERTO NUEVO
1
4 Q. MARGARITA (CANAL)
2
3
2A
Q. DE LOS MUERTOS
3
5 Q. JOSEFINA
2B
4
2A Q. DONA ANA
5
2C
6 Q. BUENA VISTA
2A
2B Q. MONGIL
6
2A
IND. HORMIGONERA
Q. DEL AUSUBO
Q. GUARACANAL 7
3A
7
P
P.F RIO PIEDRAS
2D
BETTER ROAD ASPHALT CORP.
8
2B
9
10
11
Q. LOS GUANOS
12
2A
3A
13
2B
Q. LAS CURIAS
9
ALJIBE LAS CURIAS 10
14
11
15
16
17 kms.
NACIMIENTO
JUNTA DE CALIDAD AMBIENTAL
LEYENDA
ESTACION DE MUESTREO
VERTEDERO
DESCARGA INDUSTRIAL
P TOMA DE AGUA POTABLE
ALJIBE
PLANTA DE FILTRACION
RIO PIEDRAS
0
1 km.

TABLA 4
CLASIFICACION POR SEGMENTOS POR USOS DE

RIO PIEDRAS

SEGMENTO	CLASIFICACION	TRIBUTARIOS EN LA CLASIFICACION	OBSERVACIONES	USOS POTENCIALES
1. Desde la desembocadura del río hasta 0.5 Kilómetros aguas arriba, Barrio Hato Rey Norte, Municipio de San Juan.	Area Ecologicamente Sensitiva		Las tierras bajas ("mud-flats") del Puente de la Constitución. Esta región sostiene la mayor diversidad y concentración de aves por acre en toda la Isla. Se han registrado alrededor de 70 especies de aves diferentes en esa región.	
2. Desde la desembocadura del río hasta 3.0 Kilómetros aguas arriba, en los límites de los barrios Hato Rey Norte y Puerto Nuevo, Municipio de San Juan.	Estuario		Estimado hecho a base de lectura de mapas y experiencia previa.	
-Desde la desembodura de la Quebrada Margarita hasta 1.75 Kilómetros aguas arriba, en el Barrio Puerto Nuevo, Municipio de San Juan.	Estuario		Estimado hecho a base de lectura de mapas y experiencia previa.	

REFERENCE: 34

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WATER-RESOURCES INVESTIGATIONS
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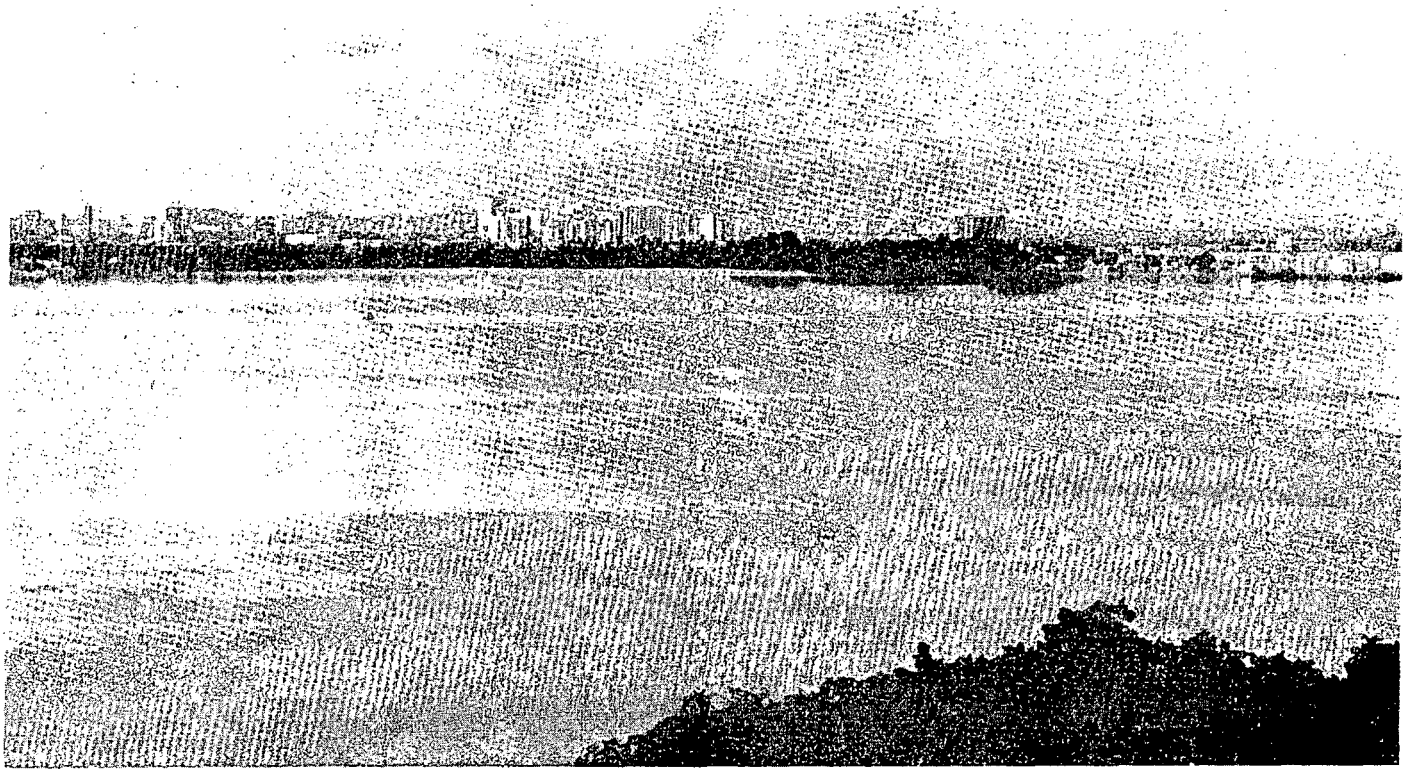

Prepared in cooperation with:
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PUERTO RICO DEPARTMENT OF NATURAL RESOURCES

HYDROLOGIC CHARACTERISTICS OF LAGOONS AT SAN JUAN, PUERTO RICO, DURING AN OCTOBER 1974 TIDAL CYCLE

By Fernando Gómez-Gómez, Ferdinand Quiñones, and Sherman R. Ellis

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Prepared in cooperation with:
PUERTO RICO ENVIRONMENTAL QUALITY BOARD AND
PUERTO RICO DEPARTMENT OF NATURAL RESOURCES
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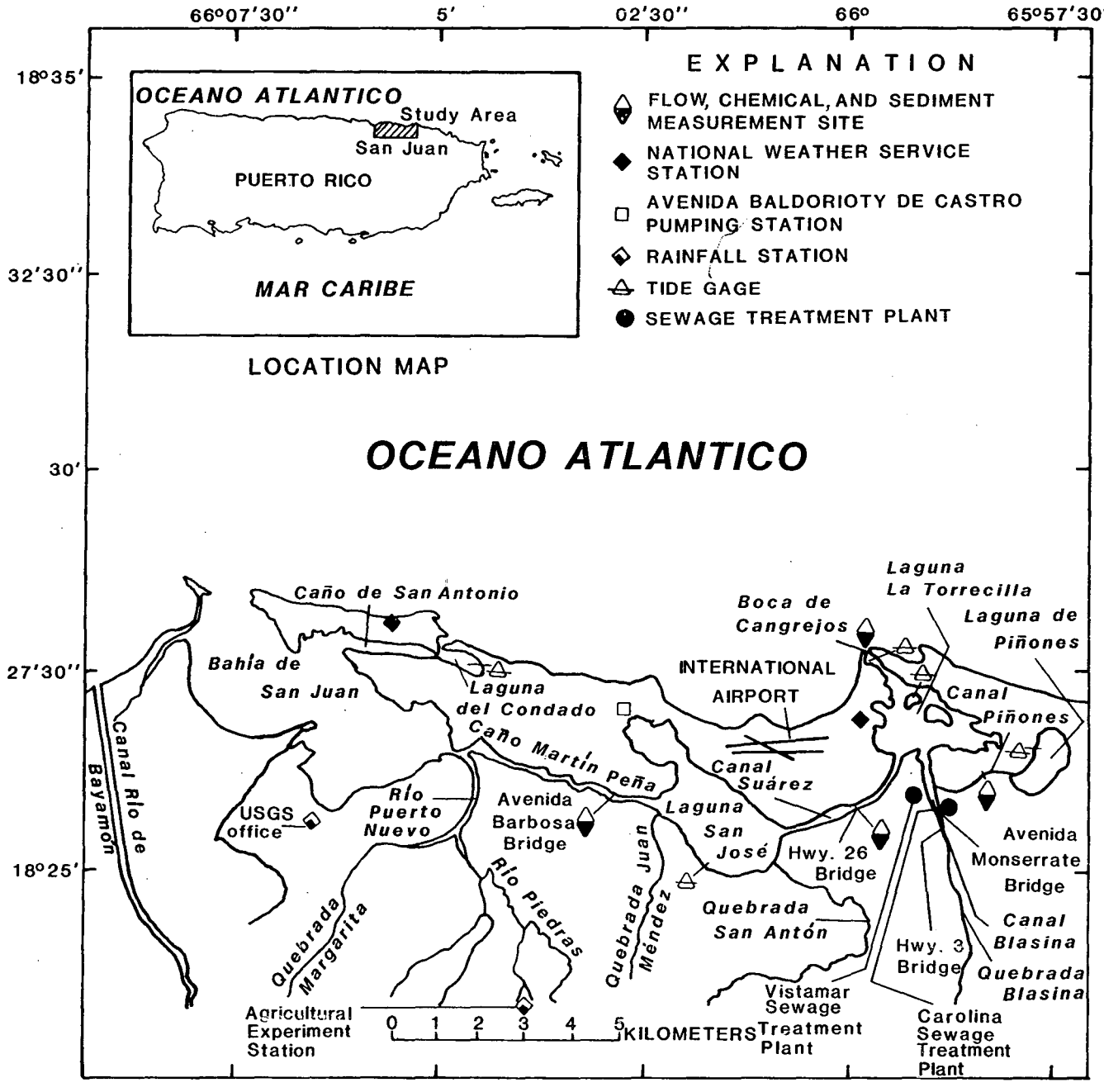


Figure 1.--General features of San Juan Lagoons project area.

Methods and Procedures

Flow measurements were made at each site hourly during the tidal cycle. Procedures described by Buchanan and Sommers (1969) were used. Stages were recorded from staff gages installed at each site and referenced to local datums.

Water samples for chemical and suspended-sediment analyses were collected with point samplers in accordance with procedures described by Brown and others (1970) and Guy (1969). Samples were integrated vertically and horizontally.

Analyses of the water samples included field determinations of specific conductance and temperature. Laboratory analyses were performed at the U.S. Geological Survey Central Laboratory in Doraville, Georgia, and included determinations of total and dissolved species of phosphorus, nitrogen, and organic carbon. Suspended-sediment samples were collected only at Boca de Cangrejos, Canal Piñones, and Canal Suárez, and analyzed at the U.S. Geological Survey field laboratory in Puerto Rico.

The storm-runoff contributions to each lagoon were computed from changes in water-surface elevations and the flow measurements at each canal or outlet. Loads of total organic carbon, total phosphorus, and total Kjeldahl nitrogen (nitrogen available in organic matter and as ammonia) were computed similarly.

Precipitation data were obtained from a network of stations operated by the National Weather Service and supplemented by data from the U.S. Geological Survey. Runoff and direct contribution of rainfall to the lagoons were computed from average precipitation loads and surface areas of the lagoons or drainage basins.

The techniques used to compute the flow of water at the outlet sites and to compute the chemical loads are described by Ellis and Gómez-Gómez (1976). The data collected during this study are published in "Water Quality and Hydraulic Data San Juan Lagoons System, Puerto Rico, by S.R. Ellis and Fernando Gómez-Gómez, 1975".

PHYSICAL CHARACTERISTICS OF THE SAN JUAN LAGOONS SYSTEM

The San Juan Lagoons System

The San Juan Lagoons system includes Laguna San José, Laguna La Torrecilla, and Laguna de Piñones (fig. 1). The lagoons are hydraulically connected by a system of natural and man-made canals. Laguna San José, the largest of the three, is connected to Bahía de San Juan by way of Caño de Martín Peña. Two main creeks (Quebrada Juan Méndez and Quebrada San Antón) flow directly into Laguna San José. Canal Suárez connects Laguna San José to Laguna la Torrecilla which is located east of the Isla Verde International Airport. Laguna la Torrecilla is perhaps the most complex of the three lagoons, since it is also connected to the Océano Atlántico at the Boca de Cangrejos outlet and to Laguna de Piñones through Canal Piñones. It also receives the flow of Quebrada Blasina, a creek flowing from the southeast end of the study area. The creek has been dredged and becomes Canal Blasina north of Highway 3. Canal Blasina provides the actual connection of Laguna de Piñones with Laguna la Torrecilla by way of Canal Piñones. Laguna de Piñones, the smallest of the three, is surrounded by Bosque Estatal de Piñones, the largest mangrove forest in Puerto Rico. Canal Piñones is the lagoon's only outlet.

The tidal and hydraulic characteristics of the San Juan lagoons have been described by Ellis and Gómez-Gómez (1976). Tide records during periods unaffected by runoff were as follows: at Laguna San José a maximum daily amplitude of 0.15 meter (m); at

Laguna La Torrecilla, much closer to the system's principal ocean outlet, Boca de Cangrejos, maximum daily tidal amplitude of 0.6 m; at Laguna de Piñones a maximum daily amplitude of 0.26 m. Approximate boundaries of the basins draining into the San Juan Lagoons are shown in figure 2.

Laguna San José

Laguna San José, the largest lagoon, has a surface area of 547 ha (fig. 3). It has an average volume of 13.2 hm^3 and an average depth of 2.4 m. About 90 percent of the watershed area of the lagoon is urbanized. Mangrove stands border the north and east perimeters.

Laguna San José has been dredged locally to depths ranging from 5 to 11 m. About 17 percent of the entire lagoon area has been dredged below the natural maximum depth of 2.5 m (Ellis, 1976).

Most of the freshwater that flows into Laguna San José is urban runoff. Quebrada San Antón and Quebrada Juan Méndez (fig. 3) with a combined drainage area of 22 km^2, provide most of the runoff to the lagoon. Additional runoff from an area of about 2 km^2 flows into the lagoon from a combined sewage-storm-drain system at the Baldorioty de Castro Avenue pump station. Several unnammed tributaries and culverts add about 15 km^2 to the drainage area. The limestone aquifer which underlies the San Juan area may be discharging up to 18,000 m^3 per linear kilometer per day along a fresh- salt-water zone (Anderson, 1975). This source may contribute as much as 50,000 m^3/d of freshwater to the lagoon.

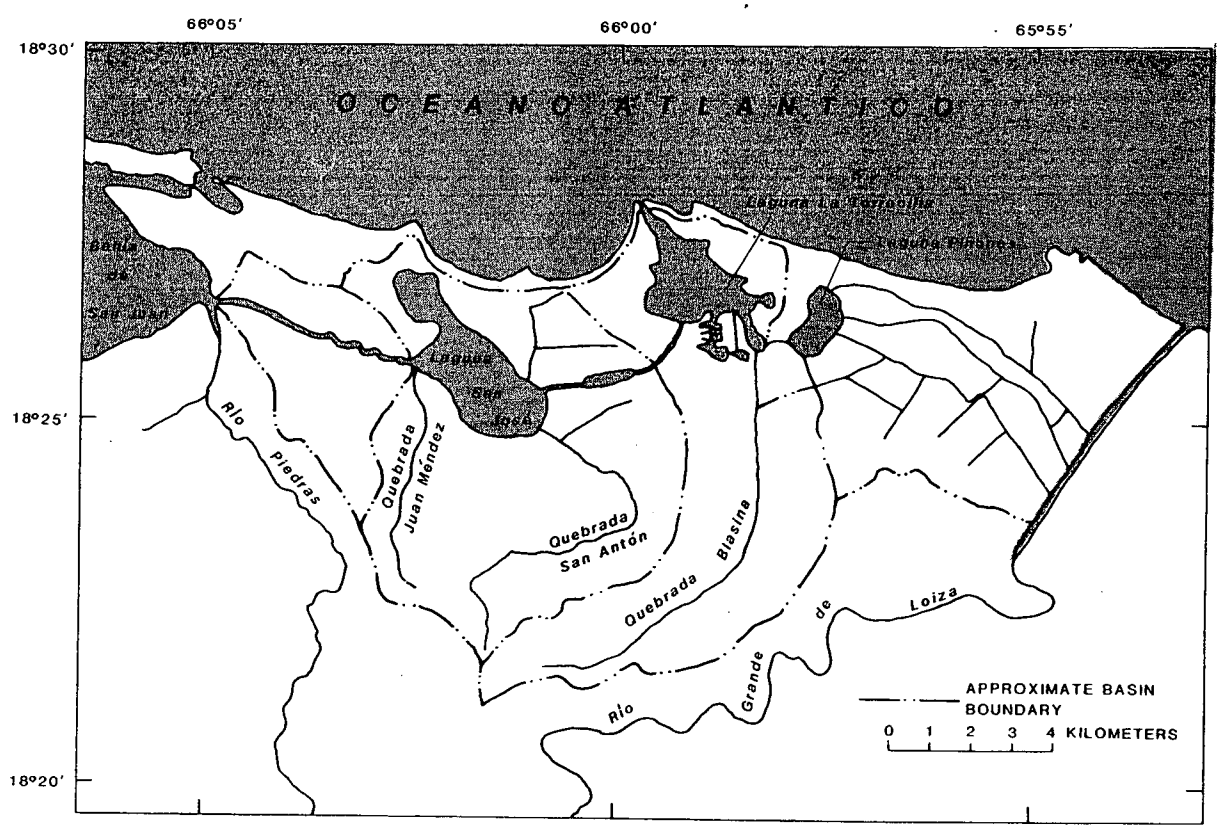


Figure 2.--Drainage basins of San Juan Lagoons.

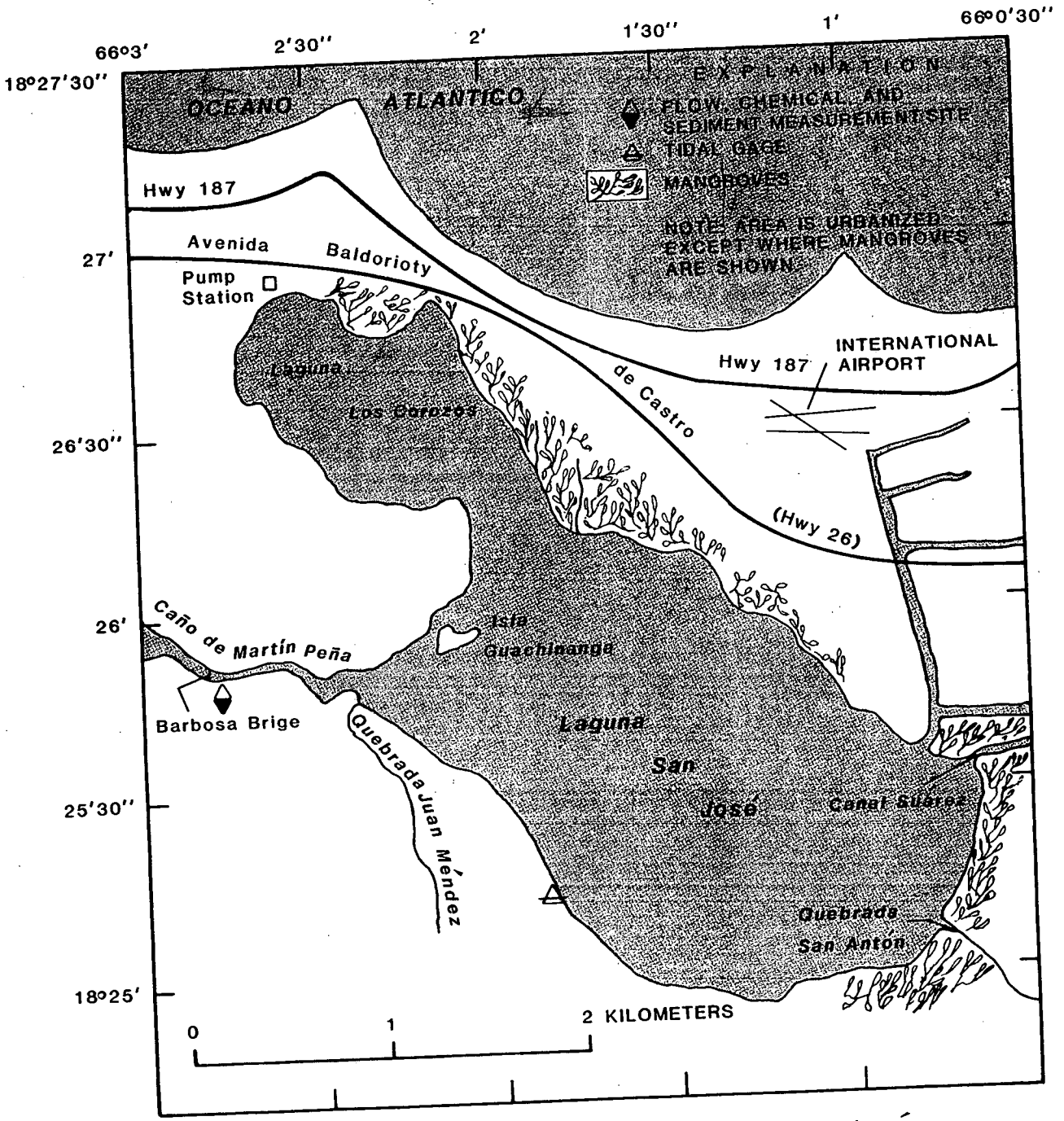


Figure 3.--General features of Laguna San José.

Brackish water flows into Laguna San José through Canal Suárez and Caño de Martín Peña. Canal Suárez connects Laguna San José to Laguna La Torrecilla, where brackish water results from the inflow of sea water at the Boca de Cangrejos outlet. The canal, about 3.3 km long, 2 to 7 m deep, and 5 to 50 m wide, is an unimproved man-made channel bordered by mangroves. Caño de Martín Peña, which connects Laguna San José to Bahía de San Juan, meanders through several densely populated areas, receiving significant amounts of domestic-waste discharges and urban runoff. The Caño has an average depth of 1 m, is 10 to 30 m in width, and is 5.1 km in length. At many places it is clogged with debris.

Ellis and Gómez-Gómez (1975) report that the annual average specific conductance at Laguna San José is about 20,000 micromhos per centimeter (umhos/cm) in areas less than 2.5 m deep. In areas dredged below 2.5 m depth, the specific conductance averages 40,000 umhos/cm.

Laguna La Torrecilla

Laguna La Torrecilla has a surface area of about 246 ha and an average depth of about 2.4 m. The lagoon is connected on the north to the ocean by way of Boca de Cangrejos, a natural opening to the sea (fig. 4).

The lagoon's principal freshwater source is Canal Blasina (Quebrada Blasina). The canal, which drains a mostly urban area of about 22 km^2, is affected by tides as far inland as Avenida Monserrate Bridge (fig. 1). Canal Blasina is heavily polluted with sewage discharges from the Carolina and Vistamar sewage-treatment plants.

The combined discharges from these plants into the canal average about 10,000 m^3/d. Additional sewage flows are discharged into the headwaters of the stream upstream from the study area. Flow from the headwaters, during low flow conditions, is about 10,000 m^3/d thus average discharge to the lagoon is about 20,000 m^3/d. Ground-water flow into the lagoon is negligible since the lagoon is seaward of the underlying aquifer's fresh-salt water interface.

Dredging in Laguna La Torrecilla has been more extensive than at any of the other two lagoons. Ellis (1976) estimated that the volume of the lagoon has been increased about 2.8 times by dredging. Seawater flowing through Boca de Cangrejos accumulates in the dredged areas. The salinity of the water in Laguna La Torrecilla can be as much as 90 percent that of seawater, with extreme variations in the water column and with time. The annual average specific conductance for depths less than 1 m is about 45,000 umhos/cm. At depths greater than 3 m the specific conductance is equal to that of sea water--50,000 umhos/cm.

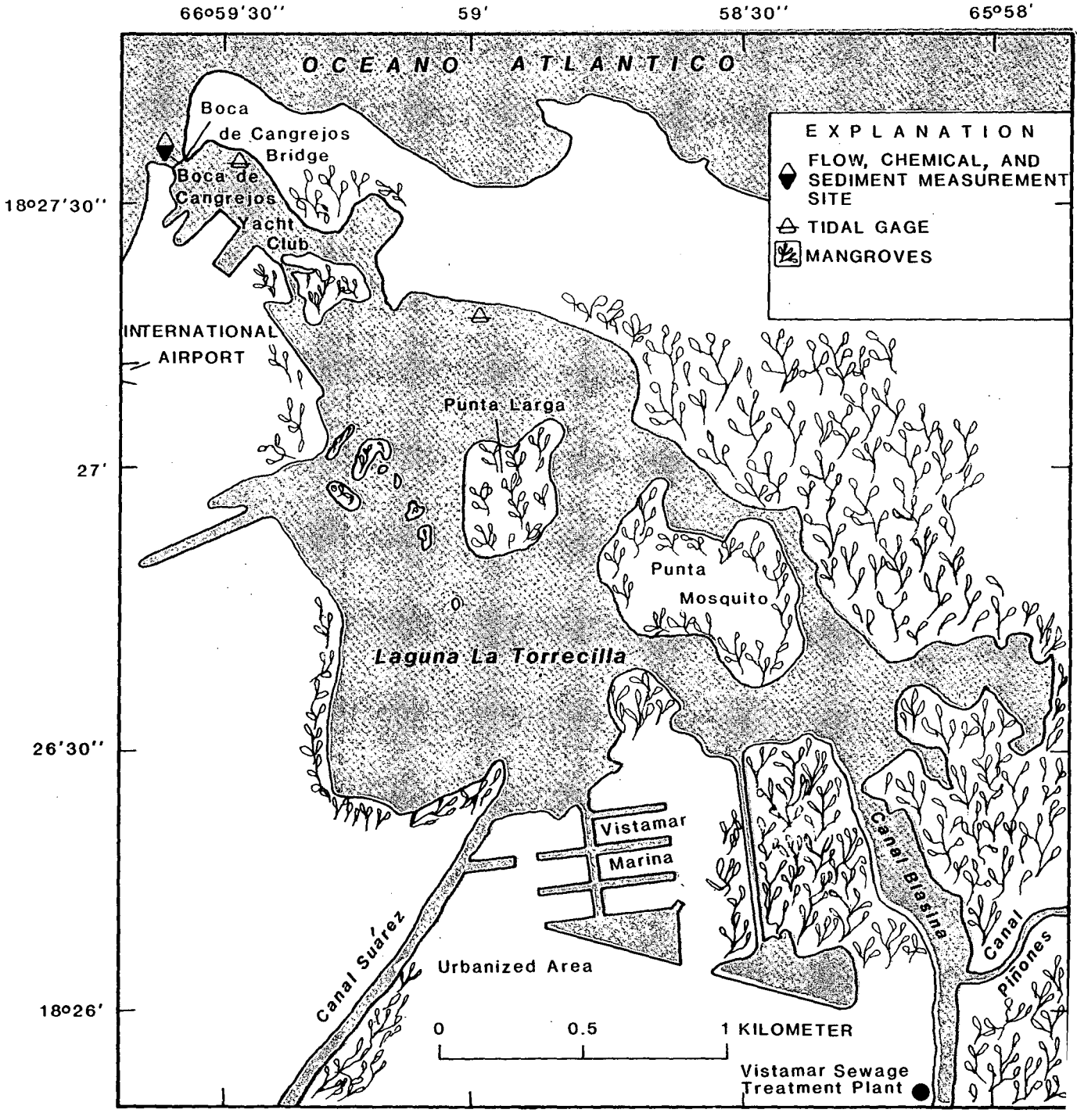


Figure 4.--General features of Laguna La Torrecilla.

Laguna de Piñones

Laguna de Piñones, the smallest of the lagoons, has a surface area of 105 ha, an average volume of 0.87 hm^3, and an average depth of 0.8 m (fig. 5). The lagoon is surrounded by the Bosque Estatal de Piñones, a mangrove forest. The forest is bisected by a network of man-made drainage canals (fig. 2). The lagoon is connected to Canal Blasina and Laguna La Torrecilla by Canal Piñones. During extreme floods the lagoon, mangrove swamp and canal receive flow from the Río Grande de Loíza (Haire, 1975). The total area draining to the lagoon is indeterminate as a result of the complex canal system in the mangrove forest.

Brackish-water flows into Laguna de Piñones from the eastern end of Laguna La Torrecilla through Canal Piñones. Ellis (1976), documented the density, tidal, and canal configuration features that induce the flow of brackish water into the lagoon. Prior to the start of the present study, Laguna de Piñones had a stable specific conductance of about 43,000 umhos/cm.

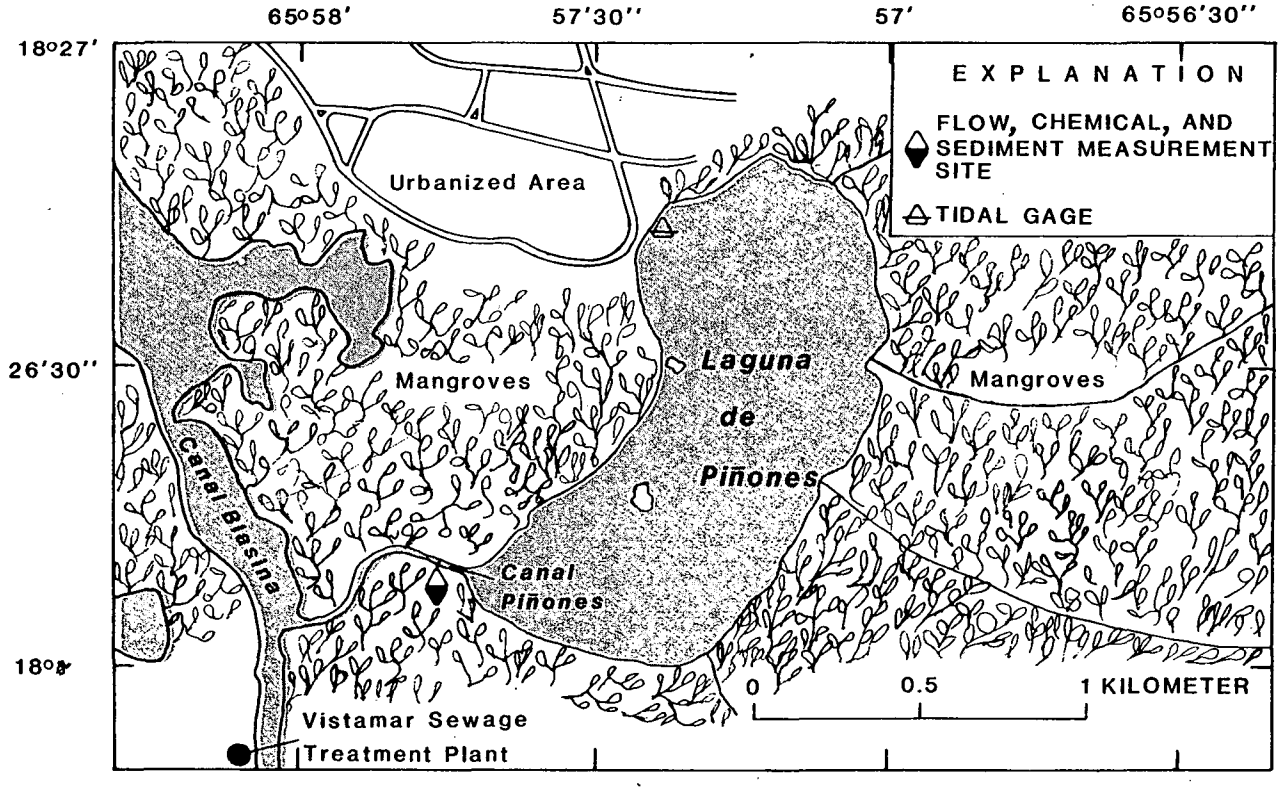


Figure 5.--General features of Laguna de Piñones.

STORM CHARACTERISTICS

Precipitation

Precipitation from the storm of October 22 to 23, 1974 in the San Juan metropolitan area ranged from about 60 millimeters (mm) at the National Weather Service (NWS) station at the International Airport, to 120 mm at the U.S. Geological Survey office near Cataño. About 60 percent of the precipitation was recorded between 0100 and 0800 hours October 23, 1974, near the end of the study period. For the most intense 12-hour period of the storm, the recurrence interval was 1.0 year (U.S. Department of Commerce, 1961).

The total amount of precipitation recorded at the Isla Verde International Airport station during the tidal cycle (1000 October 22 to 1100 October 23) was assumed to be representative of the rainfall directly over the lagoons. This was 39 mm as indicated by the NWS records.

The precipitations over other areas in the basin was computed from the data obtained at the other stations. An average of 70 mm of rain was estimated to have fallen throughout the basin south of the lagoons.

Stage Changes

The inflows to the lagoons of storm runoff resulted in higher water-surface elevations at the end of the tidal cycle. Water-surface fluctuations during the tidal cycle at each lagoon and at the inland side of the Boca de Cangrejos bridge (sea outlet of Laguna La Torrecilla) are shown in figure 6. The fluctuations are referenced to an arbitrary datum to provide net changes in stage. The moment (s) of zero flow at tidal canals, previous to runoff effects, was used in establishing the datum. The tidal cycle at Laguna del Condado (fig. 1) was assumed to be representative of the conditions at the coast.

Laguna La Torrecilla had a maximum stage amplitude of 0.25 m, equal to the amplitude observed at the Boca de Cangrejos outlet. A net gain of 0.127 m was recorded in the stage at Laguna La Torrecilla during the study period.

Laguna de Piñones showed an overall gain in stage of 0.153 m, most of which occurred during the early hours of October 23. The dampening effects of Canal Piñones in the amplitude of the tide fluctuation, as well as the time lag (2 hours) with the tide at Laguna La Torrecilla, are evident.

The most significant change in stage in the lagoons was recorded at Laguna San José, with a net change of about 0.312 m during the tidal cycle. The size of the lagoon, with its larger contributing drainage area, and constricted outlets contributed to the significant increase in stage.

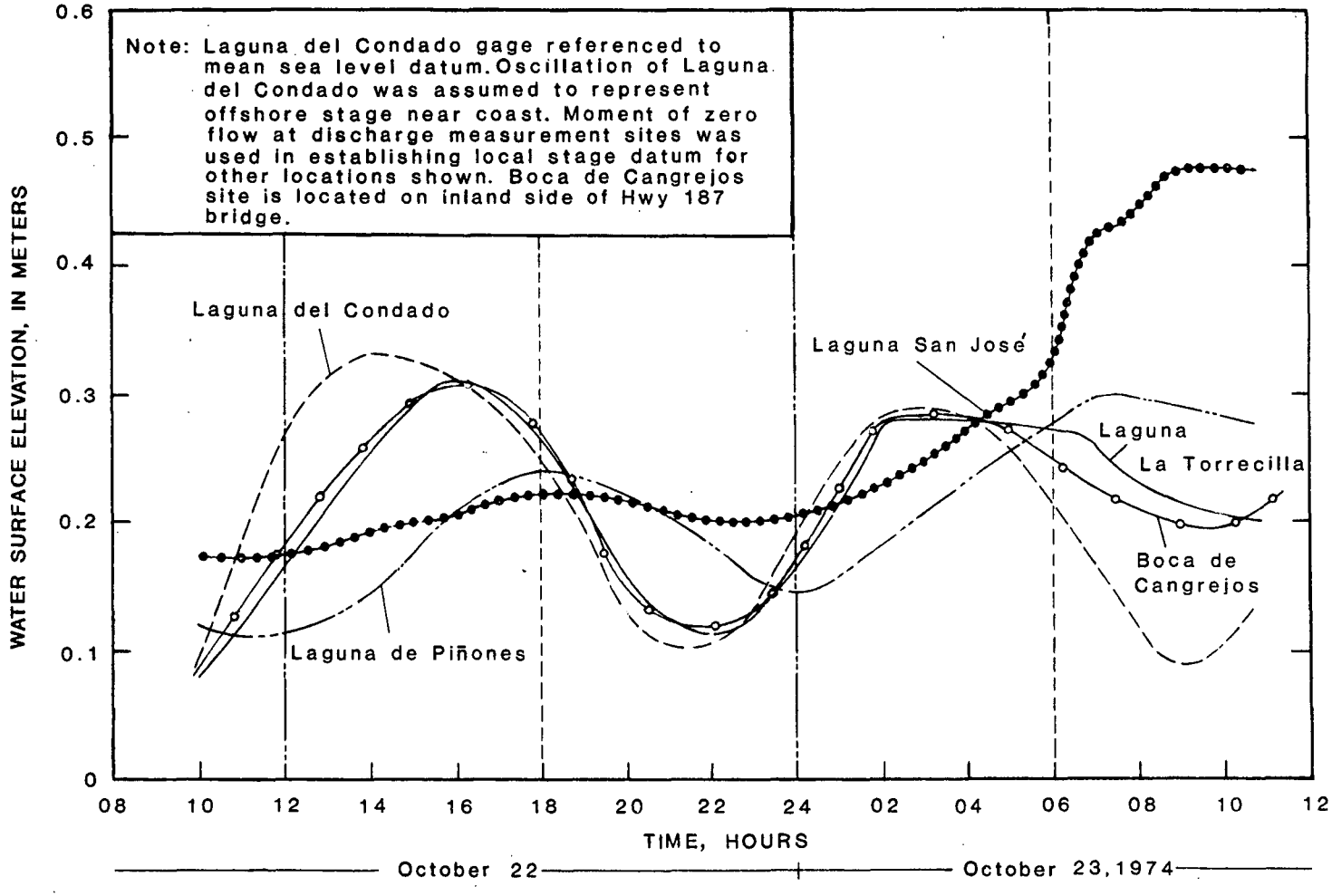


Figure 6.--Water-surface fluctuations at Laguna del Condado, Boca de Cangrejos, Laguna San José, Laguna La Torrecilla, and Laguna de Piñones.

FLOW CHARACTERISTICS AND MAGNITUDE

The effects of storm runoff on the lagoon system during periods of either normal or intense precipitation can be determined only by simultaneous flow and stage measurements at the inlets and outlets that feed or drain the lagoons. Flow and stage determinations at the selected stations (fig. 1), are complicated by changes in direction of flow with changes in tide or outflow from a particular lagoon.

The termination of the study at the end of the tidal cycle prevented an assessment of the overall effects of the storm in the flow characteristics at the measured sites. At the end of the study, stages and flows were still actively changing, and most of the accumulated runoff was still stored in the lagoons. However, the data collected can be used to estimate or model the hydrologic behavior of the lagoon system over the entire storm-response cycle.

Boca de Cangrejos Outlet

The flow direction at Boca de Cangrejos outlet followed the tidal fluctuations (fig. 7). The proximity of the ocean was reflected in the domination of flow direction by the tide. A significant increase in the flow toward the ocean occurred during the second ebbtide. Integration of the hourly measurements indicate that 1.5 hm^3 entered Laguna La Torrecilla from the floodtides and 2.9 hm^3 left the lagoon by way of Boca de Cangrejos from the combined effects of the ebbtide and storm runoff.

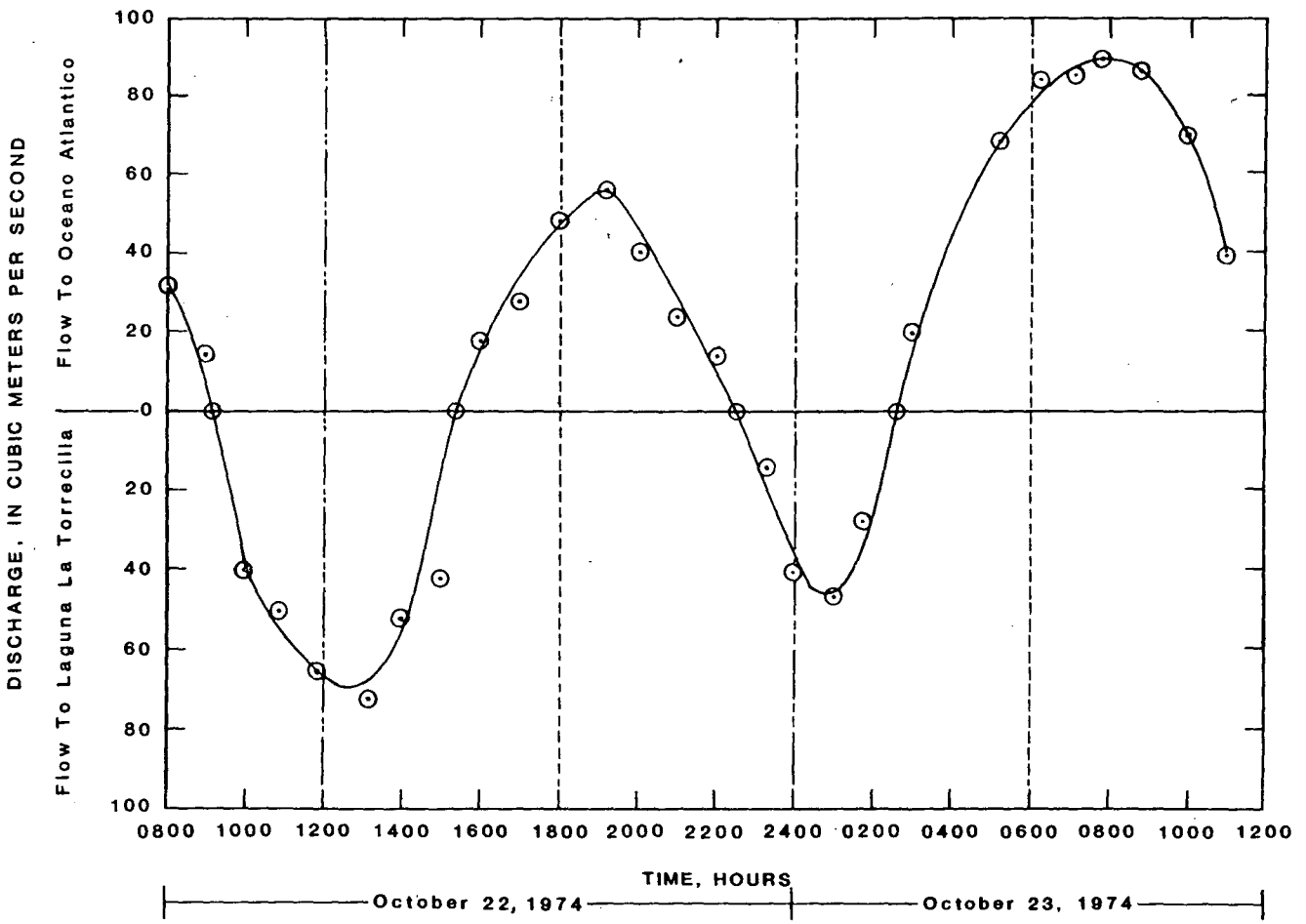


Figure 7.--Flow pattern at Boca de Cangrejos.

Canal Piñones

The flow measurements at Canal Piñones showed that the water movement also followed the tide patterns (fig. 8). During the tidal cycle, about 0.21 hm^3 of water flowed into Laguna de Piñones, while 0.15 hm^3 discharged through Canal Piñones. The water flowing into Laguna de Piñones in addition to rainfall runoff, may have been from either Canal Blasina or Laguna La Torrecilla. The combination of the amount of runoff in Canal Blasina, and the head of water in Laguna La Torrecilla, determines the source of the inflows to Laguna de Piñones. Differences in the chemical characteristics in the waters from the two sources may be used to determine which was the main flow contributor to Laguna de Piñones. This is explained in the section on water-quality characteristics.

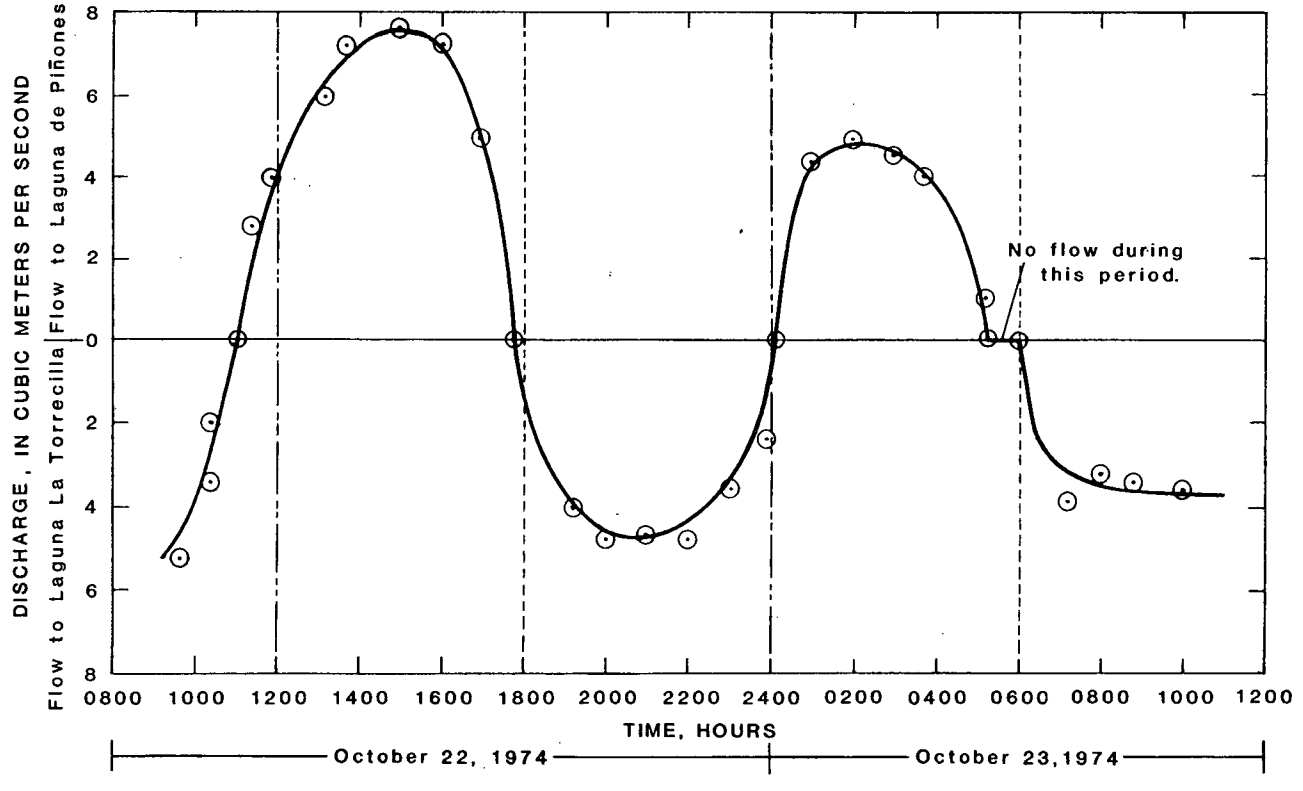


Figure 8.--Flow pattern at Canal Piñones.

Canal Suárez at Highway 26 Bridge

The measuring site at Canal Suárez was located at the Highway 26 (old) bridge. Staff gages were placed on both abutments of the bridge and stage readings were made concurrent with each flow measurement as the flow at the site is constricted by the bridge. This is evident from water-surface elevations that drop in the direction of the flow (fig. 9). The site is tidal affected with fluctuations during dry weather conditions from about 0.05 m on the Laguna San José side to 0.16 m on the Laguna La Torrecilla side.

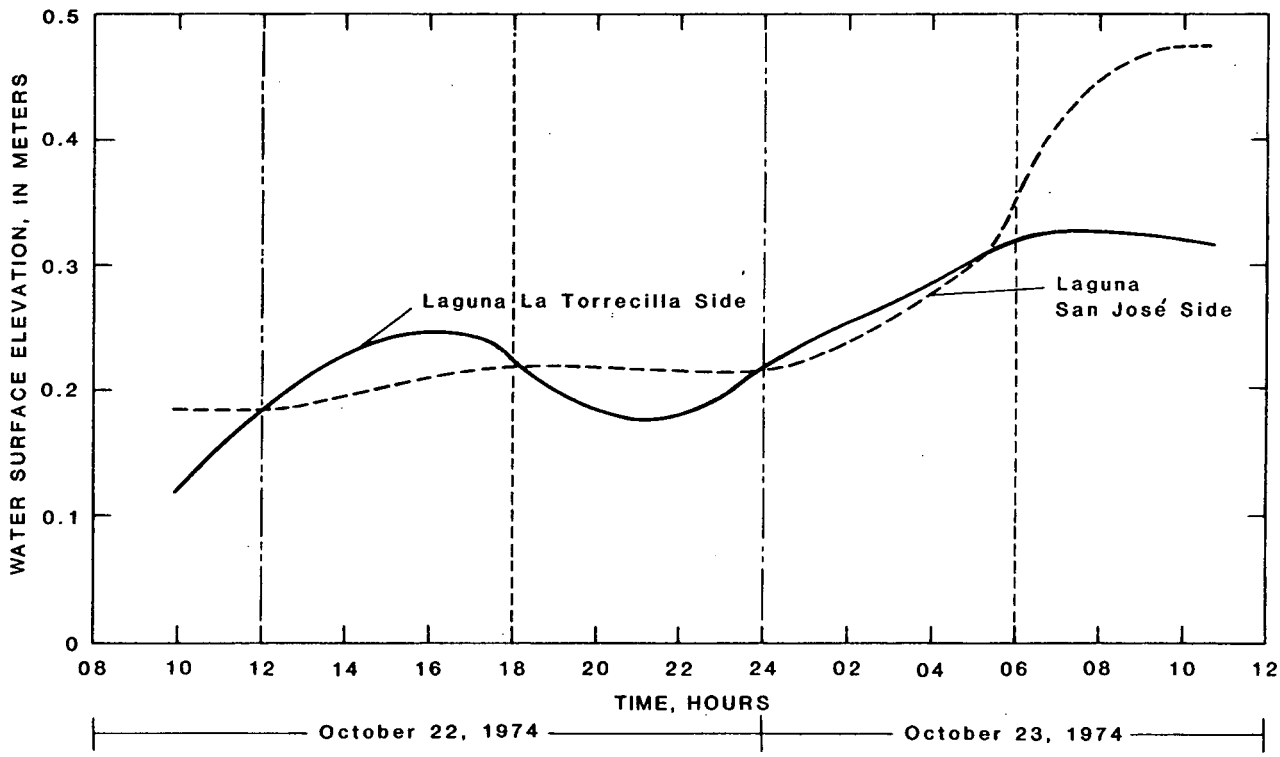


Figure 9.--Water-surface fluctuations at upstream and downstream sides of Hwy. 26 bridge at Canal Suárez. (Arbitrary datum, same as that of figure 6.)

Integration of the flow-rate curve at the Canal Suárez site (fig. 10) showed that 0.27 hm^3 entered Laguna San José from Canal Suárez during the floodtides, while 0.43 hm^3 were discharged from the combined ebbtide and storm runoff effects.

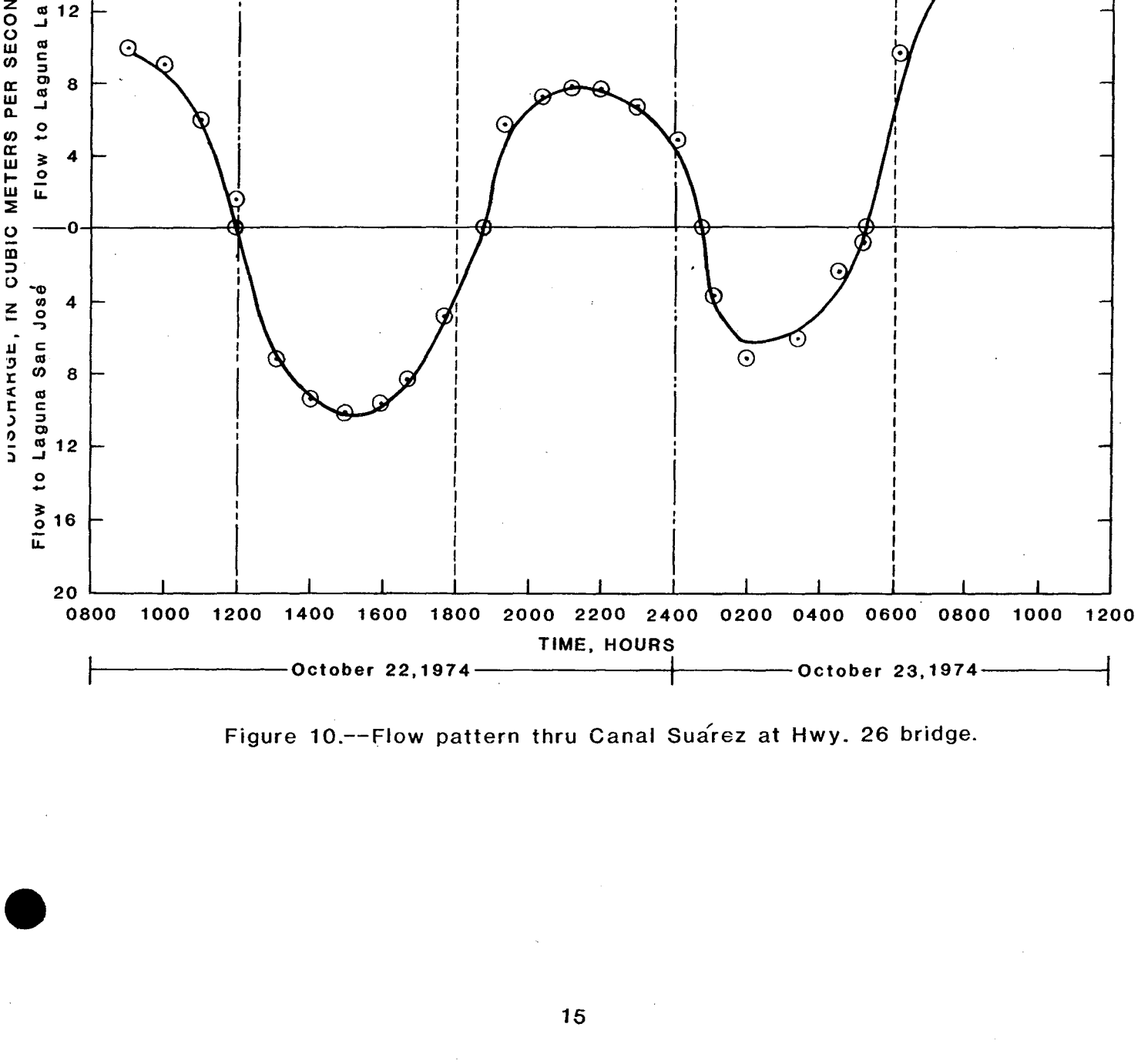


Figure 10.--Flow pattern thru Canal Suárez at Hwy. 26 bridge.

Caño de Martín Peña at Avenida Barbosa

The Caño de Martín Peña site was located at the Avenida Barbosa bridge (fig. 1). The flows in the Caño, which connects Laguna San José to Bahía de San Juan followed the predicted tidal pattern until about 2200 hours on October 22, (fig. 11). At that time the ebbtide was interrupted and the flow reversed toward Laguna San José. The flow direction in Caño de Martín Peña was in phase with the flow at Canal Suárez until storm runoff reached the canals. This canal is unique in that it is the only one which receives directly a significant amount of the total basin runoff (fig. 2). The areas in the Hato Rey and Santurce districts (fig. 1), which drain about 9.5 km^2 of urban developments, drain directly into Caño de Martín Peña. The relatively small surface area of Caño de Martín Peña in comparison to its immediate drainage basin and the limited conveyance of the canal are responsible for rapid rises of its water surface during intensive rainstorms. Flow into Laguna San José from Caño Martín Peña lasted about one hour longer than that from Canal Suárez.

Water inflow to Laguna San José through Caño de Martín Peña during the tidal cycle was 0.17 hm^3. Discharges from the lagoon to Bahía de San Juan totalled 0.15 hm^3 during the same period.

Storm Runoff Contributions to the Lagoons

One of the main objectives of the study was to determine the storm runoff contributions to the San Juan Lagoons system. This was achieved by flow measurements at the principal outlets and inlets to the three lagoons and by a water balance of all the other inflow-outflows.

The water balance at each lagoon may be represented by the equation:

$$IS = SR + DR + TC + BF$$

where IS = increase in storage;
SR = storm runoff contribution;
DR = direct rainfall;
TC = net flow measured at the tidal canals; and
BF = base-streamflow contributions from 1000 hrs to 2400 hrs, Oct. 22.

The increase in storage at each lagoon was computed from changes in water levels during the study period. The net water-level changes were obtained from the recording gages at each lagoon. The net change in water level was multiplied by the surface area of the lagoon to compute the change in volume. The general assumption was made that the surface area of the lagoons did not increase significantly due to the increase in volume because the banks of the lagoons are nearly vertical. These computations showed an increase in storage of 1.7 hm^3 for Laguna San José, 0.30 hm^3 for Laguna La Torrecilla, and 0.16 hm^3 for Laguna de Piñones.

The contributions from rainfall were computed by multiplying the surface area of each lagoon by the amount of precipitation. As previously indicated, an average of 39 mm of rainfall was assumed to represent the direct rainfall over the lagoons. The precipitation contribution to laguna San José was 0.21 hm^3, with 0.10 hm^3 computed for Laguna La Torrecilla, and 0.04 hm^3 for Laguna de Piñones.

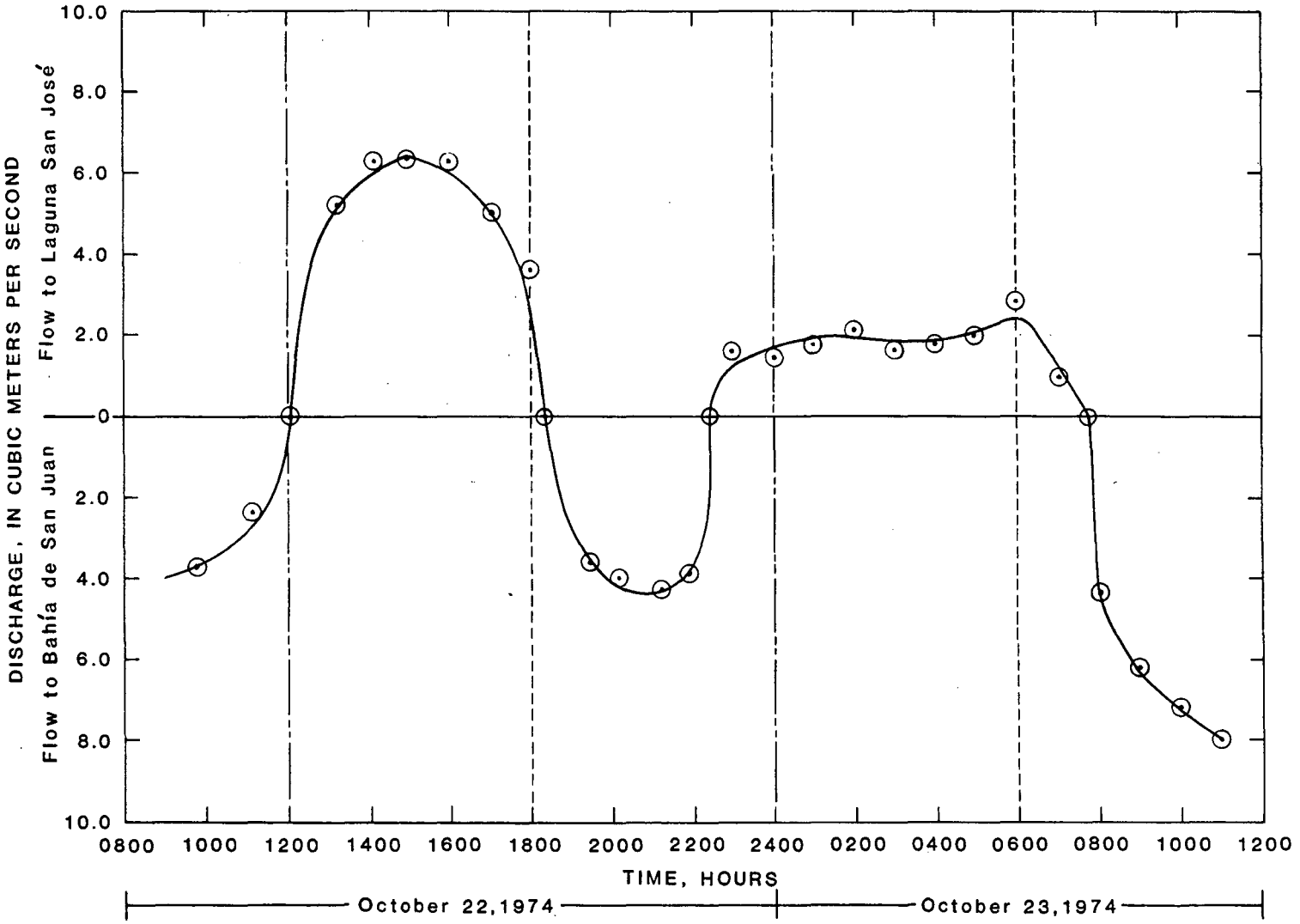


Figure 11.--Flow pattern thru Caño de Martin Peña at Avenida Barbosa bridge.

Base-flow contributions are summarized as follows:

a) Quebrada San Antón and Quebrada Juan Méndez = 0.02 hm^3

b) Quebrada Blasina, Carolina and Vistamar STP's = 0.01 hm^3

c) Avenida Baldorioty de Castro pump station = 0.01 hm^3

The contribution from the pump station to Laguna San José was obtained from daily pumpage records. A total of 0.05 hm^3 was pumped during the storm period.

The computations and water balances for each lagoon are summarized in figure 12. The direction of the arrows indicate the direction of flow. There were no adjustments for evapotranspiration losses, which probably were negligible during the study period.

The data in figure 12 show that the storm runoff during the period of study received by the lagoons totalled about 3.2 hm^3, of which about 50 percent flowed into Laguna San José, 48 percent into Laguna La Torrecilla and 2 percent into Laguna De Piñones. At the end of the study period, Laguna San José retained in storage about 75 percent of the total water input. In comparison, Laguna La Torrecilla had discharged through the Boca de Cangrejos outlet nearly 85 percent of the inflows it received. Flows out of Laguna San José were restricted at Caño de Martín Peña by the increase in head in this canal from direct storm runoff flowing into it. The discharges from Laguna San José are also restricted by the limited conveyance in Canal Suárez.

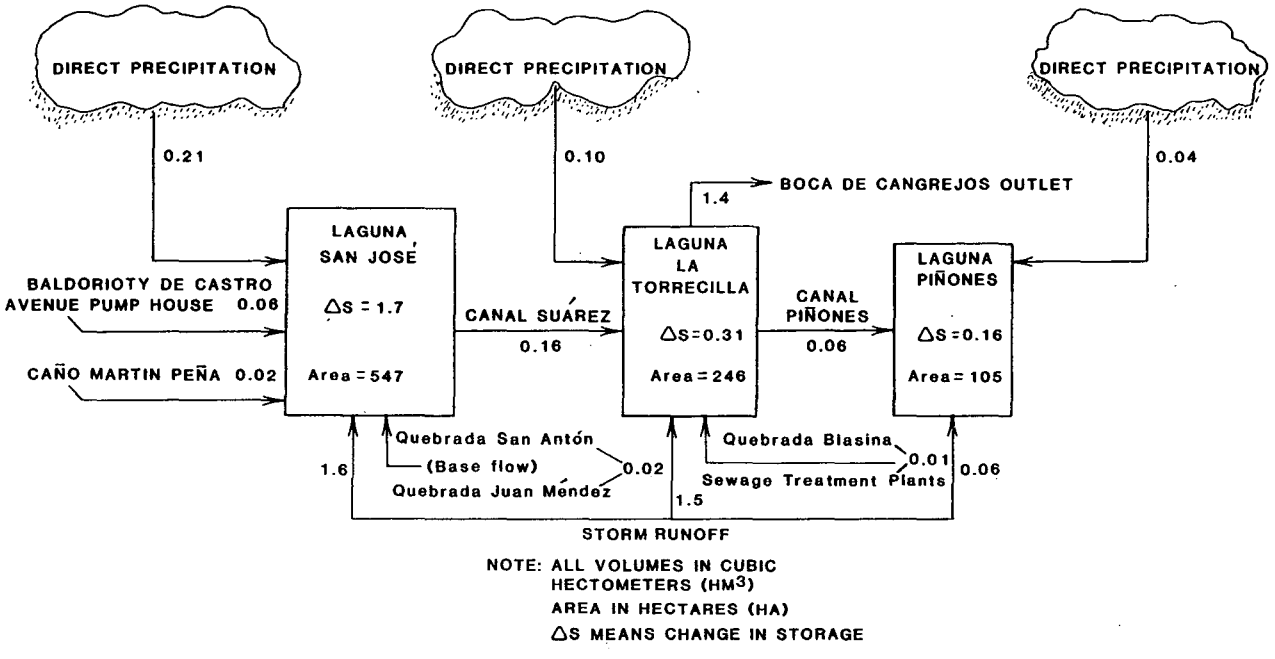


Figure 12.--Net water flows and gain in storage at Laguna San Jose, Laguna La Torrecilla, and Laguna de Piñones, during the 22-23 October, 1974 storm.

Water from Canal Blasina flows with a minimum of resistance into Laguna La Torrecilla, water in the Lagoon also flows toward the ocean at the open outlet of Boca de Cangrejos; only extreme floodtides may create enough backwater to limit the flows. Laguna de Piñones, in the meantime, did not undergo any net outflow, but increased its storage until backwater from Laguna La Torrecilla was no longer effective.

WATER QUALITY CHARACTERISTICS

Water Quality in the San Juan Lagoons

Ellis and Gómez (1975) described the general water-quality characteristics of Laguna San José, Laguna La Torrecilla and Laguna de Piñones lagoons. Their findings indicate that very poor water-quality conditions prevail in the lagoons system. The key water-quality indicators are representative of heavily polluted systems. Dissolved-oxygen concentrations range from supersaturation caused by massive algal blooms to anaerobic conditions that result in widespread fish kills. Nitrogen and phosphorus concentrations are characteristic of hypereutrophic systems, and organic carbon-concentrations reflect the organic loads discharged into the lagoons from domestic sewage. The extensive dredging in Laguna La Torrecilla and Laguna San José, which has created deep pockets of stagnant saline water devoid of oxygen, compounds the problem (Ellis, 1976). Overall, Laguna San José is the most heavily polluted of the three lagoons.

During periods of low flows the principal tributaries to the lagoons contribute relatively large concentrations of organic matter and nutrients. Chemical analyses of samples collected at the principal surface-water inflows to the lagoons during low flows are summarized in table 1. All the samples except the one at the Baldorioty Avenue Pump Station, were collected on October 22, 1974, prior to the storm. The sample from the Pump Station was collected in February 1975. The results of the Pump Station sample are considered valid, since there had been no significant changes in the area drained by the Pump Station.

The data in table 1 show that the quality of the water in the tributaries varies considerably during any day. Daily fluctuations in the quality of the effluent from sewage treatment plants have been documented by Metcalf and Eddy (1972). Regardless of the daily variations, the analyses show that these sources contribute significant loads of carbon and nutrients to the lagoons. The low-flow effects of these loads are described by Ellis and Gómez (1976); however, as shown in the following section, the low-flow contributions to the lagoon system are relatively minor when compared to those of storm runoff.

The study objective to determine the contribution from storm runoff to the water-quality conditions in the lagoons directed the nature and scope of the sampling during the October 22 to 23 storm. The parameters sampled are associated with the most critical problems in the lagoons. Organic carbon provides a measure of domestic loads and biological activity.

The dissolved and suspended species of nitrogen and phosphorus, and their different oxidation states (that is organic, ammonia, nitrite, and nitrate-nitrogen), provides evidence of degree of eutrophication, and biological activity. Specific conductance determinations were used to estimate brackish water contributions and extent.

TABLE 1.--Water quality of surface-water flows into lagoons during low-flow conditions, October 22, 1974 (all values are in milligrams per liter, except SC which is in micromhos per centimeter at 25°C)

Site	Time	SC	TOC	TP	ToPO_4-P	TKN	TON	TNH_4-N	$NO_{2,3}$-N
1	0925	492	10	1.7	1.5	6.0	1.1	4.9	0.06
1	1640	519	23	2.6	1.8	.26	.26	.00	.01
2	0850	376	8.0	.84	.79	2.6	.50	2.1	.24
2	1625	309	12	.60	.48	2.1	.70	1.4	.34
3	0730	517	14	1.1	.92	4.1	1.1	3.0	.27
3	1600	328	20	.76	.63	1.4	1.0	.38	.60
4	1040	678	29	7.6	6.5	22	.00	22	.01
5	0900*	19,000	15	1.3	.98	5.4	1.3	4.1	.03

Site number	Source
1	Quebrada Blasina at Highway 3
2	Quebrada San Antón at Avenida Campo Rico
3	Quebrada Juan Méndez at Calle Belmonte
4	Carolina Sewage Treatment Plant Outfall
5	Avenida Baldorioty de Castro Pump Station at sump

*Sample taken on February 25, 1975, when low-flow conditions prevailed at at this site similar to flow rate prior to the lagoon study.

Chemical Loads During the October 22-23, 1974 Storm

The loads of selected components through each of the principal inlets-outlets of the lagoon system were computed on the basis of the instantaneous samples and flow determinations at each site. The computations include loads of total organic carbon (TOC), total phosphorus (TP), total orthophosphate (TPO_4-P), total organic nitrogen (TON), total ammonia nitrogen (TNH_4-N), nitrate (NO_3-N), nitrite (NO_2-N), and suspended sediment (SED).

Boca de Cangrejos

Load data for the Boca de Cangrejos outlet show that all of the components measured followed the prevailing tidal pattern (fig. 13). Discharges to the ocean increased with the ebbtide, receding for several hours during the early hours of October 23, and increasing again toward the ocean as the storm runoff reached Laguna La Torrecilla. From 80 to 100 percent of the individual components were in solution. Most of the phosphorus was in the more soluble orthophosphate state, readily accessible for assimilation by algae.

The suspended-sediment curve in figure 13 shows almost a balance between the inflows and outflows. Strong winds and wave actions during the floodtide may have caused the suspension and inflow into Laguna La Torrecilla of sand particles. On the first floodtide (before storm effects) mean velocities into the lagoon at the outlet were as high as 0.69 meter per second (m/s), with maximum suspended-sediment concentrations of 25 milligrams per liter (mg/L). On the second floodtide, (during the storm) the mean velocity into the lagoon peaked at 0.41 m/s while the suspended-sediment concentration was about 35 mg/L, reflecting the increased sediment load in the coastal water (fig. 14).

Canal Piñones

The load and flow-rate curves at the Canal Piñones station followed the prevailing tidal cycle (fig. 15). Between 0520 and 0600 hours, October 23, flow at the canal was stagnant, probably due to storm runoff into Canal Blasina over-coming the flood tide in its early stage.

Overall, the integration of the transport curves show that the net inflow to Laguna De Piñones of each of the measured components exceeded the outflow. This could indicate that Laguna de Piñones is a sink in the lagoon system for organic carbon, nitrogen, and phosphorus. However, since the system had not reached equilibrium from the storm effects at the time the study was terminated, additional exports probably occurred during the next ebbtide.

Chemical analyses of filtered samples show that a significant part of the carbon, phosphorus and nitrogen flowing through Canal Piñones was in solution. Soluble phosphorus varied from 45 to 90 percent, with the higher percentages occurring during the period of heavy runoff (early hours October 23). Ammonia nitrogen followed a trend similar to phosphorus with the soluble fraction varying from 35 to 90 percent of the total. An average of 30 percent of the organic nitrogen was in solution throughout most of the period.

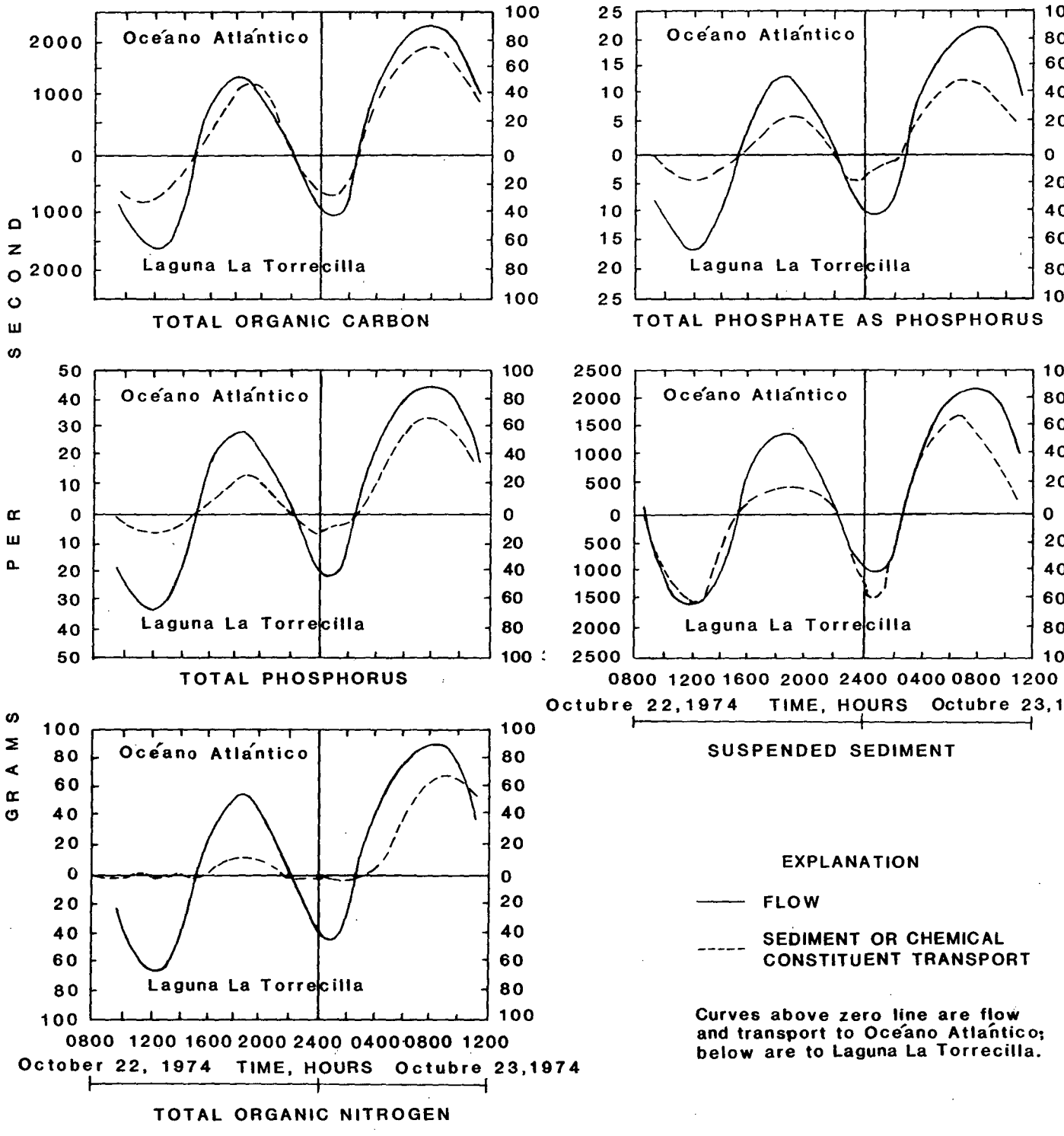


Figure 13.--Flow pattern of chemical constituents and suspended sediments thru Boca de Cangrejos.

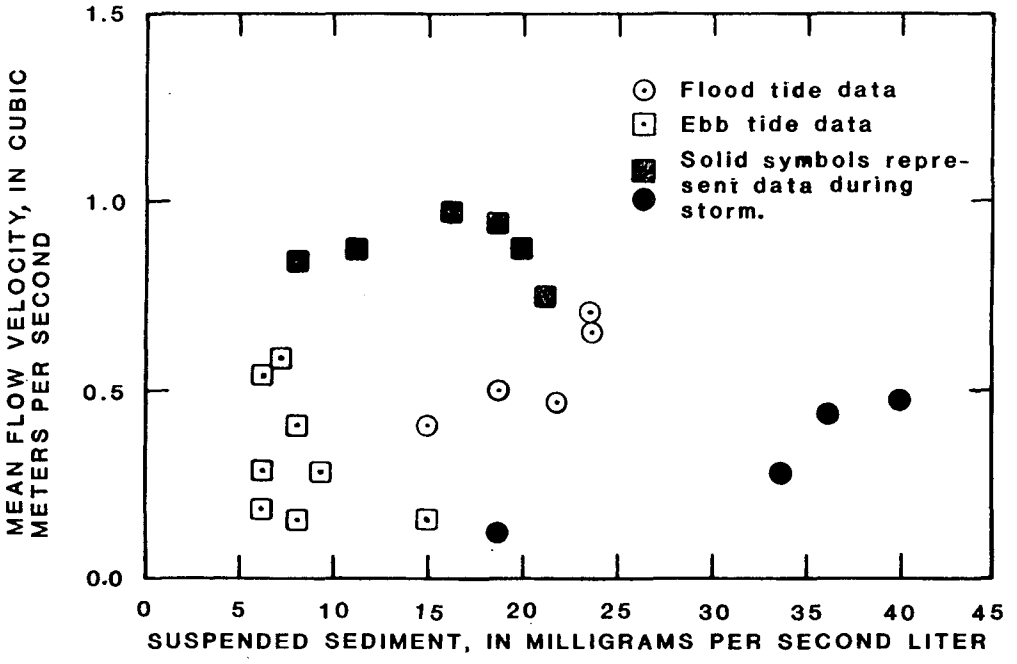


Figure 14: Suspended sediment concentration as related to mean flow velocity at Boca de Cangrejos during October 22-23,1974 study.

Figure 14.--Suspended sediment concentration as related to mean flow velocity at Boca de Cangrejos during the 22-23 October, 1974 study.

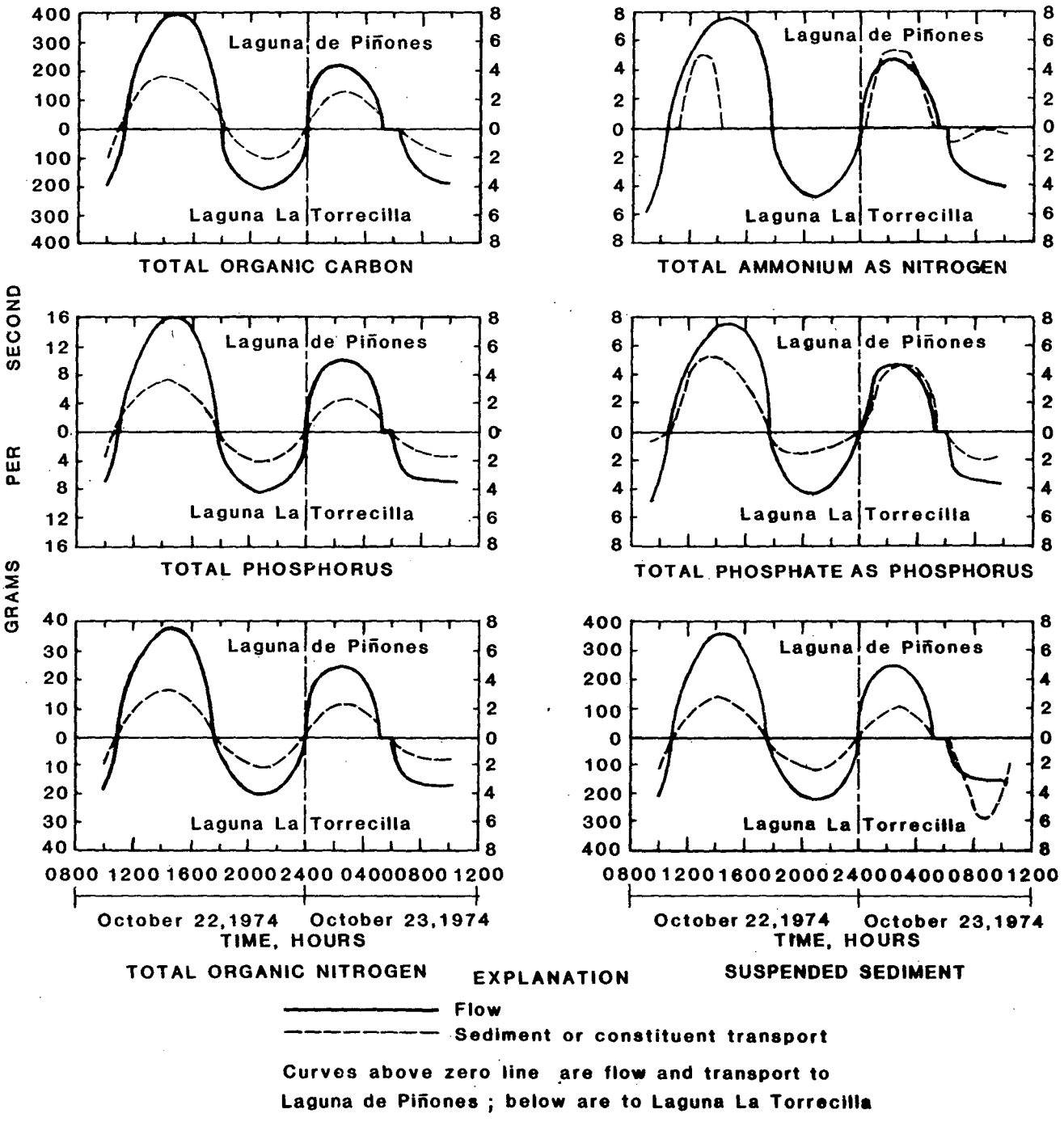


Figure 15.--Flow pattern of chemical constituents and suspended sediment thru Canal Piñones.

The average ratio of TPO_4-P to TP at Canal Piñones was 0.18 during the ebbtides and 0.42 during the floodtides. Sewage inputs into Canal Blasina, rich in inorganic orthophosphates, contribute to increase the flow of TPO_4-P into Laguna de Piñones. A sample collected at the Carolina sewage treatment plant discharge into Canal Blasina showed that about 85 percent of the phosphorus was in the orthophosphate form. Similarly, there was essentially no ammonia nitrogen flowing out of Laguna de Piñones during the ebbtide, while about 30 percent of the total nitrogen during the floodtides was in the form of ammonia. In the sewage treatment plant effluent, all of the available nitrogen was ammonia nitrogen.

The suspended-sediment concentration at Canal Piñones was about 21 mg/L during both the ebb and flood-tides prior to the storm. At the peak of the storm-runoff, the suspended-sediment concentration flowing out of Laguna de Piñones was about 83 mg/L. Runoff from the mangrove forest contributed to the increased sediment concentration.

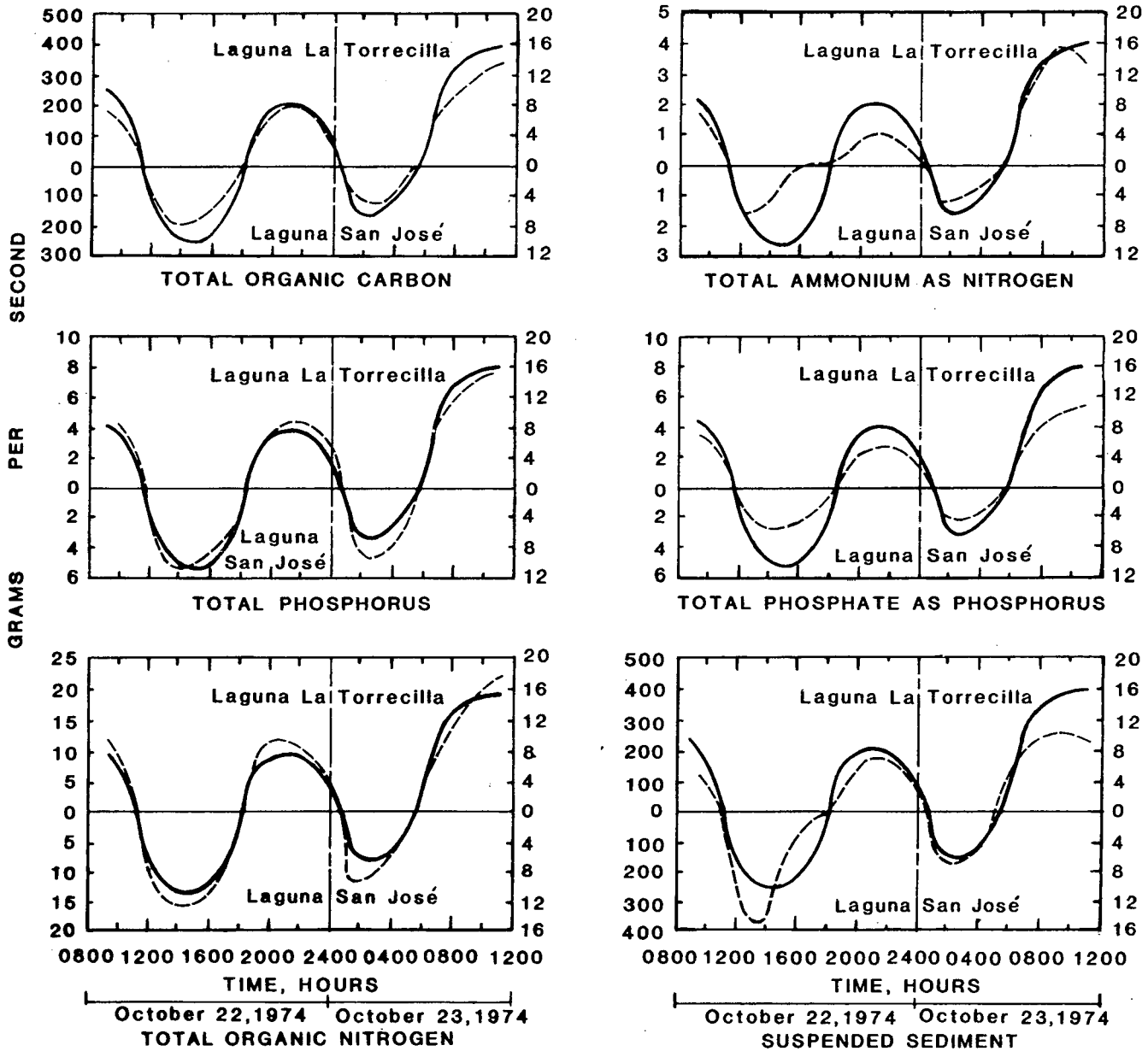
Canal Suárez at Highway 26 Bridge

The transport and flow curves at the Canal Suárez station indicate a net outflow from Laguna San José to Laguna La Torrecilla of each of the chemical constitutents determined (fig. 16). The flushing of Laguna San José into Laguna La Torrecilla during periods of high storm runoff is evident.

Similar to the other tidal stations in the lagoon system, most of the organic carbon, nitrogen, and phosphorus were in solution. About 95 percent of the organic carbon was in soluble form, while soluble phosphorus varied from 75 to 90 percent of the total. The available nitrogen, 96 percent of which was organic, included about 85 percent in solution.

The suspended-sediment concentration at Canal Suárez varied from 20 to 43 mg/L. The maximum occurred during the floodtide prior to the storm. High-suspended sediment in the discharge from culverts near the station may have influenced the maximum measured concentration.

Perhaps the most significant feature of the transport curves in figure 16 is the magnitude of the increase in the concentration of the chemical constituents with the increase in flow. In an unsteady system, one would expect that after the initial slug of water with high chemical concentrations, additional slugs would tend to have lower concentrations. However, except for ammonia and suspended sediment, which peaked around 0900 hours on October 23, all of the components followed the rise in flow until the termination of the study. Normally, a limited amount of carbon and nutrients is available in the basin to be flushed by storm runoff. It is possible that this point was not reached in the study, and the basin was still yielding large loads of carbon and nutrients. A second possibility is that lagoons, in particular Laguna San José, act as temporary sinks of chemicals. These are removed and transported during storms. Continuation of the study could have yielded additional data to answer these questions.



EXPLANATION

——— Flow

– – – – – – Sediment or chemical constituent transport

Curves above zero line are flow and transport to Laguna La Torrecilla; below are to Laguna San José.

Figure 16.--Flow pattern of chemical constituents thru Canal Suárez at Hwy. 26 bridge.

Caño de Martín Peña at Avenida Barbosa

The net contributions of organic carbon and nutrients from Caño de Martín Peña to the lagoons system was minimal during the storm period. The transport and flow curves at the Avenida Barbosa Station show that after the ebbtide of October 22 a near flat response occurred in the flow and transport of each chemical component (fig. 17). As previously stated, storm runoff into Caño de Martín Peña may cause rapid surges in the canal. However, the increases in head at Laguna San José reversed the flow in the Caño toward Bahía de San Juan ahead of the ebbtide.

The percentages of organic carbon and nutrients in solution at Caño de Martín Peña changed after the effects of the storm reached the sampling station. Dissolved organic carbon decreased from 70 to 50 percent of the total, while phosphorus remained nearly unchanged at 70 percent in solution. However, the percentages of organic nitrogen in solution increased from 28 to 46 percent, while dissolved ammonia also increased from 41 to 80 percent, of the total. These changes indicate that organic carbon in particulate form, and nitrogen species with a low oxidation state (typical of sewage) were washed into the canal from the urban areas of Hato Rey and Santurce.

A comparison between the transport curves at Canal Suárez (fig. 16) and Caño de Martín Peña (fig. 17) shows a significant difference in the quality of the water between the two sites. Laguna San José is the dominating feature in the lagoons' hydraulic system. Once a near steady-stage equilibrium is reached in the system during a storm, water flows from Laguna San José at both Canal Suárez and Caño de Martín Peña. If the quality of the water in Laguna San José were homogeneous, once equilibrium was reached, the quality of the water at the other two tidal sites should have been similar. The differences in the quality of the water between the two sites show that either Laguna San José did not reach a homogenous state, or other contributions to Caño Martín Peña are more significant than the flow from Laguna San José.

Net Loads in the Lagoon System

Net flows (loads) of organic carbon, nutrients, and suspended sediment at the tidal canals and the Boca de Cangrejos outlet to the ocean are summarized in figure 18. Storm runoff contributions of some of the parameters also are shown. The contributions of storm runoff were estimated from a mass balance analysis. Estimates were made only for TOC, TP, and total Kjeldahl nitrogen (TKN-equivalent to the sum of TON and TNH_4-N). The computations of the loads in storm runoff appear reasonable on the basis of comparisons with measured loads at the tidal canals. The most significant departures between measured loads budget for the tidal cycle, the contributions in and out of Laguna de Piñones are minimal. An error in the flows in and out of Laguna de Piñones is not as significant as for the other two lagoons.

Estimates of the nitrogen in rainfall are based on studies by Reid (1961). Similar data were obtained by Jordan and Fisher (1977) in a study of chemical quality of rainfall in St. Thomas, U.S. Virgin Islands.

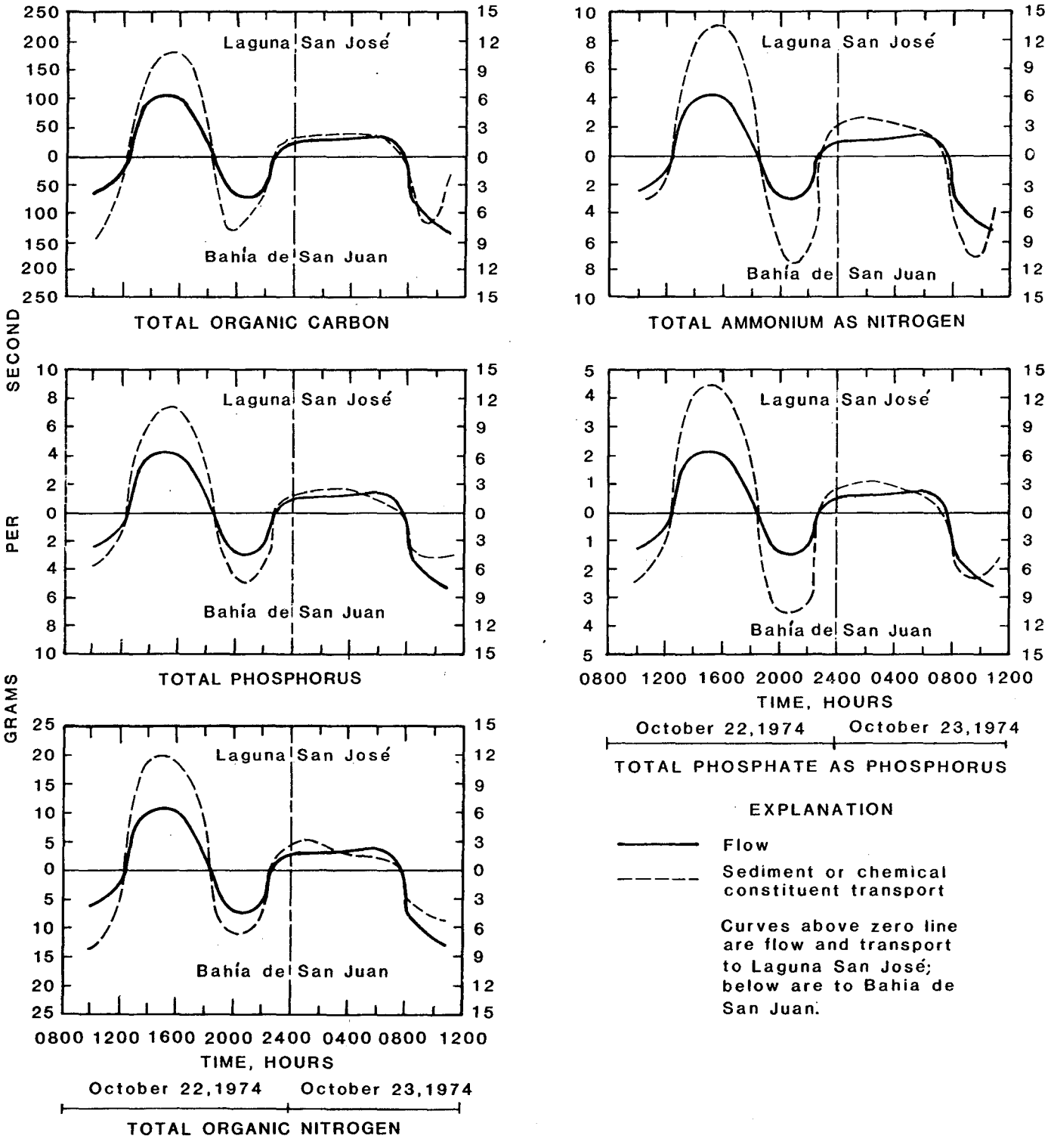


Figure 17.--Flow pattern of chemical constituents thru Caño de Martin Peña at Avenida Barbosa bridge.

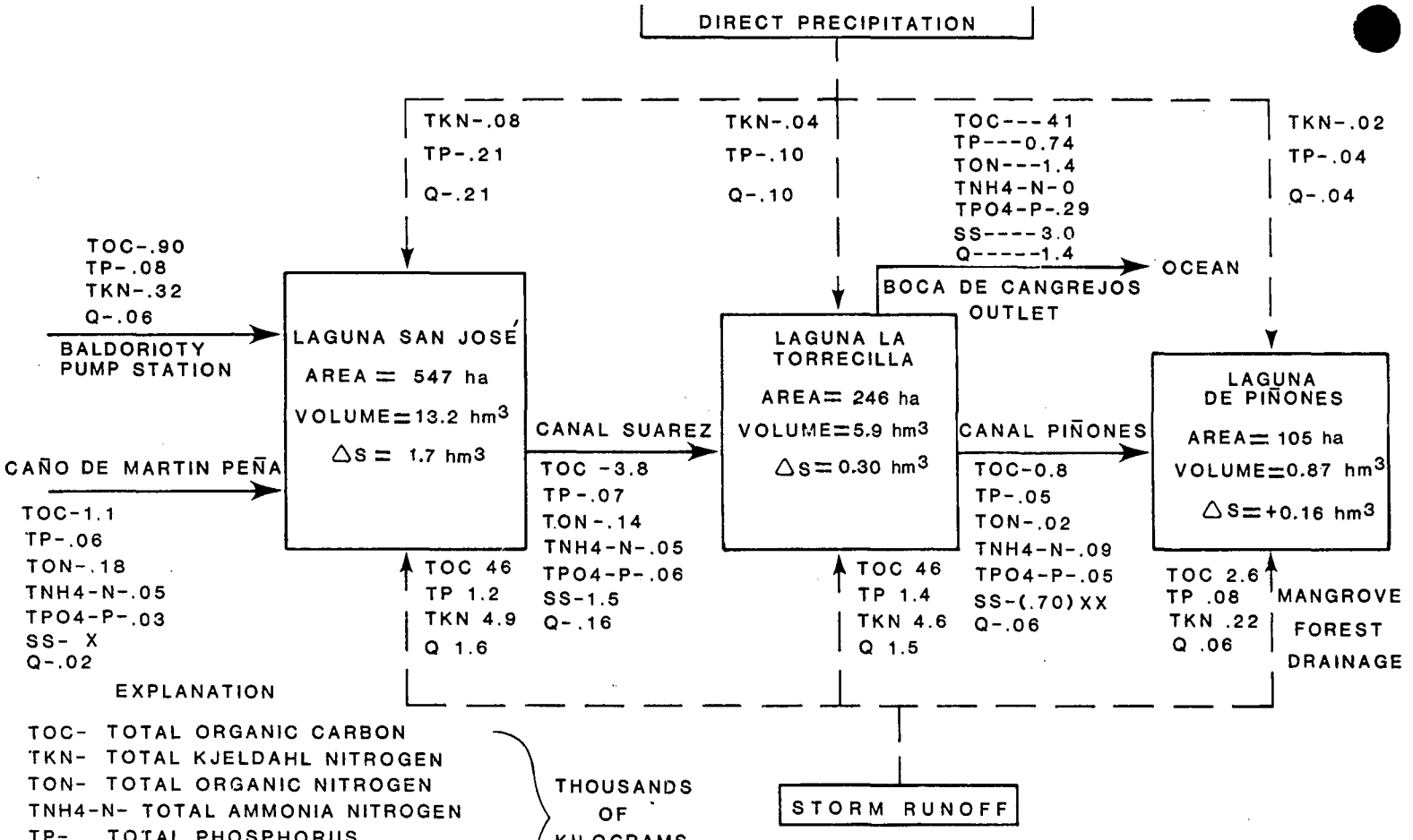


Figure 18.--Net water flows, nutrients, and suspended-sediment loads, in the San Juan Lagoons during the storm-affected tidal cycle of 22-23 October, 1974.

The data in figure 18 show that during the study period, both Laguna San José and Laguna La Torrecilla received more organic carbon, nitrogen and phosphorus than was exported. A mass balance on Laguna San José shows that of about 45.4 x 10^3 kilograms (kg) of organic carbon, only about 8 percent was exported. Nitrogen and phosphorus show similar trends. In Laguna La Torrecilla, of a total organic carbon loading of about 51.8 x 10^3 kg, almost 84 percent was exported to the ocean and Laguna de Piñones.

The retention of organic matter and nutrients by both Laguna San José and Laguna La Torrecilla is a key factor in the water-quality conditions in the lagoon system. The organic loading exerts inordinate biochemical oxidation demands on the lagoons, particularly in Laguna San José. The nutrients that accumulate, either in solution or in bottom deposits, enhance high biological activity which creates extremes in oxygen levels. Dissolved-oxygen concentrations may be driven to zero or near zero values as a result of the organic loading, or to supersaturation levels due to biological activity. Both extremes (0-9.7 mg/L at 1 m, Ellis and Gómez-Gómez, 1975) probably are the main reasons for the frequent fish kills in the lagoons.

A summary of the flow and chemical loads in the lagoon system during a normal tidal cycle (dry weather conditions) is shown in figure 19. The data are presented to provide a comparison of flows and chemical loadings between the normal tidal cycle, without intense precipitation, and those of the

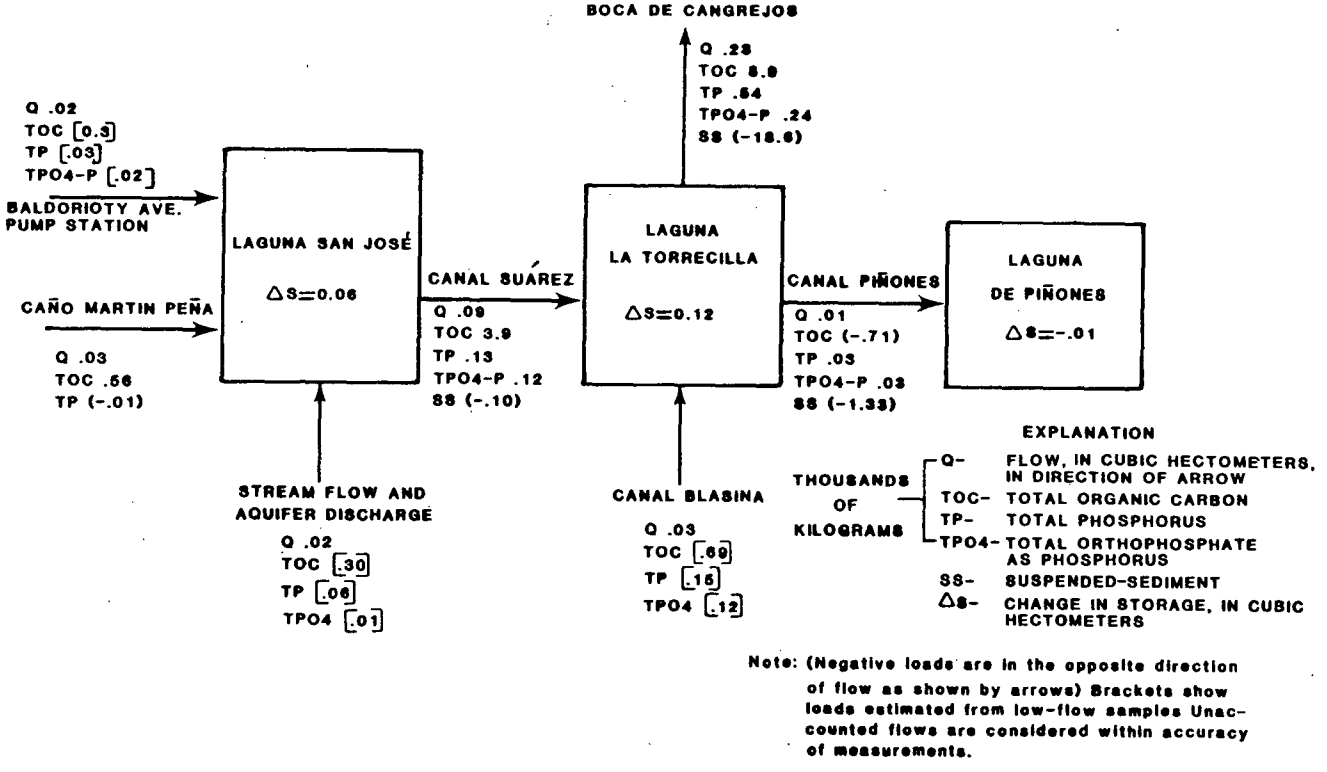


Figure 19.--Net water flows, nutrients, and suspended-sediment loads at the San Juan Lagoons system during a 22-23 January, 1974 tidal cycle. (Modified from Ellis and Gómez-Gómez, 1976.)

present study. Since the study by Ellis and Gómez-Gómez (1976) did not include determinations of the chemical loads at the Avenida Baldorioty de Castro pump house, streamflow into Laguna San José, and Canal Blasina discharges to Laguna La Torrecilla, these were estimated. The estimates were based on samples collected during low flows representative of the low-flow tidal cycle.

A further analysis of the data in figures 18 and 19 provides additional evidence that during storm events a significant amount of nutrients is stored in the lagoons. During dry conditions the lagoons export these to the ocean. The difference during both studies can be seen in table 2.

Table 2.--Net loads of major nutrients and total-organic carbon during wet and dry periods at Laguna San José and Laguna La Torrecilla (values in 1000 kilograms).

COM-PONENTS	WET PERIOD IN	WET PERIOD OUT	WET PERIOD RETAINED	DRY PERIOD IN	DRY PERIOD OUT	DRY PERIOD RETAINED
			Laguna San José			
TOC	47	44	3	0.6	7.1	-6.5
TP	1.6	0.8	0.8	0.1	.2	-0.1
TKN	5.5	2.2	3.3		NO DATA	
			Laguna La Torrecilla			
TOC	86	104	-18	7.9	15.5	-7.6
TP	2.2	1.9	0.3	0.4	1.0	-0.6
TKN	6.8	3.6	3.2		NO DATA	

Note: Negative sign indicates no retention. Amount indicated leached from bottom sediments, contributed by detritus or autotrophic production.

These loads were computed by adjusting values to zero storage change. Canal Suárez, which conveys in excess of 80 percent of the water out of Laguna San José was assumed to carry its entire flow. The ratio of nutrient load (TOC, TP or TKN) to flow (Q) from figures 18 and 19 was assumed to remain equal until the excess water volume in the lagoon was flushed. The same was assumed at Laguna La Torrecilla for Boca de Cangrejos outlet, but the net outflow from Laguna San José to Laguna La Torrecilla was included in the latter's inflow loads.

Comparisons between this study and that conducted during dry weather conditions show that low-flow contributions of TOC and nutrients to the lagoons are small when compared to inputs during a significant storm. The frequency of such storms in the metropolitan San Juan area clearly indicates the importance of storm runoff in the lagoons system.

The termination of the study after 25 hours of measuring and sampling was premature. The data in figure 18 shows that the lagoon system had not achieved equilibrium in terms of water flows and transport of chemical loads. It is probable that the export of TOC and nutrients from Laguna San José to Laguna La Torrecilla, and thereafter to the ocean outlet, would have continued above base levels. Many questions relative to the balance in the system remain unanswered. What is the sediment load (particularly the sand fraction) of the major streams? What would have been the Canal Suárez flow and chemical transport characteristics as storm runoff receded? Would Laguna San José begin to export TOC and nutrients by way of Caño de Martín Peña on the next receding ebbtide in the absence of runoff from the urban areas?

These and many other questions that relate to the hydraulic and chemical characteristics of the San Juan Lagoon system cannot be answered within the scope of this study. The system is too complex, with too many interactions involving tides, volumes, flow constraints in the canals, fresh-salt water mixing, ground-water inputs, and so forth. A solution to systems as complex as the San Juan Lagoons usually involves development and calibration of a mathematical model. Such models are available and the data collected during the investigations in the San Juan Lagoons can be used to calibrate a model.

CONCLUSIONS

Storm runoff to the San Juan lagoon system on 22 to 23 October, 1974 was about 70 percent of the storm precipitation in the basin. The mostly urbanized area probably prevents infiltration and reduces the travel time of the storm runoff into the lagoons. The hydraulic system of the lagoons, which normally follows the prevailing tides, is significantly effected by storm runoff. As storm runoff accumulates in Laguna San José, the increasing head reverses tidal flows in Canal Suárez and Caño de Martín Peña. The combination of flows from Laguna San José and Canal Blasina forces Laguna La Torrecilla to discharge to the ocean as much as 95 percent of the total inflows to the lagoons.

The transport of carbon, nutrients, and suspended-sediment in the lagoon system appears to be affected principally by inputs from storm runoff. Low-flow contributions, in terms of loads, are a fraction of those during intense storms. Although several point sources along Canal Blasina contribute significant organic and nutrient loads, a storm as intense as the one during the study contributes many times those loads. This indicates that the water-quality problems in the lagoon system cannot be solved by eliminating only the point sources. The control of non-point sources in the urbanized basin is essential.

Nutrients and organic matter are released from the lagoons during dry-weather conditions at a rate greater than what can be accounted for from inputs. This is more evident in Laguna San José and Laguna La Torrecilla. In the dredged areas of both lagoons, anaerobic conditions prevail most of the time. This suggests that the dredged areas may be an important storage pool of the organic matter and nutrients discharged to the lagoons. These storage areas will continue to yield nutrients and organic matter to the lagoons even after point and non-point sources of these components are controlled. This will prevent a quick improvement of the water-quality conditions in both lagoons.

The San Juan Lagoons constitute a very complex system that cannot be properly defined by conventional techniques. The data from this and other studies can be used to model the response of the lagoons to variable hydraulic and chemical-load conditions. Models are available and could be calibrated to provide management with alternatives to study and improve the quality of the water in the San Juan Lagoons system.

REFERENCE: 35

REPORT

U.S. DEPARTMENT OF COMMERCE
JOHN T. CONNOR, *Secretary*
WEATHER BUREAU
ROBERT M. WHITE, *Chief*

TECHNICAL PAPER NO. 53

Two- to Ten-Day Rainfall for Return Periods of 2 to 100 Years in Puerto Rico and Virgin Islands

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WASHINGTON, D.C.
1965

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5. ISOPLUVIAL MAPS

Relation between 2-year 24- and 240-hour amounts. It was necessary to develop a relationship for estimating 10-day values for points in regions for which data were either unavailable or inadequate. Since a generalized chart of 2-year 24-hour rainfall was already available, the values for this duration were selected to develop such a relation. Observations from 66 stations (sec. 2) provided the basic data. Comparison of the meteorological situations resulting in heavy rains and examination of the rainfall-frequency characteristics of Puerto Rican and Virgin Island stations indicated some regional differences.

Puerto Rico and the Virgin Islands are located on the northern edge of the Carribbean Sea in the path of the northeasterly trades. The primary orographic feature of Puerto Rico is a range of mountains oriented east-west. In the Virgin Islands generalized elevation contours show a primarily east-west ridge orientation. The stations on the northern slopes of these ridges are favorably exposed for almost daily showers which are orographically augmented. These stations, therefore, indicated a higher 10- to 1-day ratio than those on the leeward or southern slopes. The stations were separated into windward and leeward groups and separate curves were drawn (fig. 4).

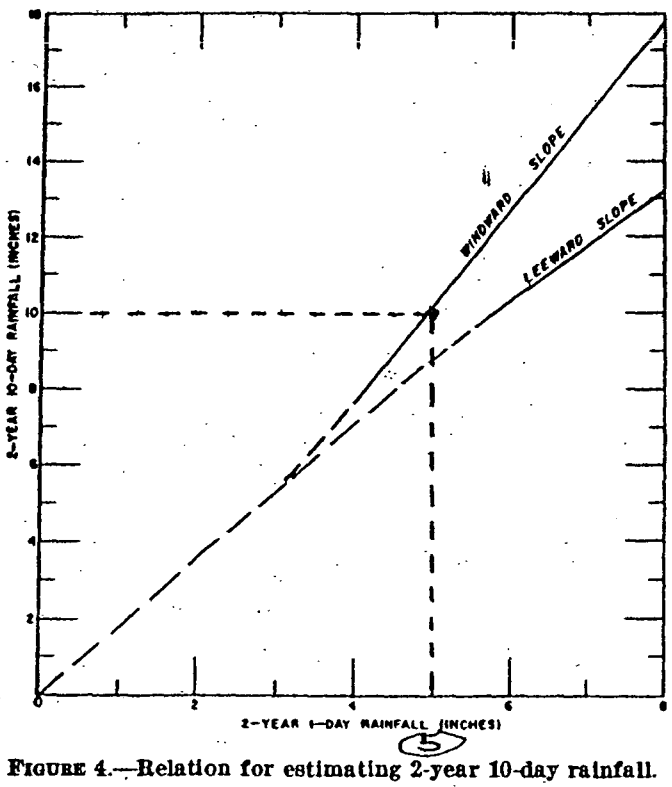

FIGURE 4.—Relation for estimating 2-year 10-day rainfall.

In the development of the relationship of figure 4 all 24-hour data were adjusted to the corresponding 1440-minute amounts. The 10-day values were adjusted to the corresponding 240-hour amounts. The correlation coefficient between the computed and estimated amounts was 0.85, with a standard error of estimate of 0.8 in. The mean of the computed values was 9.3 in. The scatter of estimated vs. computed values is shown in figure 5.

Smoothing of isopluvial maps. The analysis of maps involves the question of how much to smooth the data. An understanding of the degree of smoothing in the analysis is necessary to the most effective use of the maps. The problem of drawing isopluvial lines through a field of data is analogous to drawing a regression line on a scatter diagram. Just as an irregular regression line can be drawn to every point on a scatter diagram, the isolines may be drawn to fit every point. Such a complicated pattern of many small highs and lows would be unrealistic in most cases. There is a degree of inconsistency between smoothness and closeness of fit. Analysis must strive for a balance between the two, sacrificing some closeness of fit for smoothness and vice versa. The maps of this report were drawn so that the standard error of estimate was commensurate with the sampling and other errors in the data and methods used.

2-year 10-day maps (figs. 29 and 53). The relationship (fig. 4) described in the preceding paragraphs, and the 2-year 24-hour maps of [1] were used to estimate the 2-year 10-day values for a grid of 560 points, about 490 points on Puerto Rico and 70 points on St. Croix (fig. 6). Also plotted on the map were the data for the 66 stations (fig. 1) for which 10-day data had been tabulated. On these and similar maps all precipitation data have been adjusted by the factors of table 2 to n-hour amounts, i.e., the 2-day map presents 48-hour amounts, the 4-day presents 96-hour amounts, etc.

Ratio of 100-year to 2-year values. A map of Puerto Rico (fig. 7) was prepared showing the 100-year to 2-year ratio for 10-day amounts. This map was based on data for 52 stations (sec. 2). The ratios indicated a smooth geographical pat-

5 inches

2

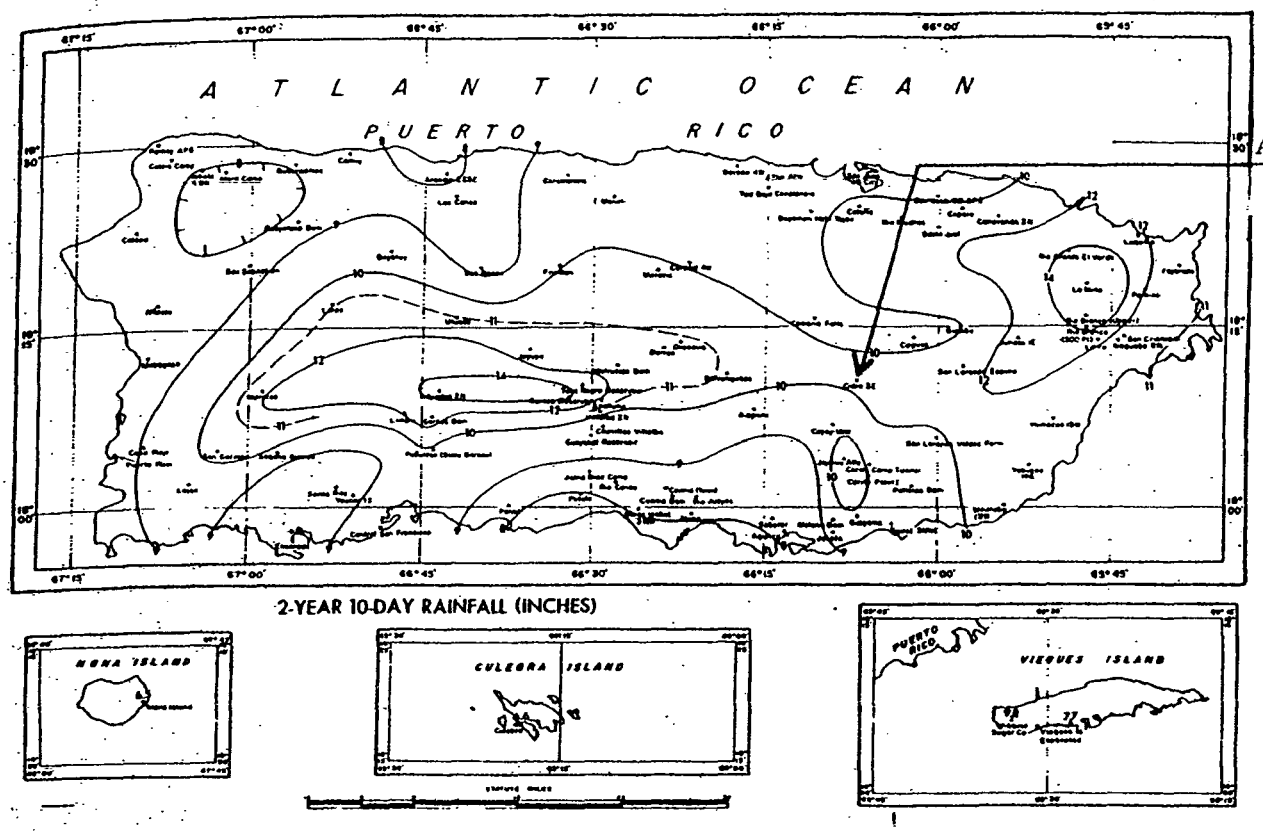

FIGURE 29.—2-year 10-day rainfall (in.) for Puerto Rico.

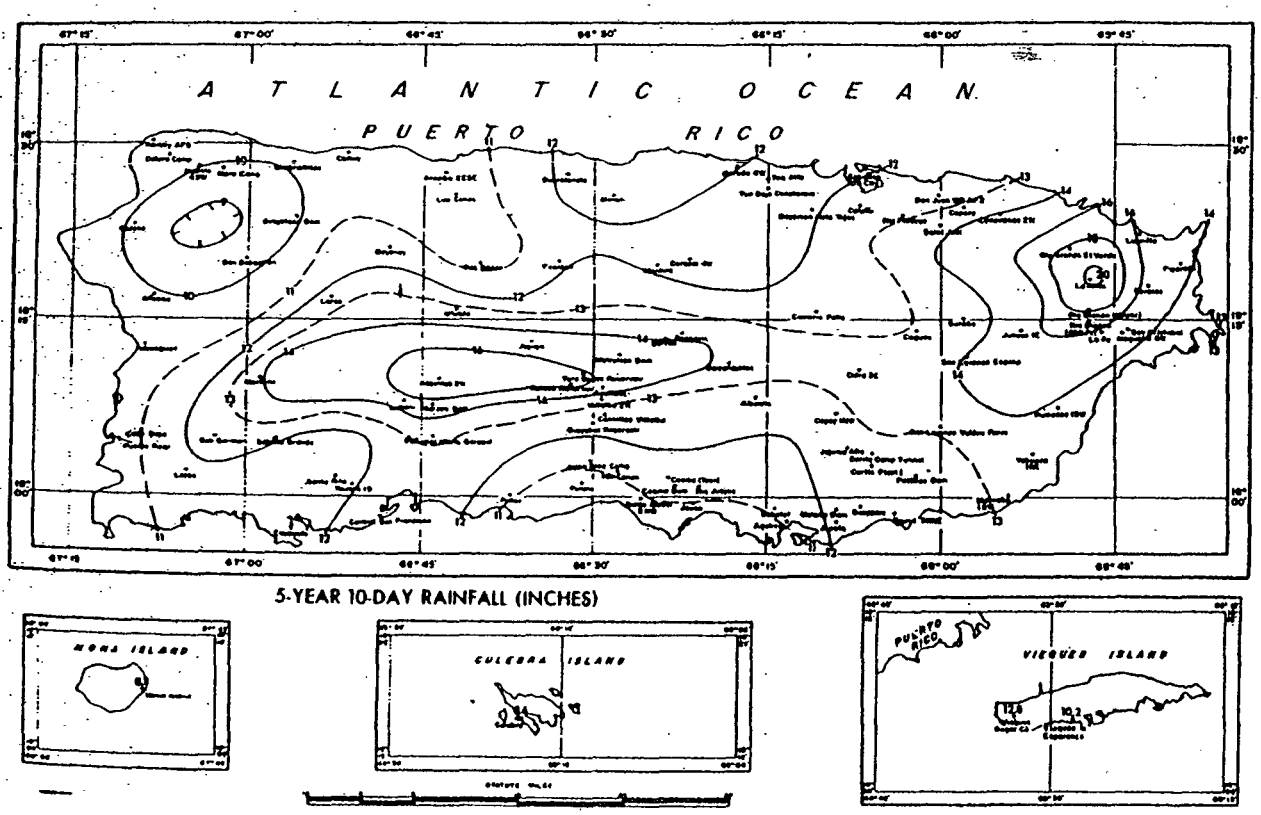

FIGURE 30.—5-year 10-day rainfall (in.) for Puerto Rico.

REFERENCE: 36

(ABANDONED) EXT. ROOSEVELT
(ABANDONED) PARQUE ROOSEVELT
(ABANDONED) OSUNA
(STAND-BY) HIRAM BITHORN
(ABANDONED) ISABEL LA CATOLICA
(ABAND.) CUNSA
(ABAND.) SEARS
McKRAKEN
NOT IN USE
POZO
TRUMAN
MIGUEL SUCH
(ABANDONED) UNIVERSITY GARDENS
(ABANDONED) UNIVERSIDAD 2
(ABANDONED) MANUELA PEREZ
(ABANDONED) MANUELA
PUERTO NUEVO
(ABAND.) DR. ISAAC GONZALEZ
(STAND-BY) LAS AMERICAS
(ABAND.) AMERICO MIRANDA
(ABAND.) SORBONA
LOS POLLITOS
STAND-BY
(STAND-BY) GABRIELA MISTRAL
(ABAND.) JILLY GRAHAM
(STAND-BY) VILLA NEVAREZ
(ABANDONED) WILLIAM D. BOYCE
(NOT IN USE) RIO PIEDRAS
(NOT IN USE) LOMA DE PRIN
GUARACANAL
SIGN & DATE
Celda Lavandería
Cerrado, causa
Ave Avero

ATLANTIC
SAN JUAN
Peñon de San Jorge
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6.10
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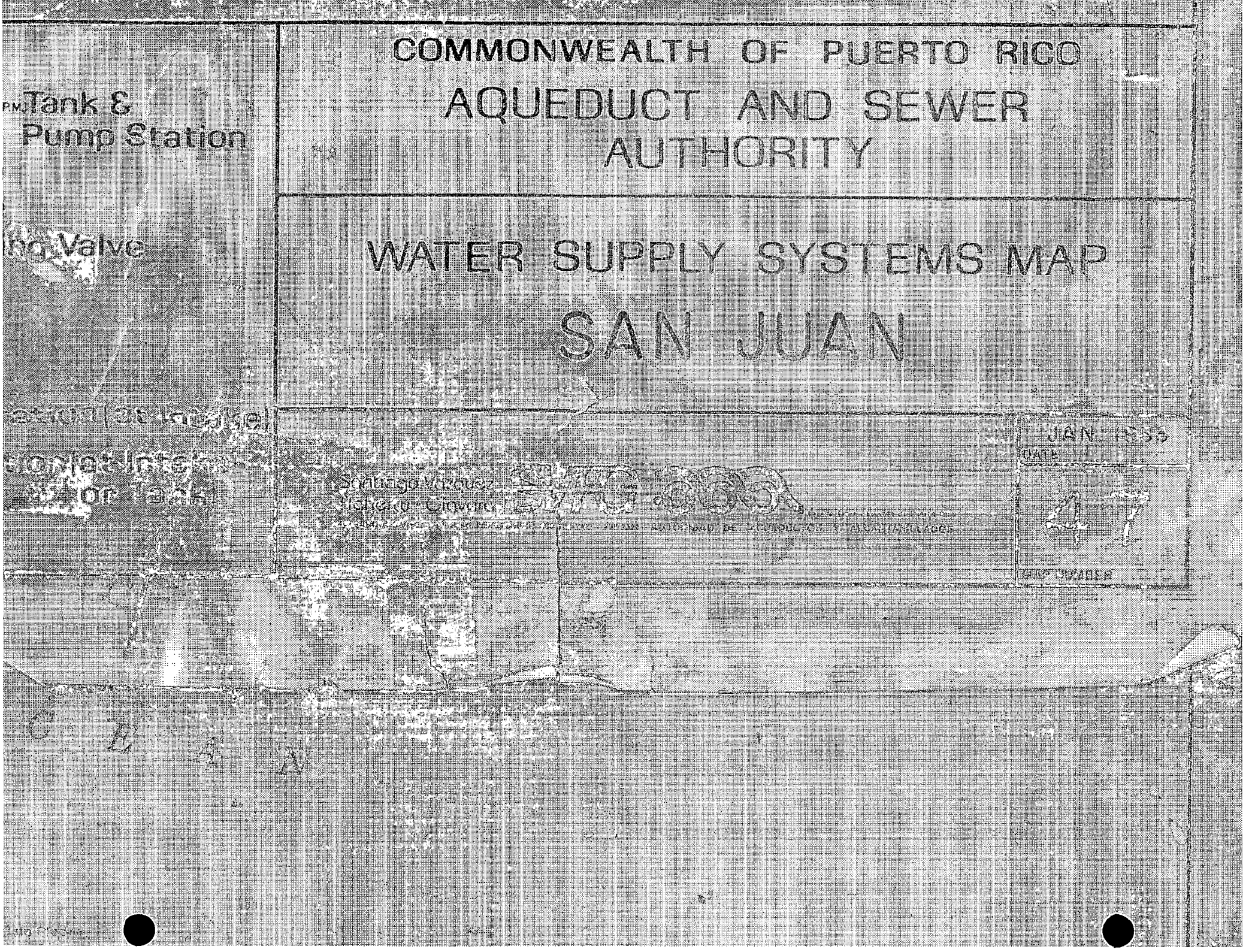
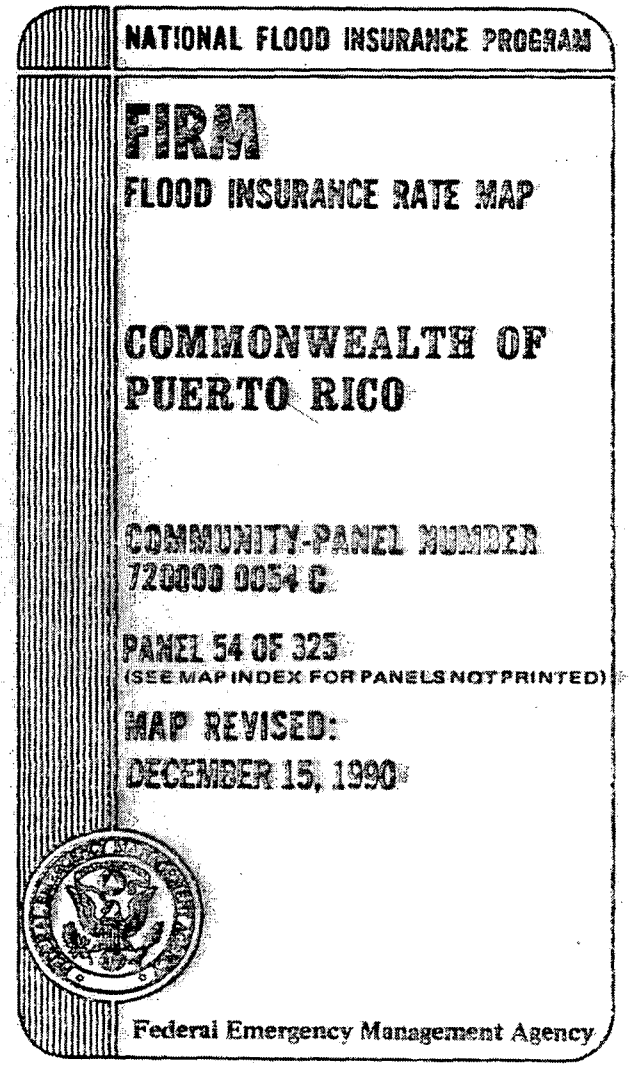
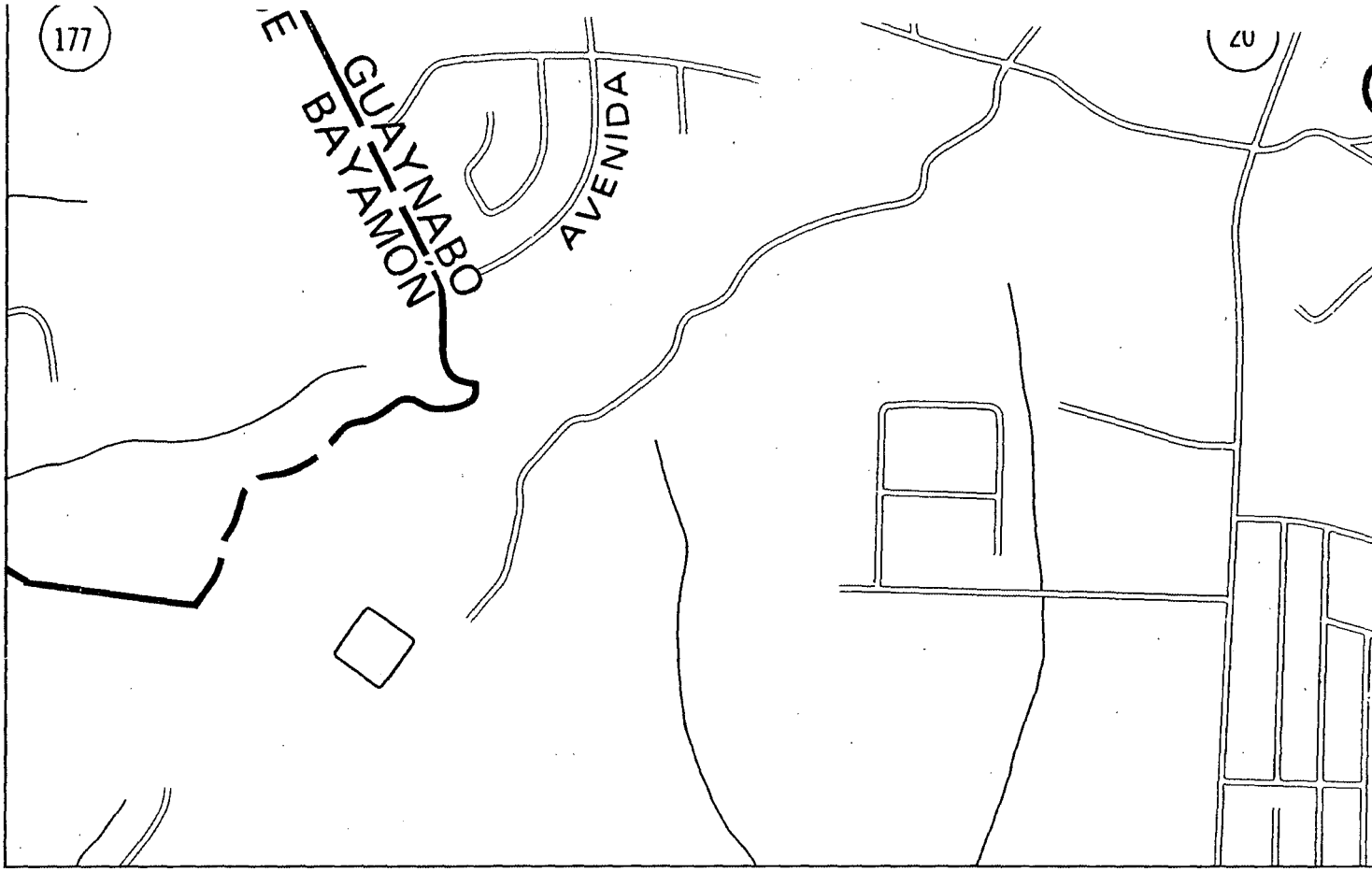

COMMONWEALTH OF PUERTO RICO
AQUEDUCT AND SEWER AUTHORITY
WATER SUPPLY SYSTEMS MAP
SAN JUAN
Tank &
Pump Station
Valve
JAN
DATE
Santiago Vazquez
Ignacio Cinvara
MAP NUMBER


NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
COMMONWEALTH OF PUERTO RICO
COMMUNITY-PANEL NUMBER
720000 0054 C
PANEL 54 OF 325
(SEE MAP INDEX FOR PANELS NOT PRINTED)
MAP REVISED:
DECEMBER 15, 1990
Federal Emergency Management Agency

REFERENCE _____

REFERENCE: 37



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 0.3 to 0.9 meter (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 0.3 to 0.9 meter (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding; velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 0.3 meter or with drainage areas less than 2.6 square kilometers and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

UNDEVELOPED COASTAL BARRIERS†

Identified 1983

Identified 1990 or Later

Otherwise Protected Areas Identified 1991 or Later

†Coastal barrier areas are normally located within or adjacent to special flood hazard areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Meters*

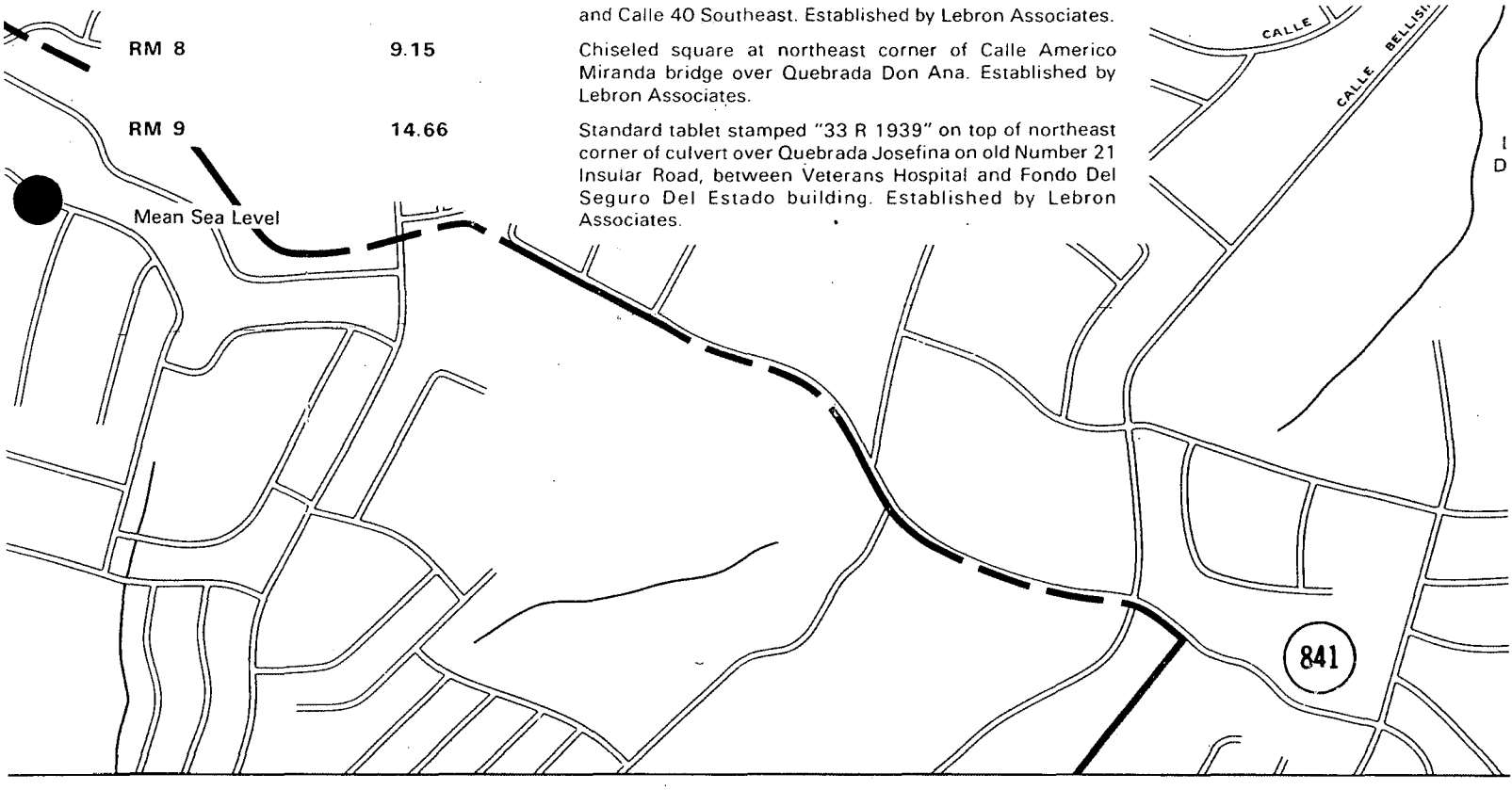
D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Meters Where Uniform Within Zone*

RM 7$_X$ — Elevation Reference Mark

*Referenced to Mean Sea Level

ZONE AE
ZONE X
CALLE CESAR GONZALEZ
CALLE JUAN B. RODRIGUEZ
ZONE X
CALLE JUAN J. JIMENEZ
CALLE MANUEL DOMENECH
PROFILE BASE LINE
CANAL PUERTO NUEVO
PROFILE BASE LINE
Quebrada Doña Ana
CALLE ANTILLAS
ALICANTE
CALLE ARAGON
CALLE ALPES
AMBERES
ATENAS
ALEJANDRIA
ALESIA
ZONE AE
ZONE X
CALLE COLL TOSTE
ZONE X
CALLE CELEMON
CALLE COLUMBIA
GEORGETOWN
HARVARD
CALLE OXFORD
ZONE X
ZONE X
INTERAMERICANA
ZONE AE
Rio Piedras
CALLE GALLEGO
CALLE FULTON
CALLE VOLTA
CALLE FARADAY
CALLE GUTEMBERG
ZONE X
CALLE 33
ZONE X
CALLE KINGSTON
CALLE HABANA
CALLE SAN SALVADOR
CALLE SANTO DOMINGO
CALLE TEGUCIGALPA
CALLE GUATEMALA
ZONE AE
CALLE 55
CALLE 57
ZONE X
RM4
CALLE AMERICO MIRANDA
ZONE X
CALLE 24
CALLE 26
LIMIT OF STUDY
ZONE X
CALLE 20
23
18
17
3.6
4.6
5.0
5.2
5.6
5.8
6.8
7.6
6.0
8.0
8.0
8.0
9.0
9.0
9.6
10.0
9.6



APPROXIMATE SCALE

1:10000

½ ¼ 0

500 0 500 1000 1500 2000 2500 3000 3500 Feet

.5 .25 0 .5 Kilometer

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only landward of 0.0m Mean Sea Level (MSL), and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100- year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

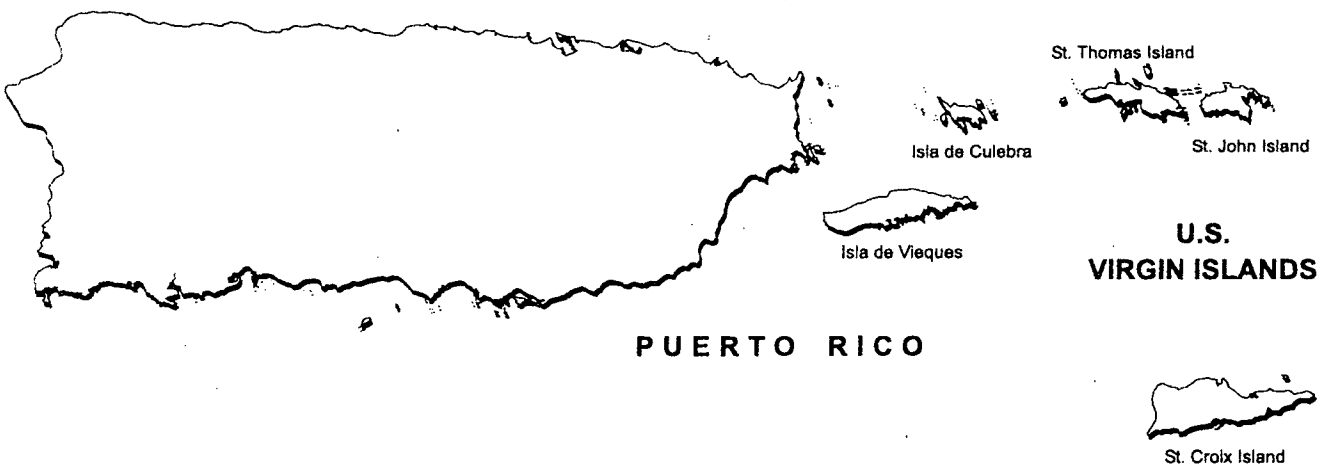
Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

REFERENCE: 38

USGS
science for a changing world

Water Resources Data Puerto Rico and the U.S. Virgin Islands Water Year 2000



U.S. Department of the Interior
U.S. Geological Survey

Prepared in cooperation with the Commonwealth of Puerto Rico, the Government of the U.S. Virgin Islands, and with other agencies

50049100 RIO PIEDRAS AT HATO REY, PR

WATER-QUALITY RECORDS

LOCATION.--Lat 18°24'34", long 66°04'10", at bridge on Avenida Piniero at Expreso Las Americas, and 0.8 mi (1.3 km) southwest of Hato Rey.

DRAINAGE AREA.--15.4 mi^2 (39.9 km^2). → D 9,856 acre

PERIOD OF RECORD.--Water years 1971 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L) (00340)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV											
26...	1300	65	368	7.8	25.9	91	6.9	84	30	46000	26000
FEB											
23...	1130	25	251	7.7	25.8	59	8.0	97	11	39000	71000
APR											
25...	1100	18	477	8.0	28.2	32	7.1	90	14	58000	6700
AUG											
15...	1015	15	447	7.6	28.2	2.0	3.8	49	30	61000	39000

DATE	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ANC WATER UNFLTRD FET FIELD MG/L AS CACO3 (00410)	SULFIDE TOTAL (MG/L AS S) (00745)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
NOV										
26...	140	38.6	10.6	21.4	.8	2.7	136	<1.0	19.0	23.3
FEB										
23...	--	--	--	--	--	--	161	--	--	--
APR										
25...	160	44.3	12.1	31.3	1	2.8	175	<1.0	12.9	38.2
AUG										
15...	150	41.0	10.5	28.1	1	3.1	154	--	12.6	34.8

DATE	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUSPENDED (MG/L) (00530)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)
NOV										
26...	.1	23.5	221	38.9	154	1.24	.06	1.3	.44	.76
FEB										
23...	--	--	--	--	99	.88	.09	1.0	.77	.63
APR										
25...	.2	35.1	282	13.4	47	1.16	.14	1.3	.74	.36
AUG										
15...	.2	29.6	252	10.0	<10	.44	.09	.5	2.30	.60

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	NITROGEN, TOTAL (MG/L AS NO3) (71887)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	ARSENIC TOTAL (UG/L AS AS) (01002)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA) (01007)	BORON, TOTAL RECOVERABLE (UG/L AS B) (01022)	CADMIUM WATER UNFLTRD TOTAL (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)
NOV										
26...	1.2	2.5	11.1	.130	E2	166	47	.1	5	E14
FEB										
23...	1.4	2.4	10.5	.270	--	--	--	--	--	--
APR										
25...	1.1	2.4	10.6	.240	<3	109	58	<.1	2	<20
AUG										
15...	2.9	3.4	15.2	.390	--	--	--	--	--	--

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Area Conversion

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Convert what quantity? 15.4

From:	To:
acre	acre
acre [commercial]	acre [commercial]
acre [survey]	acre [survey]
acre [Ireland]	acre [Ireland]
are	are
arpent [Canada]	arpent [Canada]
barn	barn
bovate	bovate
bunder	bunder

Convert

Result (rounded to 7 decimal places):

15.4 square mile = 9,856 acre

Quick Links:
Select One...

Can't find something?
Try searching.

Are you bored?
Try the Fun Stuff.

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Information:
statute - Used Pre-1976 by the US Federal, State, and Local Governments.
survey - Used mostly in Pre-1959 U.S. land titles and deeds.
International - Used in trade, non U.S. countries, and Post-1959 U.S.

REFERENCE: 39

Critical Wildlife Areas of Puerto Rico

Resource Planning Area

Coastal Zone And Wildlife Planning Division

Estado Libre Asociado de Puerto Rico

Departamento de Recursos Naturales

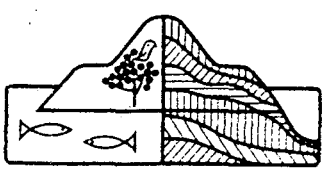
CRITICAL WILDLIFE AREAS OF PUERTO RICO

DEPARTMENT OF NATURAL RESOURCES
AREA OF PLANNING AND RESOURCES ANALYSIS
Division of Coastal Resources and Wildlife Planning

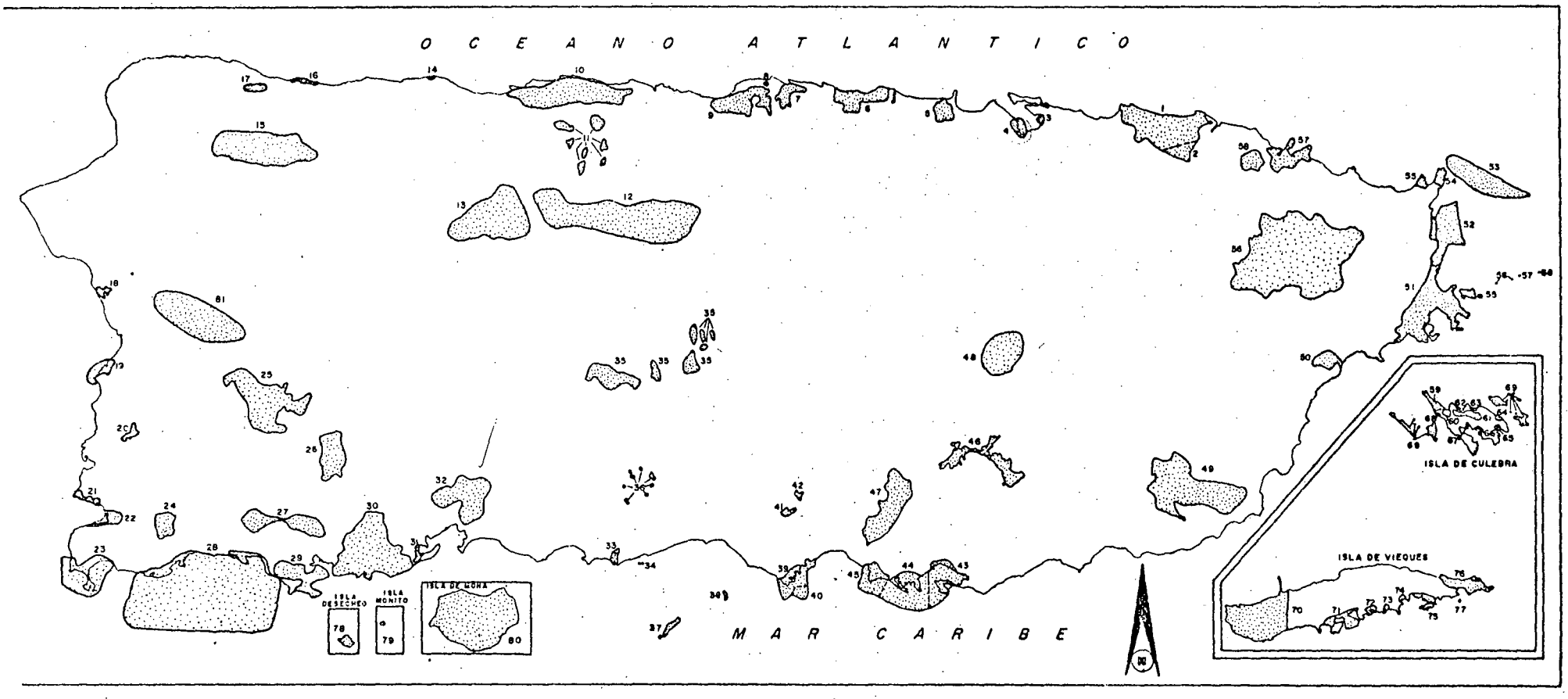
Fred V. Soltero Harrington
Secretary

Gabriel del Toro
Assistant Secretary of Planning

September 1979



PUERTO RICO'S CRITICAL WILDLIFE AREAS



SCALE
10 5 0 5 10 15 20 25 KILOMETERS
0 0 5 10 15 MILES

LEGEND:

1 - TORRECILLA - PIÑONES
2 - TORRECILLA ALTA
3 - CONSTITUTION BRIDGE MUDFLATS
4 - PALO SECO PENINSULA
5 - SAN PEDRO SWAMP
6 - LAKES AND FOREST OF DORADO BEACH AND CERROMAR BEACH HOTELS
7 - CIBUCO SWAMP
8 - LAKE PUERTO NUEVO
9 - TORTUGUERO LAGOON, RICA LAKE, AND CABO CARIBE SWAMP
10 - TIBURONES SWAMP
11 - CAMBALACHE FOREST
12 - SABANA HOYOS - HATO VIEJO KARST
13 - RIO ABAJO KARST
14 - CARRIZALES MANGROVE
15 - GUAJATACA KARST
16 - GUAJATACA CLIFFS
17 - BARRIO COTO
18 - SABANETAS SWAMP
19 - GUANAJIBO MANGROVE AND ADJACENT
20 - CUEVA LAGOON
21 - GUANIQUILLA
22 - BOQUERON REFUGE
23 - CABO ROJO SALTFLATS AND ADJACENT AREAS
24 - CARTAGENA LAGOON
25 - MARICAO STATE FOREST
26 - SUSUA STATE FOREST AND ADJACENT LANDS
27 - GUANICA LAGOON
28 - LA PARGUERA
29 - GUANICA STATE FOREST - WEST
30 - GUANICA STATE FOREST - EAST AND ADJACENT LANDS
31 - LLUVERAS
32 - GUAYANILLA HILLS
33 - CABULLON MANGROVE
34 - FRIOS CAYS
35 - TORO NEGRO STATE FOREST
36 - SERRALLES
37 - CAJA DE MUERTOS AND MORRILLITO ISLAND
38 - BERBERIA CAY
39 - PUNTA PETRONA MANGROVE
40 - CARACOLES
41 - COAMO RESERVOIR
42 - BAÑOS DE COAMO
43 - PUNTA POZUELO
44 - MAR NEGRO
45 - PUNTA ARENAS
46 - CERRO DEL GATO AND ASSOCIATED AREAS
47 - SALINAS TRAINING AREA
48 - CIDRA LAKE
49 - PANDURA MOUNTAIN RANGE
50 - HUMACAO SWAMP
51 - ROOSEVELT ROADS NAVAL BASE
52 - FAJARDO COASTLINE
53 - FAJARDO CORDILLERA
54 - GRANDE LAGOON AND ADJACENT LANDS
55 - AGUAS PRIETAS LAGOON
56 - LUQUILLO MOUNTAINS
57 - ENSENADA CONEZON
58 - CIENAGA BAJA
59 - FLAMENCO PENINSULA
60 - FLAMENCO LAGOON
61 - RESACA MOUNTAIN
62 - RESACA BEACH
63 - BRAVA BEACH
64 - LARGA BEACH AND ZONI LAGOON
65 - PUERTO DEL MANGLAR
66 - LOS CAÑOS
67 - CEMENTERIO BAY
68 - CORNELUIS LAGOON
69 - CULEBRA'S SURROUNDING ISLETS
70 - WEST VIEQUES
71 - ENSENADA SOMBE SWAMP, MOSQUITO BAY AND FERRO BAY
72 - TAPON BAY
73 - CHIVA SWAMP
74 - YANUEL LAGOON
75 - ENSENADA HONDA MANGROVE
76 - EAST TIP OF VIEQUES
77 - CONEJO ISLAND
78 - DESECHEO ISLAND
79 - MONITO ISLAND
80 - MONA ISLAND
81 - CABEI RIVER

increase the numbers of waterfowl in the area. The construction of impoundments in this zone would be even more beneficial, but would prove substantially more expensive. The adjacent limestone hills should be protected from further destruction from developments so that they might continue to serve as an important locality for pigeon and dove hunting.

Torrecilla Alta is probably a prime wildlife area.

3. Constitution Bridge Mudflats - (San Juan)

Until recently the mudflats adjacent to Constitution Bridge in San Juan Bay were one of the two best areas in all of Puerto Rico for shorebirds, gulls and terns. Per acre it probably supported the greatest diversity and concentrations of birds anywhere on the island. As many as 5,000 birds had been observed on the few acres of flats at a single time and 70 avian species have been recorded from the locality to date. The Caspian Tern, Forster's Tern, Cayenne Tern, Ring-billed Gull and Black-headed Gull are seen regularly at Constitution Bridge while most of them occur only accidentally elsewhere on the island. The largest roost of Louisiana Herons known in Puerto Rico and the second largest roost of Snowy Egrets are found next to Constitution Bridge. In addition, a rookery of about 1,000 Cattle Egrets is established in the area and approximately

250 Brown Pelicans (protected-federal ESA) depend on the locality as a feeding and roosting area. To add to the tremendous wildlife values of the Constitution Bridge mudflats is its localization within the heart of San Juan. This gives it an outstanding educational and recreational potential. With proper management the Constitution Bridge mudflats could be made into an outdoor educational facility from which all the people of San Juan could benefit. This could be done at minimal expense by establishing a parking area at the northern end of the flats along with a small educational facility for giving brief talks, showing slides and presenting displays, and the construction of an observation tower for viewing the mudflats by telescope. By manning the facility full time, thousands of school children could be within a short ride of a unique experience in outdoor education.

Unfortunately, the flats on the south side of Martin Peña Canal, which previously provided superior waterbird habitat than the northern flats and which are better for observing with respect to the sun, were significantly modified in recent years. The silt laden runoff from a dredge disposal area adjacent to these flats, a locality previously scheduled for dock construction, was directed over the flats with the consequent precipitation of tons of silt on the flats thus

raising their level above the normal ebb and flow of the tide. The raising of the flats by as much as several feet in some places has led to the destruction of 90% of the area previously inhabited by waterbirds and the invasion of the site by mangroves. Mangroves are occupying the elevated southern flats at such a rate that they threaten to completely eliminate this area as a significant waterbird habitat.

A reversal of this trend could be initiated through the implementation of a restoration program for the site. First, most of the excess silt that has settled on the flats could be bulldozed back to the old spoil area which is now abandoned. The elevation would have to be reduced to a level where normal high tide covers the flats with but an inch or two of water. Some of the silt removal may have to be done with a dredge, but a good engineer could probably keep dredging to a minimum. The second step would be to construct a retaining structure along the abandoned spoils dike to the south of the flats to avoid the continued erosion of soil onto the flats. Finally, on the elevated land between the dike and the flats an excellent outdoor educational facility could be constructed as described above.

The Constitution Bridge mudflats are one of Puerto Rico's prime wildlife areas. A list of the birds of the locality, and their status, follows.

Birds of Constitution Bridge

SPECIES	STATUS
Brown Pelican	C
Magnificent Frigatebird	UC
Great Blue Heron	UC
Green Heron	UC
Little Blue Heron	C
Cattle Egret	C
Reddish Egret	A-1 of the four species from Puerto Rico
Great Egret	UC
Snowy Egret	C
Louisiana Heron	C
Yellow-crowned Night Heron	UC
Least Bittern	R
White Ibis	A-1 of the two records from Puerto Rico
White-cheeked Pintail	A

SPECIES	STATUS
Blue-winged Teal	R
Clapper Rail	UC
Common Gallinule	UC
Semipalmated Plover	C
Wilson's Plover	UC
Killdeer	UC
American Golden Plover	UC
Black-bellied Plover	C
Black-necked Stilt	C
Ruddy Turnstone	C
Whimbrel	UC
Spotted Sandpiper	UC
Greater Yellowlegs	C
Lesser Yellowlegs	C
Willet	UC
Red Knot	R
Pectoral Sandpiper	R
White-rumped Sandpiper	UC
Least Sandpiper	UC
Dunlin	A-1 of the two records from Puerto Rico

SPECIES	STATUS
Semipalmated Sandpiper	C
Western Sandpiper	C
Sanderling	UC
Short-billed Dowitcher	C
Stilt Sandpiper	C
Hudsonian Godwit	A-1 of the three records from Puerto Rico
Great Black-backed Gull	A-1 of the two records from Puerto Rico
Herring Gull	UC-known in Puerto Rico practically only from Constitution Bridge
Ring-billed Gull	C-known in Puerto Rico practically only from Constitution Bridge
Laughing Gull	C
Black-headed Gull	R
Franklin's Gull	R-known in Puerto Rico only from Constitution Bridge
Gull-billed Tern	UC
Forster's Tern	A-known in Puerto Rico practically only from San Juan Bay
Common Tern	C

SPECIES	STATUS
Roseate Tern	UC
Least Tern	UC
Royal Tern	C
Cayenne Tern	R-known in Puerto Rico practically only from Constitution Bridge
Sandwich Tern	C-largest congregation in Puerto Rico proper
Caspian Tern	UC-known in Puerto Rico only from Constitution Bridge
Black Tern	R
Black Skimmer	R-known in Puerto Rico practically only from Constitution Bridge
Zenaida Dove	R
White-winged Dove	R
Common Ground Dove	UC
Smooth-billed Ani	UC
Belted Kingfisher	R
Cave Swallow	R
Caribbean Martin	R
Yellow Warbler	C
Orange-cheeked Waxbill	UC

SPECIES	STATUS
Strawberry Finch	UC
Bronze Mannikin	UC
Greater Antillean Grackle	UC
Black-faced Grassquit	UC

LEGEND: C - Common
UC - Uncommon
R - Rare
A - Accidental

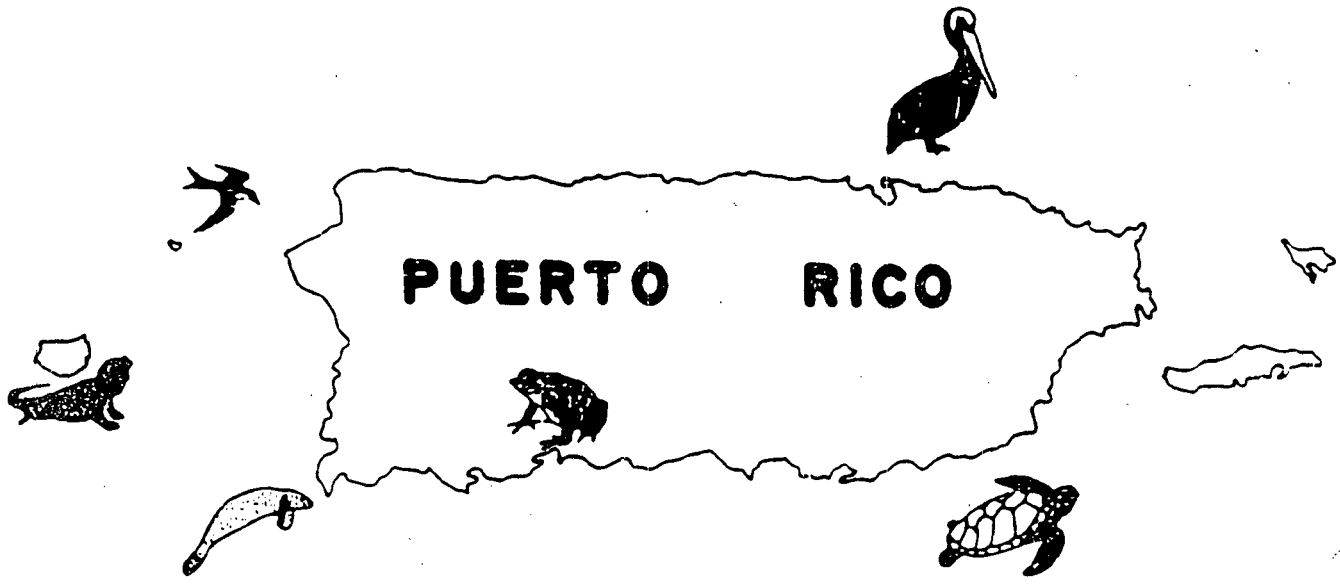
4. Palo Seco Peninsula - (Guaynabo)

Many gulls, terns and pelicans rest on this spot and feed along with unusually large congregations of frigatebirds in the adjacent cove. In addition, large numbers of migrant shorebirds stop to feed and rest out on the point. The value of this area increases with the destruction of mudflats elsewhere in San Juan Bay. Palo Seco Peninsula was an area of primary wildlife values, though it now appears that these values will be destroyed by construction of a development on the peninsula.

REFERENCE: 40

CRITICAL COASTAL WILDLIFE AREAS OF PUERTO RICO

By Julio E. Cardona and Manuel Rivera



Commonwealth of Puerto Rico
Department of Natural Resources
Puerto Rico Coastal Zone Management Program
Scientific Research Area
San Juan, Puerto Rico

September 1988

HOJA DE DOCUMENTACION

DEPARTAMENTO DE RECURSOS NATURALES

1·NUMERO DEL INFORME	2· FECHA: September 1988
3·TITULO Critical Coastal Wildlife Areas of Puerto Rico	4·CLASE DE INFORME: PRELIMINAR ☐ FINAL [X] OTRO _____
5·AUTOR (AUTORES) Julio F. Cardona and Manuel Pivera Drafting M.Rivera and G.I.Fuentes	
6·AGENCIA PARA LA QUE SE PREPARO EL INFORME P.R. Coastal Zone Management Program Department of Natural Resources	7·PERIODO CUBIERTO POR ESTE INFORME. 2 years
8·TITULO DEL ESTUDIO O PROYECTO Task 7.3 Critical Wildlife Areas	9·NUMERO DE PAGINAS

10· DESCRIPTOR

Fauna,habitats,maps,wildlife,

11·IDENTIFICADORES

Puerto Rico ,Vieques ,Culebra,

12·ABSTRACTO (NO MAS DE 200 PALABRAS)

The current status of 73 coastal areas considered critical for threatened, endangered, gamebird, and aquatic wildlife species survival is compared with their status in 1979. Aspects such as habitat degradation, increase and reduction of areas and continued use by their characteristic fauna are examined. Location, administrative status and ownership are indicated. General management recommendations are given where appropriate. Maps illustrating all areas and showing general vegetation features and characteristic fauna are included.

Some degree of degradation was observed on approximately one third of the areas. Loss of habitat occurred in about one fourth, and encroachment was evident in nearly half the areas. Habitat losses are equally represented among private and publicly owned areas. These and other aspects are briefly discussed for a number of areas.

ACKNOWLEDGEMENTS

We would like to acknowledge all the people who have helped in the completion of this study. The names of persons who gave of their valuable time giving us information, transportation, and companionship would fill several pages. Almost all dependencies of the Department of Natural Resources were involved at one time or another. This is the case of the Ranger Corps, Bureau of Reserves, Refuges and Sanctuaries and the Forest Service, Scientific Inventory Division, the Corporation for the Development and Conservation of Culebra, the Resident Biologists and Management Officers of the different Reserves and State Forests, the Terrestrial Resources Division of the Planning Area, and the Marine Resources Section of the Scientific Research Area.

Personnel of several Commonwealth agencies, such as the Lands Administration, Lands Authority, and the Department of Agriculture also were extremely helpful and efficient in providing requested information and maps. Federal agencies include the U. S. Fish and Wildlife Service of the Department of the Interior, the U. S. Army Corps of Engineers, and the Environmental Officers of the different dependencies of the U. S. Armed Forces in Puerto Rico.

Special thanks are due Dr. José L. Vivaldi who gave us enthusiasm and administrative expertise. Dr. Vivaldi also gave invaluable editorial services for the final version of the manuscript. Miss Giovanna Fuentes colaborated immensely in the preparation of maps and drafting in general. Her assistance greatly improved the quality of illustrations and made meeting deadlines possible. Personnel of the Office of Coastal Zone Management were invaluable in helping surmount the drudgery of paperwork for the processing of purchase orders and many other aspects of this work. Our Monitor, Miss Marianela Torres, and the Office Director, Professor Inés Monefeldt took a special interest in seeing that everything related to this task worked out as smoothly as possible, with great success. Ms. Jacqueline Rousseau, of the National Oceanic and Atmospheric Administration also took a personal interest in the completion of this work and helped refine its focus.

To Barbara Cintrón, Director of the Technical Assessment Division of the DNR, we are thankful for suggesting the study, drafting the original proposal, and providing support and encouragement. Mr. José Gonzalez Liboy, former Director of the Office of Coastal Zone Management, gave indefatigable support,

enthusiasm and administrative expertise during most of the first year of this study. To all, we extend our deepest gratitude.

Last, but not least, we want to express our gratitude to our families for enduring prolonged absences during field trips with utmost patience, and for providing support, encouragement and enthusiasm throughout the duration of this study.

CRITICAL COASTAL WILDLIFE AREAS

1- Torrecilla-Piñones, Vacía Talega Complex (Loiza-Carolina) M-1

This site is located east of the metropolitan area of San Juan. More than 10,000 acres in area, its vegetation is dominated by mangrove forests, but other plant communities occur, such as littoral woodland, freshwater swamp and marshes, and coconut plantations. The Piñones State Forest portion of this large and complex area was designated a Natural Reserve in 1979. Several technical documents have been prepared for this area. Information on water quality is found in Rodriguez (1981), an environmental evaluation was prepared by Palacios (1981). Details on the flora are contained in Del Llano et al. (1980). The avifauna was summarized by Perez and Ferrer (1980).

The Forest supports a diverse fauna including birds, reptiles, fish, and crabs, among others. We found four species of fiddler crabs. Reptiles are represented by several lizard species and a considerable population of the native fresh water turtle. The area is popular among fishermen, which harvest a number of species both for commerce and sport.

At least 89 bird species have been recorded from the area (Perez and Ferrer 1980). The large variety of species ocurring in the area was evident during the field evaluation of this area. It supports a large number of herons and egrets, a considerable population of the Brown Pelican (FE), terns and gulls. The Great Egret was observed nesting at Carmelita island. We also observed one individual of the Yellow-shouldered Blackbird (FE) foraging along with a number of Greater Antillean Grackles and Shiny Cowbirds. One pair of Blackbirds was later found nesting in the Forest's recreational area next to the administrative offices. The West Indian Whistling Duck (CT) and Masked Duck (CT) have been reported from the area by hunters (Perez and Ferrer 1980).

A variety of migratory birds such as Waterthrushes, Kingfishers, Ospreys, and a variety of warblers are abundant during the winter months. During one of our trips to the area we observed one Double-crested Cormorant. This species is accidental in Puerto Rico.

The construction of a bridge over the Loiza River and the widening and paving of road 187 connecting Loiza and Piñones have greatly increased vehicular traffic movement through the area. A sand dune was rebuilt by the U.S. Army Corps of Engineers to mitigate beach erosion, which intermittently occurs in a few

3- Constitution Bridge Mudflats (San Juan) M-2

The Constitution Bridge mudflats are located in the eastern end of San Juan Bay, at the confluency of the Martín Peña Canal and the Puerto Nuevo River. The area is one of the richest in avifaunal diversity in the Island. Approximately 62 aquatic and 31 terrestrial species have been recorded in the area (Díaz-Marrero et al. 1983). These figures include migratory, resident, and introduced species. Mudflats in the area along the Martín Peña Canal were extremely valuable for migrating shorebirds. The 1979 document indicated that as many as 5000 birds could be seen in the mudflats in a single day. Diaz et al. (1983) should be consulted for a detailed description of the area's vegetation and fauna.

Two endangered species, the Yellow-shouldered Blackbird (FE) and the Brown Pelican (FE),occur in the area. The Roseate (FT) and Least (FT) terns have also been reported from the area. At present, ten ardeid species have been documented as breeding in the area (Diaz et al. 1983). Several of these nest near the entrance of the Martín Peña Canal.

This area is presently highly degraded due to the construction, in progress, of the Agua-Guagua mass transportation system. An artificial mudflat was constructed north of a narrow mangrove stand at the mouth of the canal as mitigation for the lost mudflats along the Martín Peña Canal.

This site, once one of the best feeding and roosting areas for marine and wading birds in particular may be on its way to disappearing due to the combined effects of this and other projects, such as the projected channelization of the Puerto Nuevo River and the expansion of the docking facilities of the San Juan harbor. Landfill operations for the placement of main electrical wire posts by the Electric Energy Authority and the Municipal Public Works Office have further reduced areas occupied by mangroves.

Other developments that have or will contribute to further degradation of the area include the New Center of San Juan City and the Central Park on opposite extremes of the area. The latter was built for the Pan American Games of 1979. A few years after construction of the Central Park, Yellow-shouldered Blackbirds ceased to be sighted from the area. In addition, plans are well underway for the contruction of a 70 million dollar project including a marina, hotel, mall, and docking facilities capable of accomodating cruise ships in the Hoare sector of Santurce. The project will be located near the mudflat built as mitigation for the lost mudflats along the Martin Peña Canal. It will all but destroy the wildlife value of this once magnificent locality.

mid-January 1987. This facility is established on the area connected to the mainland, with the bicycle and jogging path extending about two thirds of the way into the peninsula. The path ends abruptly at a drop off point, practically at sea level, where a fence separates and restricts access to the remaining portion, which has been set aside as a wilderness area. It is beyond that point that bird use is concentrated. The easily disturbed Magnificent Frigatebird as well as the Brown Pelican (FE) utilize the taller Casuarina trees as a roost, indicating that the area is relatively isolated from human activities. The pelican also roosts on red mangroves, which dominate parts of the coast facing the shallow cove. During our brief visits we also observed about four to five hundred sandpipers utilizing the north shore, where a strip of rocks of volcanic origin have been placed for erosion control.

The area near the tip has become enlarged by about two acres relative to 1979, extending towards the south. This new area has been colonized by several pioneer plant species such as the sea grape (Coccoloba uvifera), the vine Canavalia maritima, and others.

Analysis of 1977 aerial photographs reveals more open, sandy areas near the base of the tip. Also, the narrow strip joining the boot shaped tip to the basal part of the area lacked the young red mangrove-Thespesia association it now supports. Whereas in 1977 there was a fairly wide sandy strip bordering most of the peninsula, vegetation now reaches the water in many points. The already shallow cove has become significantly shallower, and a small vegetation covered islet of about one acre in area has formed near the mouth of canal, near the Catano coast.

Because of the development of the Esperanza recreation facility, which occupies more than half the area of the peninsula, and the concomitant increase in human presence, which undoubtedly has reduced foraging use of the shallow cove by waterbirds, we conclude that this area is degraded in quality and reduced in size relative to 1979. However, it remains a primary wildlife area.

At the time of this evaluation, the Constitution Bridge area although extremely degraded relative to 1979, is still a primary wildlife area, but prospects for its continued existence are grim.

4- Palo Seco Peninsula (Cataño) M-3

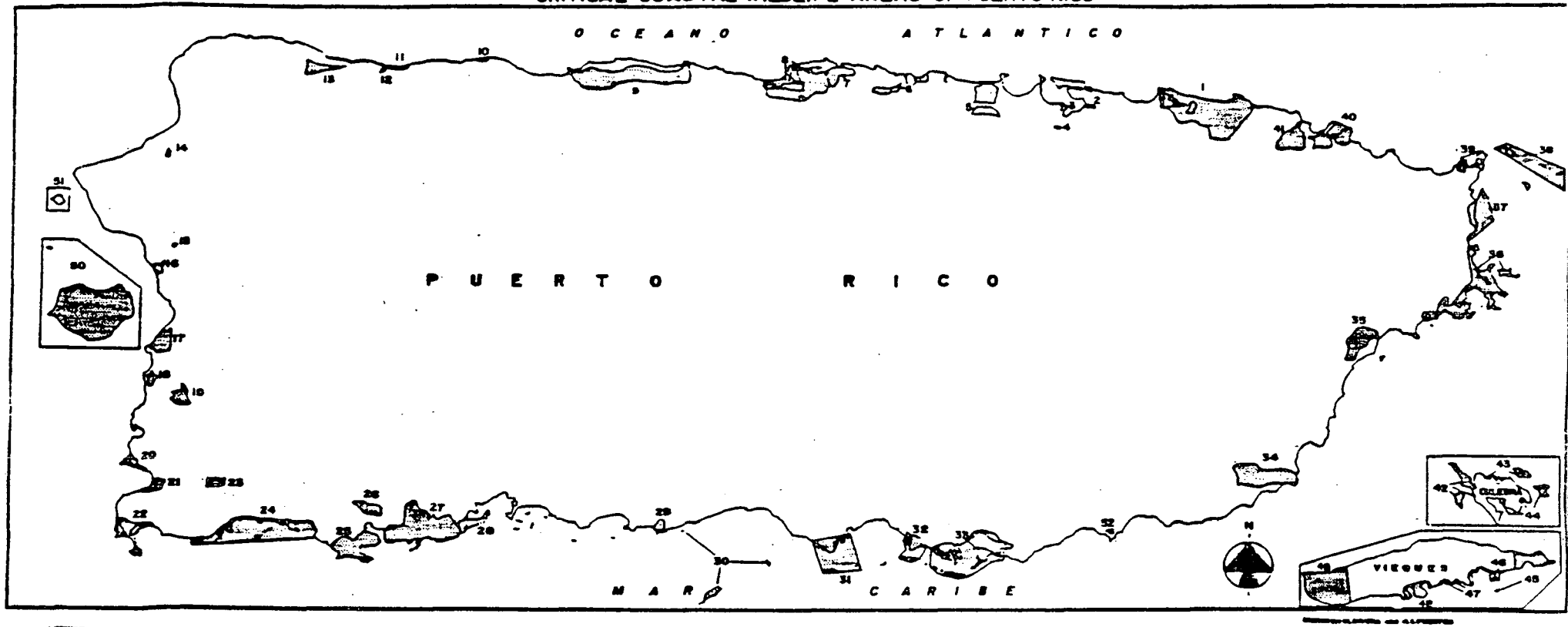
This 30 acre peninsula located in the north-West Sector of San Juan Bay was created in 1963 with dredged sands from the bay to afford protection from wave action to the Bay View area coastline in the municipality of Cataño. During its 25 years of existence the newly created land surface has become colonized and thickly overgrown by mangroves, Australian Pine (Casuarina equisetifolia), Emajaguilla (Thespesia populnea), grasses, vines, and a variety of other plants.

Since the peninsula is chiefly made up of sand and is subject to strong currents and wave action, its shape and position is quite dynamic. Studies performed in the 1970's estimated a southward migration of its hammer shaped tip at a rate of about 50 m/yr. If that tendency were to continue, it would be a matter of a few decades for the tip to reach the coast, forming a lagoon on the shallow cove on the south side of the peninsula. Much of the wildlife value of this area depends on the attraction of seabirds and waders that forage on the shallow cove. If a lagoon is eventually formed and the dynamics and composition of fish, crustacean, and mollusc populations are significantly altered, the community of migrant and resident birds utilizing the area may also change.

Through the years, the existence of this area has been threatened by development projects that would destroy or greatly diminish its wildlife value. A large marina and tourism complex was proposed for the area in the 1970's. Dredging of the cove for yacht docking facilities probably would have destroyed the hatchery characteristics and fish abundance that attract large numbers of Brown Pelicans (FE) and other seabirds. Authorization for this project was denied by the Commonwealth Planning Board. Plans to build a wide mass transportation canal to and from Bayamon that would empty into the cove were abandoned in the mid-1980's.

These lands, formerly owned by the Commonwealth Lands Administration, are now owned and administered by the municipality of Cataño. A passive recreation facility including picnic areas, a children's park, and bicycle and jogging paths was inaugurated shortly after our field evaluation of the area in

CRITICAL COASTAL WILDLIFE AREAS OF PUERTO RICO



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1 T[illegible]
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3 PILO SECO PENINSULA
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6 [illegible]
7 CABO ROJO SALTFLATS AND ADJACENT AREAS
8 CARTAGENA LAGOON
9 LA PARGUERA
10 GUANICA STATE FOREST WEST
11 GUANICA LAGOON
12 GUANICA STATE FOREST EAST
13 LLUVIONES
14 CABALLOS MANGROVE
15 [illegible]
16 PUNTA PETRONA
17 PUNTA ARENAS
18 PUNTA PEDRERA AND VAN HORN
19 [illegible]
20 JOBOS LAGOON
21 CEIBA LAGOON
22 [illegible]
23 [illegible]
24 CAMUY CAVE SYSTEM
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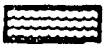
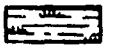
34 [illegible]
35 [illegible]
36 [illegible]
37 FLAMENCO COASTLINE
38 FLAMENCO CORDILLERA
39 [illegible]
40 [illegible]
41 CERRADA BAR
42 CULEBRA SURROUNDING ISLETS, CORDILLERA LAGOON, FLAMENCO LAGOON AND FLAMENCO PENINSULA
43 [illegible]
44 CONDUCTORS BAY, CULEBRA SURROUNDING ISLETS, LUIS PEÑA AND PUERTO REAL MANGROVE
45 EAST TIP OF VIEQUES AND CORDILLER ISLAND
46 [illegible]
47 CROSS MANGROVE, TAPON BAY AND TRAVIESO LAGOON
48 [illegible]
49 WEST VIEQUES
50 MONA AND MONITO ISLANDS
51 DESECHEO ISLAND
52 Palmas Pond, Arroyo

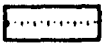
SYMBOLS UTILIZED ON MAPS

Legend:

Water 

Mangrove

Wetland 

Dike 

Industrial Area

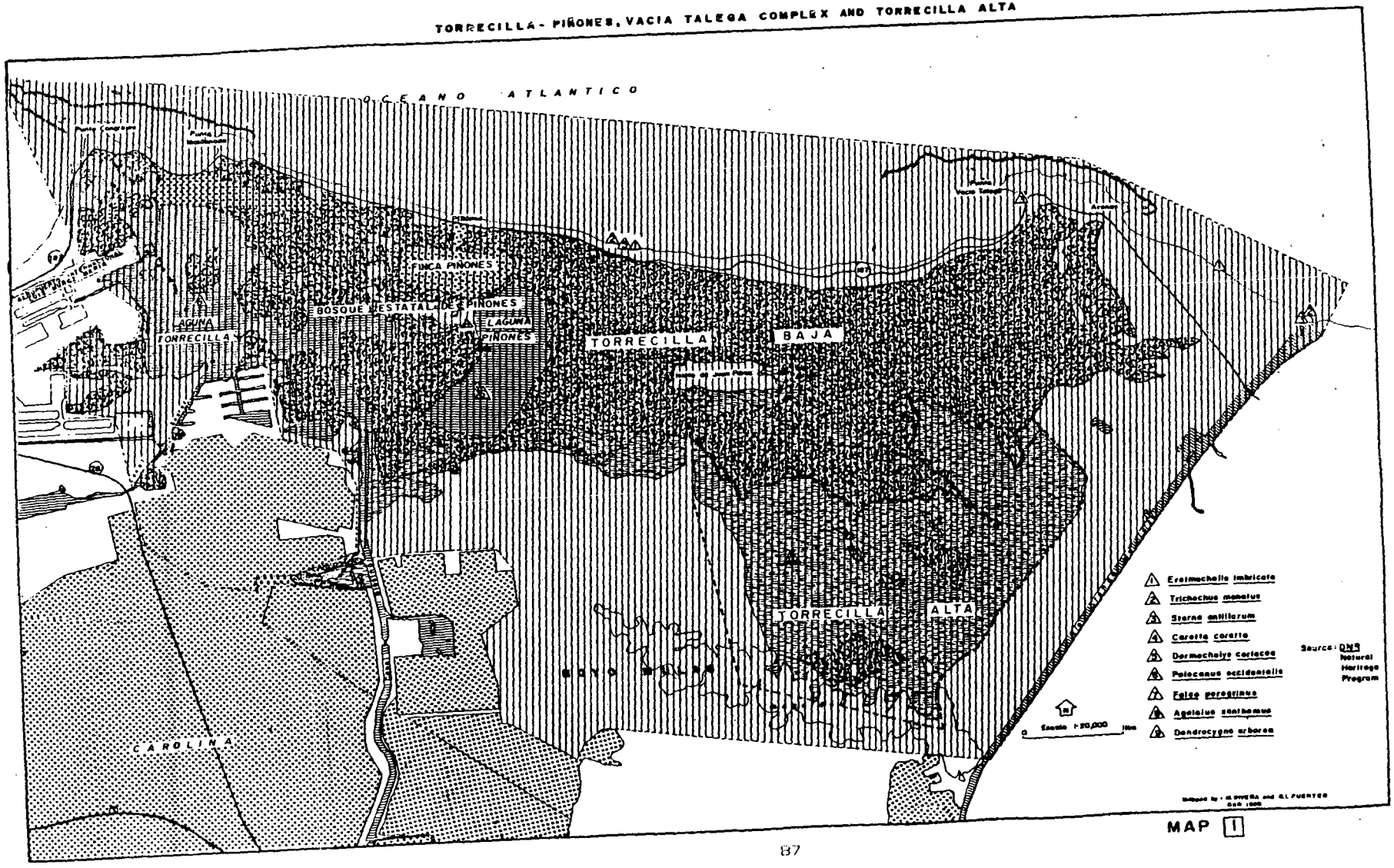
Urban or Residential Area

Name and Location of Critical Fauna in the Area

Area included as Critical Wildlife Habitat

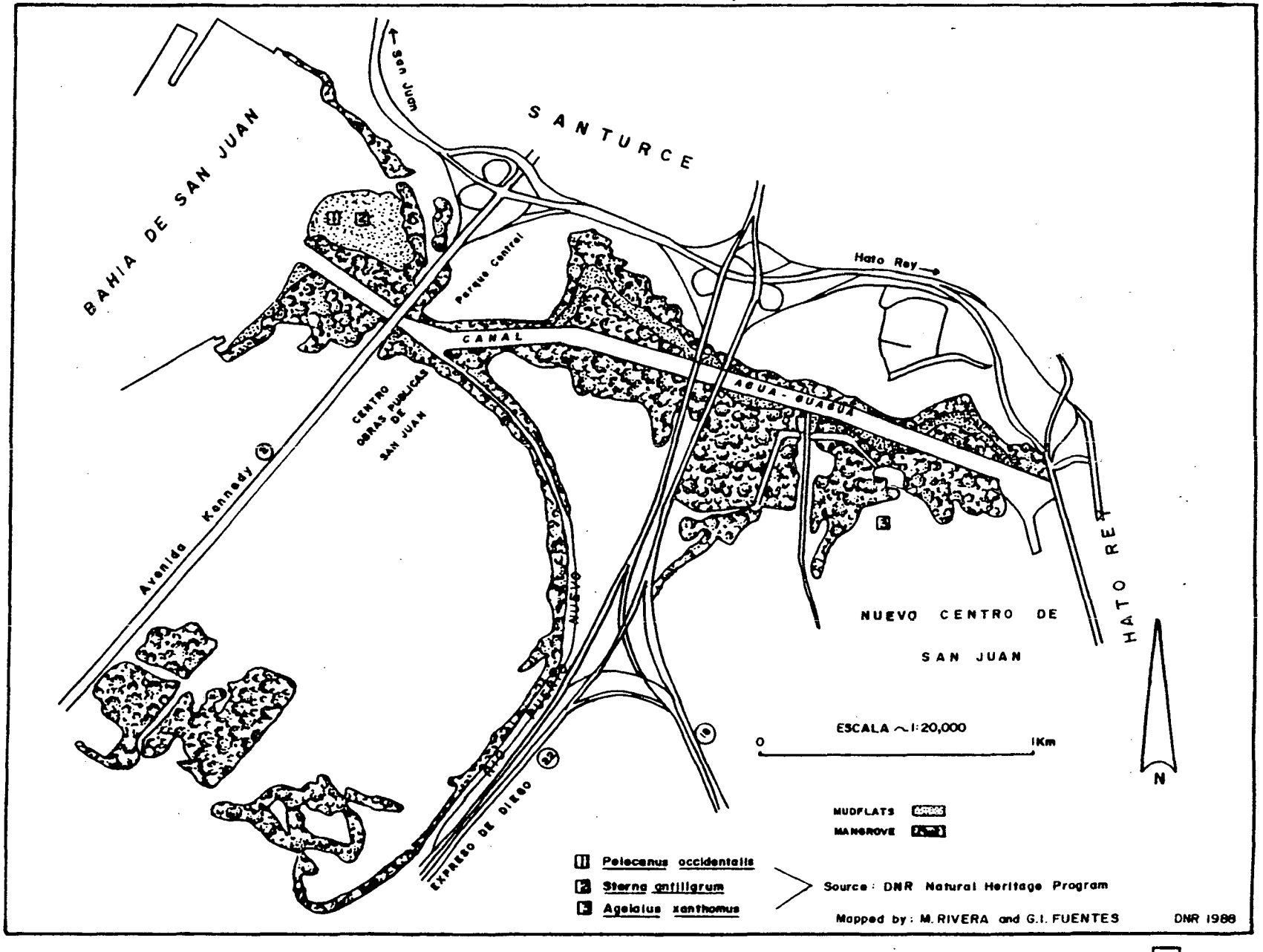
Sand dunes

TORRECILLA - PIÑONES, VACIA TALEGA COMPLEX AND TORRECILLA ALTA



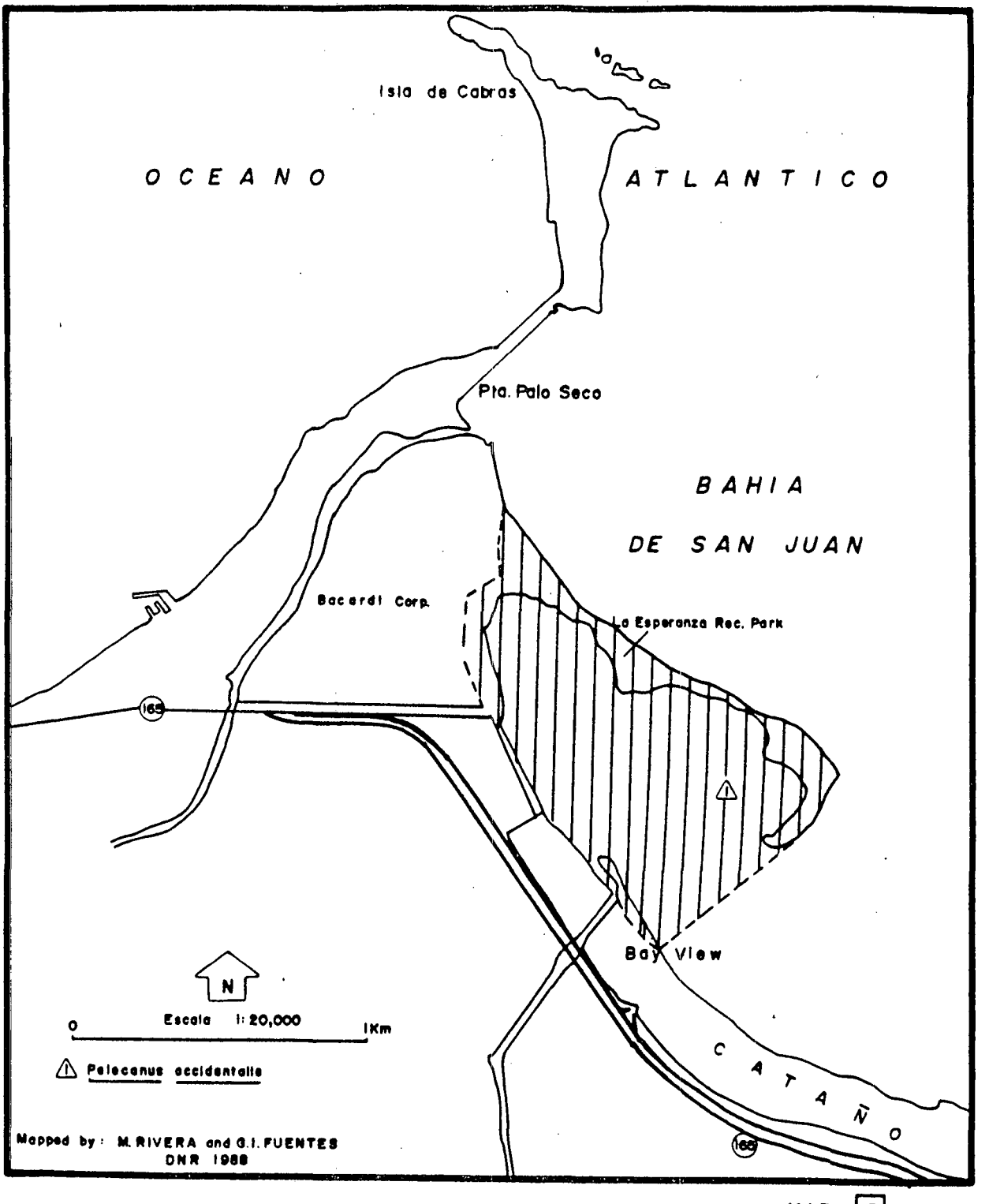
MAP 1

CONSTITUTION BRIDGE MUDFLATS , SAN JUAN



MAP 2

PALO SECO PENINSULA



MAP 3

REFERENCE: 41

Hon. Santos Rohena Betancourt
Secretario
DRN

Dr. Eduardo Cardona
Secretario Auxiliar
Investigaciones Científicas

Jaime González Azar
Autor

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EL DEPARTAMENTO DE RECURSOS NATURALES NO DISCRIMINA POR RAZONES DE RAZA, COLOR, EDAD, SEXO, ORIGEN O CONDICION SOCIAL, IDEAS POLITICAS, RELIGIOSAS E IMPEDIMENTOS FISICOS O MENTALES.

CUALQUIER ALEGACION AL RESPECTO PUEDE DIRIGIRLA AL SECRETARIO DEL DEPARTAMENTO DE RECURSOS NATURALES ESCRIBIENDO AL APARTADO 5887, PUERTA DE TIERRA, SAN JUAN, PUERTO RICO 00906.

Estado Libre Asociado de Puerto Rico
DEPARTAMENTO DE RECURSOS NATURALES
Pda. 3 1/2, Ave. Muñoz Rivera, Pta. de Tierra
Apartado 5887, Pta. de Tierra, San Juan, P.R. 00906

Estado Libre Asociado de Puerto Rico
DEPARTAMENTO DE RECURSOS NATURALES

GUIA PARA LA PESCA RECREATIVA EN LOS EMBALSES DE PUERTO RICO

PROGRAMA DE EDUCACION DE RECURSOS ACUATICOS

EMBALSE CARRAIZO (LOIZA)

Localización y Acceso

El embalse de Loíza está localizado dentro de los límites de los barrios San Antonio de Caguas, el Jagua de Gurabo y Carrafzo y la Gloria de Trujillo Alto.

Todos los accesos y rampas para botes se encuentran en propiedad privada. Algunos de los negocios en las carreteras PR-175 y PR-739 tienen rampas.

Descripción y Uso

La cuenca de Loíza tiene una extensión de 84.23 kilómetros cuadrados.

El embalse cubre una superficie de 392.5 hectáreas con una capacidad de 24,670,530 metros cúbicos. Tiene un volumen de 50,920 metros cúbicos. Los suplen de agua los ríos Caguitas, Gurabo, Bairoa y Loíza.

Este embalse es administrado por la Autoridad de Acueductos y Alcantarillados. Su construcción terminó en el año 1954 y el agua es utilizada para suplir agua potable al Area Metropolitana y para la producción de energía eléctrica (2,600 Kw.).

Peces

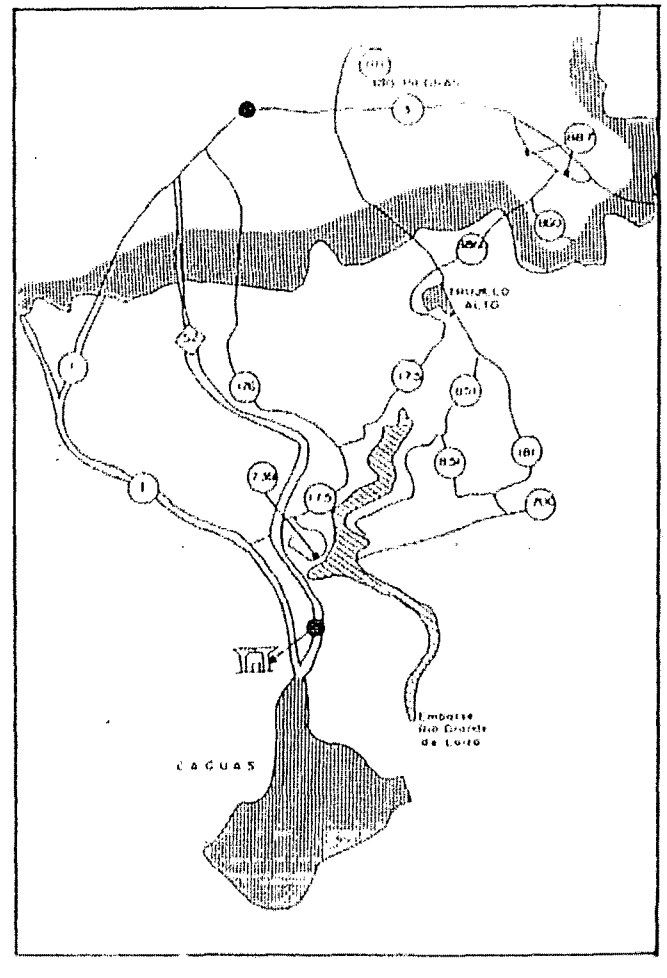
En este lago se encuentran la lobina, la chopa caracolera, la chopa, la tilapia, la tilapia cotorro, el barbudo de canal o liza y el tucunaré.

Atractivos Naturales

Su atractivo principal es la buena pesca de orilla especialmente de tilapias. La mayor parte del año se puede pasear en lancha, aunque en ocasiones, la superficie del embalse se cubre con jacintos de agua.

En este embalse la pesca de la lobina es de temporada, pero cuando se empieza a capturar, la pesca es abundante.

LOCALIZACION
EMBALSE CARRAIZO (LOIZA)



5. Barbudos *(Ictalurus spp.)*

Los gatos o barbudos son pescados principalmente de orilla. Se utiliza un carrete de mano o una lata con monofilamento enrollado. El anzuelo debe ser de tamaño mediano. La línea debe tener por los menos 15 libras de resistencia. De carnada se utiliza hígado, agallas y pedazos de pescado, hígado de pollos, chopas pequeñas o lombrices de tierra.

El tipo de orilla más productiva para su pesca es la que no excede 15 pies de profundidad y durante el día la que tiene sombra.

En algunos lagos los pescadores utilizan un pedazo de monofilamento de dos o tres pies de largo amarrado a una boya que dejan de un día para otro en distintas áreas del lago.

La boya generalmente consiste de una botella plástica vacía. De carnada utilizan chopas o tilapias pequeñas.

FIGURA 9-a: BARBUDO DE CANAL *(ICTALURUS PUNCTATUS)*

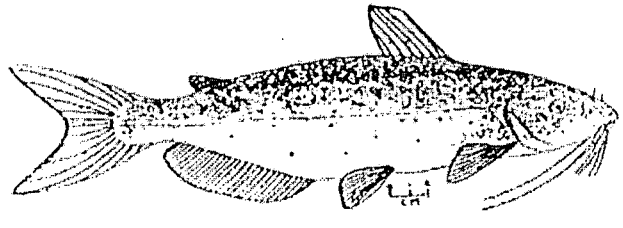


FIGURA 9-b: BARBUDO MARMOLADO O TORITO *(ICTALURUS MARMORATUS)*

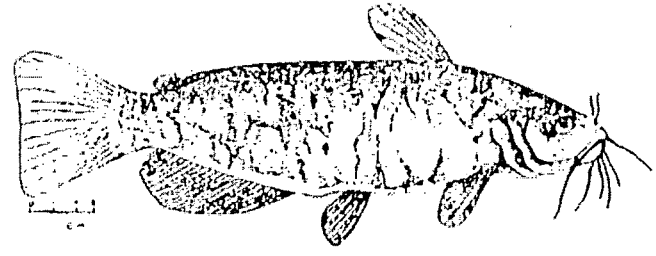


TABLA 1

Las Especies de Pesca Recreativa en los Embalses

Nombre Común en Español	Nombre Común en Inglés	Nombre Científico
Lobina	Largemouth bass	*Micropterus salmoides*
Chopa caracolera	Redear sunfish	*Lepomis microlophus*
Chopa de pecho colorado	Redbreast sunfish	*Lepomis auritus*
Chopa	Bluegill	*Lepomis macrochirus*
Barbudo de canal, Liza	Channel catfish	*Ictalurus punctatus*
Barbudo cabezón o Blanco	White catfish	*Ictalurus catus*
Barbudo moteado, Torito	Marbled bullhead	*Ictalurus marmoratus*
Tucunaré	Peacock bass	*Cichla ocellaris*
Tilapia	Mozambique tilapia	*Tilapia mossambica*
Tilapia coloirro	Congo perch	*Tilapia rendalli*
Sardina de agua dulce	Threadfin shad	*Dorosoma petenense*

REFERENCE: 42

Endangered & Threatened Wildlife and Plants

50 CFR 17.11 & 17.12

APRIL 15, 1990

Title 50—Wildlife and Fisheries

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

* * * * *

Subpart B—Lists

Source: 48 FR 34182, July 27, 1983, unless otherwise noted.

§ 17.11 Endangered and threatened wildlife.

(a) The list in this section contains the names of all species of wildlife which have been determined by the Services to be Endangered or Threatened. It also contains the names of species of wildlife treated as Endangered or Threatened because they are sufficiently similar in appearance to Endangered or Threatened species (see § 17.50 *et seq.*).

(b) The columns entitled "Common Name," "Scientific Name," and "Vertebrate Population Where Endangered or Threatened" define the species of wildlife within the meaning of the Act. Thus, differently classified geographic populations of the same vertebrate subspecies or species shall be identified by their differing geographic boundaries, even though the other two columns are identical. The term "Entire" means that all populations throughout the present range of a vertebrate species are listed. Although common names are included, they cannot be relied upon for identification of any specimen, since they may vary greatly in local usage. The Services shall use the most recently accepted scientific name. In cases in which confusion might arise, a synonym(s) will be provided in parentheses. The Services shall rely to the extent practicable on the *International Code of Zoological Nomenclature.*

(c) In the "Status" column the following symbols are used: "E" for Endangered, "T" for Threatened, and "E [or T] (S/A)" for similarity of appearance species.

(d) The other data in the list are nonregulatory in nature and are provided for the information of the reader. In the annual revision and compilation of this title, the following information may be amended without public notice: the spelling of species' names, historical range, footnotes, references to certain other applicable portions of this title, synonyms, and more current names. In any of these revised entries, neither the species, as defined in paragraph (b) of this section, nor its status may be changed without following the procedures of Part 424 of this title.

(e) The "historic range" indicates the known general distribution of the species or subspecies as reported in the current scientific literature. The present distribution may be greatly reduced from this historic range. This column does not imply any limitation on the application of the prohibitions in the Act or implementing rules. Such prohibitions apply to all individuals of the species, wherever found.

(f)(1) A footnote to the **Federal Register** publication(s) listing or reclassifying a species is indicated under the column "When listed." Footnote numbers to §§ 17.11 and 17.12 are in the same numerical sequence, since plants and animals may be listed in the same **Federal Register** document. That document, at least since 1973, includes a statement indicating the basis for the listing, as well as the effective date(s) of said listing.

(2) The "Special rules" and "Critical habitat" columns provide a cross reference to other sections in Parts 17, 222, 226, or 227. The "Special rules" column will also be used to cite the special rules that describe experimental populations and determine if they are essential or nonessential. Separate listing will be made for experimental populations, and the status column will include the following symbols: "XE" for an essential experimental population and "XN" for a nonessential experimental population. The term "NA" (not applicable) appearing in either of these two columns indicates that there are no special rules and/or critical habitat for that particular species. However, all other appropriate rules in Parts 17, 217 through 227, and 402 still apply to that species. In addition, there may be other rules in this title that relate to such wildlife, e.g., port-of-entry requirements. It is not intended that the references in the "Special rules" column list all the regulations of the two Services which might apply to the species or to the regulations of other Federal agencies or State or local governments.

(g) The listing of a particular taxon includes all lower taxonomic units. For example, the genus *Hylobates* (gibbons) is listed as Endangered throughout its entire range (China, India, and SE Asia); consequently, all species, subspecies, and populations of that genus are considered listed as Endangered for the purposes of the Act. In 1978 (43 FR 6230–6233) the species *Haliaeetus leucocephalus* (bald eagle) was listed as Threatened in "USA (WA, OR, MN, WI, MI)" rather than its entire population; thus, all individuals of the bald eagle found in those five States are considered listed as Threatened for the purposes of the Act.

(h) The "List of Endangered and Threatened Wildlife" is provided below:

Editorial Note: This is a compilation and special reprint of 50 CFR 17.11 and 17.12 and is current as of the date shown on the cover. Minor changes and corrections to the October 1, 1989, compilation of 50 CFR have been incorporated in this printing, as well as all published final rules that have subsequently appeared in the **Federal Register.** Otherwise no entry in these lists has been significantly affected. This list has been prepared by the staff of the Division of Endangered Species and Habitat Conservation, U.S. Fish and Wildlife Service, Washington, D.C. 20240. Readers are requested to advise the Service of any errors in this list. Copies are available from the Publication Unit, U.S. Fish and Wildlife Service, 725-ARLSQ, Washington, D.C. 20240.

REFERENCE: 43

Compendio Enciclopédico de los Recursos Naturales de Puerto Rico

3

Editorial Librotex, Inc.
San Juan, Puerto Rico
1988

LAGUNA DE SAN JOSE

La Laguna de San José se encuentra a 10 km al sureste de San Juan en la latitud 18°25'48"N y longitud 67°01'42"O (Tabla 1).

Trabajos Anteriores

La Laguna de San José es la laguna metropolitana que más se ha estudiado. Storer Bello Professional (1970) evaluaron para el Departamento de Salud la calidad sanitaria de las lagunas San José, Torrecilla y Piñones. En el estudio se cuantificaron las concentraciones de cloruros, la temperatura, el OD, los coliformes totales, el DBO y el por ciento de saturación de oxigeno en el agua. El trabajo concluye que la Laguna San José está altamente contaminada. La contaminación proviene de las descargas pluviales y sanitarias además de los desperdicios sólidos que se vierten a la laguna.

La EPA (1971) midió el oxigeno disuelto, la temperatura, el pH y plancton en la laguna. De acuerdo a su evaluación, las concentraciones de oxigeno en la Laguna San José son muy variables (0.30 mg/l) lo que favorece las mortandades de peces y demás organismos marinos.

Ellis y Gómez (1976a) estudiaron las características hidrológicas de la laguna y coleccionaron muestras sobre la calidad del agua durante un ciclo de marea.

Carvajal-Zamora (en preparación) estudió en el 1974 las fluctuaciones cualitativas y cuantitativas del fitoplancton en la Laguna San José. En el 1976 investigó los factores que afectan la bioluminiscencia en las lagunas metropolitanas e incluyó algunos parámetros físicos y químicos de la laguna.

Ellis (1976) publicó un mapa batimétrico de la Laguna San José. Según él (idem), en la laguna se dragaron 3.1 millones de m^3 del material del fondo. A consecuencia del dragado, el volumen de la laguna aumentó 130% del volumen original. Esto junto a la construcción del Canal Suárez (en el 1900) ha reducido el tiempo

de renovación y aumentado el estancamiento de aguas salobres an
xicas en las áreas dragadas.

La Junta de Calidad Ambiental (1979) reportó violaciones e
los límites permisibles para la calidad del agua en plomo, coli
formes fecales y totales, pH y oxigeno disuelto en el agua.

Descripción

La Laguna San José tiene una superficie de 547 ha (incluye
do la Laguna los Corozos al noroeste de la laguna). Su perimetr
es de 13.5 kilómetros. El largo y ancho máximo de la laguna es
4.52 y 2.20 km, respectivamente. El índice del desarrollo de la
orilla es de 1.63 (Tabla 2). La Laguna San José no tiene
comunicación directa al mar. Según los datos coleccionados por
Ellis y Gómez (1976a) en agosto del 1973, el 70% del agua salob
que entraba y salía de la Laguna San José provenía de la Laguna
Torrecilla a través del Canal Suárez. El 30% restante provenía
la Bahía de San Juan a través del Canal de Martín Peña. De
acuerdo a ellos, la laguna recibe aportes de agua dulce de la
Casa de Bombas de la Baldorioty de Castro, aguas subterráneas,
descargas pluviales y de riachuelos que drenan a la laguna.

Debido a las extracciones y dragados en la laguna, el per
del fondo es irregular. Según Ellis (idem), la profundidad pro
dio de la laguna es de 2.4 m y la máxima de 11 m. Las profundi
des máximas se dan en las inmediaciones del Canal Suárez y a l
largo de la franja norte y suroeste del sector de Los Corozos.

De acuerdo a Gómez (com. pers.) la composición granulomét
ca promedio en los sedimentos del fondo de la Laguna San José
de 32% arena, 48% cieno y 20% arcilla. Comparativamente con la
otras lagunas costeras visitadas por nosotros, la proporción d
cieno en los sedimentos es mayor (Tabla 10). Según Gómez (com.
pers.) la proporción granulométrica de los sedimentos no es un
forme en toda la laguna. Las proporciones más altas de arena
(48%) y las más bajas de arcilla (11%) se dan hacia el Canal d
Martín Peña. Las proporciones más altas de cieno se dan según
hacia el Canal Suárez.

La visibilidad con el disco Secchi en diciembre de 1980 fluctuó entre 0.62 y 0.68 m. El coeficiente de la extinción de la luz promedio, estimado con el disco Secchi para esa misma fecha, fue de 3.08 y el por ciento de luz incidente en el fondo fue menor de 0.15%. De acuerdo a los datos de Pérez (datos sin publicar) la zona fótica fluctúa entre 0.75 y 1.5 m. La visibilidad promedio con el disco Secchi es de 0.5 m y el coeficiente de extinción de la luz promedio es de 4.5.

La columna de agua no es homogénea. Según Pérez (idem) se observan variaciones tanto horizontales como verticales. Las variaciones horizontales las atribuye él a los efluentes de agua dulce, los cuales influyen en el patrón de circulación y en la hidrología de la laguna. De acuerdo a sus datos en el sector oeste la salinidad y el oxigeno disuelto en el agua son comparativamente menores a los que se observan en el sector este de la laguna.

Debido al volumen de las descargas de agua dulce y a que el fondo de la laguna en ocasiones alcanza profundidades de hasta 11 m, la columna de agua tiende a ser estratificada en salinidad. El grado de estratificación es variable y fluctúa de acuerdo a las descargas de agua dulce y a la precipitación en el área. Según Pérez (idem) las salinidades en la laguna fluctúan entre 12 a $18^{O}/00$. Sólo en algunas ocasiones el USGS (1976, 1978) ha registrado concentraciones de cloruros y conductividades equivalentes a salinidades mayores y menores a éstas. Los valores extremos de salinidad calculados en base de los datos de conductividad del U.S.G.S. (idem) son de 6.0 y $37^{o}/_{oo}$ (Tabla 3).

La demanda quimica y bioquimica de oxigeno en el agua y especialmente en los sedimentos de fondo de la laguna es alta. El marcado gradiente en salinidad indica poca mezcla y por lo tanto poco intercambio de oxigeno en la columna de agua. La pobre difusión vertical del oxigeno y la poca circulación del agua en la laguna proveen que los fondos sean anóxicos y permanezcan estancados. Cerca de la superficie la situación es un tanto diferente. La acción del viento y la productividad fitoplanctónica proveen que se establezca un ambiente con una mayor tensión de oxigeno. Cintrón (1974) reportó valores de saturación de oxigeno en el agua de hasta 300%. Según la EPA (1971) estas condiciones de sobresaturación en los niveles de oxigeno están asociadas a afloramientos de algas. En ocasiones acoplados a descensos rápidos en el OD durante las noches de los dias nublados y de poco viento.

De acuerdo a nuestros datos, el oxígeno disuelto dismi
rápidamente a partir del primer metro de profundidad (Fig.8).

A base de los datos del USGS (idem) y Pérez (idem) las co
centraciones y las fluctuaciones en los nutrientes en la Lagu
San José son amplias. Según las evaluaciones hechas por la Ju
de Calidad Ambiental (JCA) (mimeo), la Laguna San José recibe
gran cantidad de nutrientes y materia orgánica proveniente de
áreas circundantes a la laguna lo que hace de ésta uno de los
cuerpos de agua más eutroficados en la Isla.

De acuerdo a los datos obtenidos por nosotros, las conce
traciones de fósforo total en la Laguna San José son superior
las encontradas en las demás lagunas costeras (Fig.9). Esto e
gran importancia ya que con nuestros datos confirmamos la rel
ción lineal entre las concentraciones de fósforo total y las
centraciones de clorofila a (Fig.10) y a su vez las de la clo
fila a con la productividad primaria bruta (Fig.11). Todo est
tiende a señalar que en la Laguna San José existen las condi-
ciones óptimas para floraciones fitoplanctónicas, las cuales
han relacionado con mortandades de peces (Carvajal-Zamora, 19

Los conteos bacteriológicos en la Laguna San José tambié
son altos. Los valores estimados por el USGS (1976, 1978) par
coliformes y estreptococos fecales fluctúan de 10 a 170,000
MPN/100 ml y 0 a 83,000 MPN/100 ml, respectivamente. De acuer
sus datos, la mayor concentración bacteriológica se da al oes
de la laguna cerca del Canal de Martín Peña y la Planta de Bo
de la Avenida Baldorioty de Castro. La relación de CF/EF sugi
que los mismos son de origen humano.

El plan de mejoras temporeras a la calidad de agua del C
de Martín Peña (JCA, mimeo) señala como las causas de contami
ción en la laguna, las descargas de aguas usadas crudas, las
cargas procedentes de áreas carentes de alcantarillados y los
desperdicios sólidos descargados directamente a la laguna.

La flora planctónica en la Laguna San José no es diversa
De acuerdo a los muestreos llevados a cabo por Carvajal-Zamor
(en preparación) y el USGS (1978) en la Laguna San José se ha
coleccionado 15 géneros diferentes.

Figura 8. Perfil de salinidad, temperatura y oxígeno disuelto en el agua en Laguna San José (Dic. 1980)

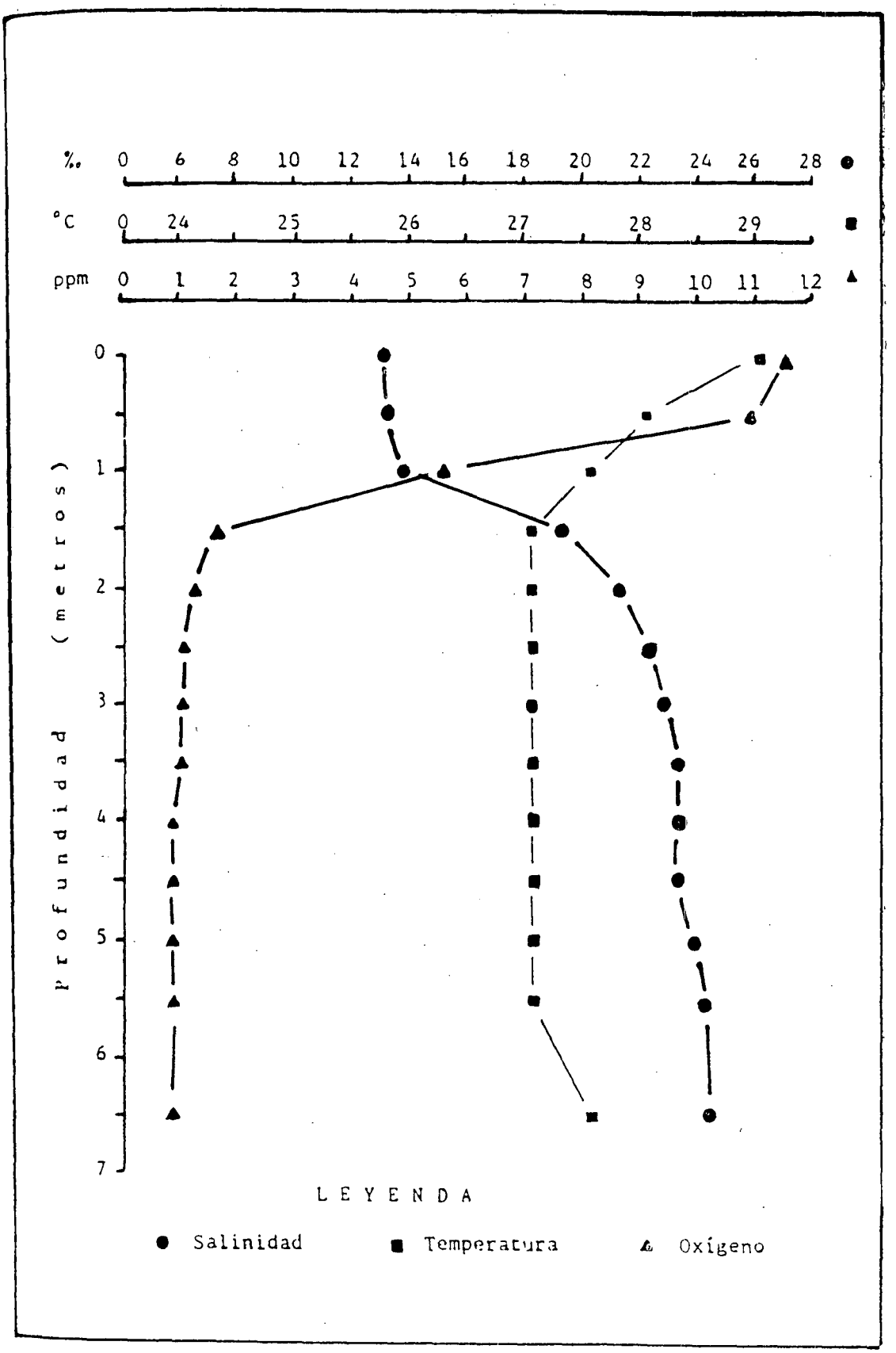


Figura 9. Concentración promedio y error standard del promedio de fósforo total para 15 Lagunas Costeras de Puerto Rico.

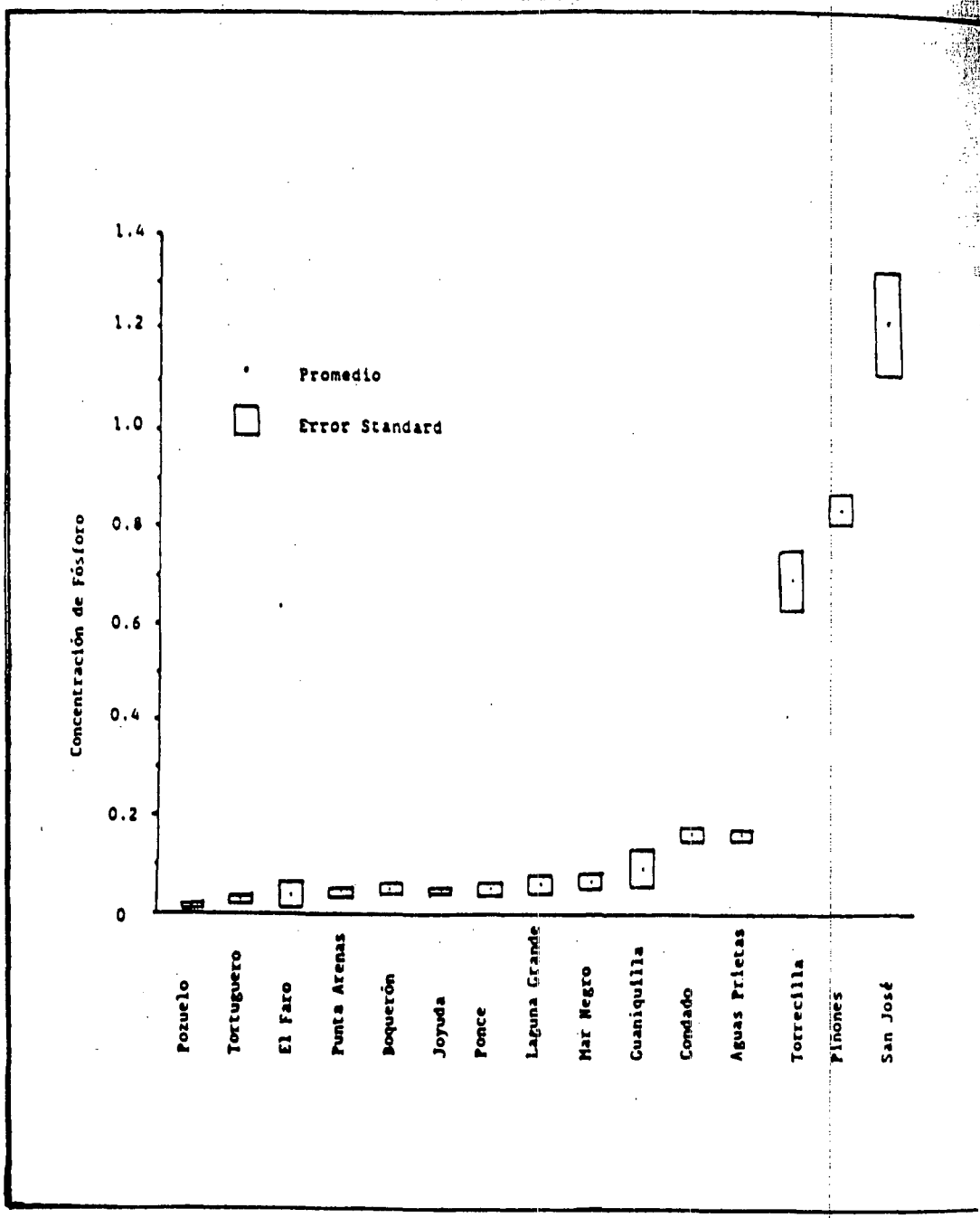


Figura 10 . Relación entre las concentraciones de fósforo total y clorofila a.

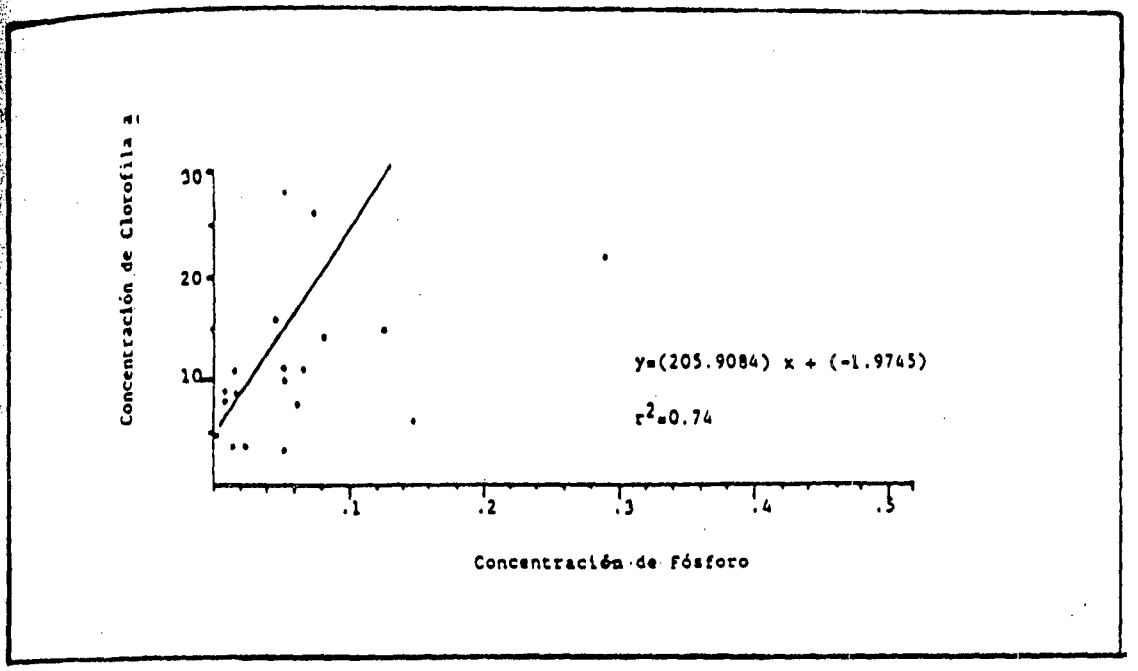
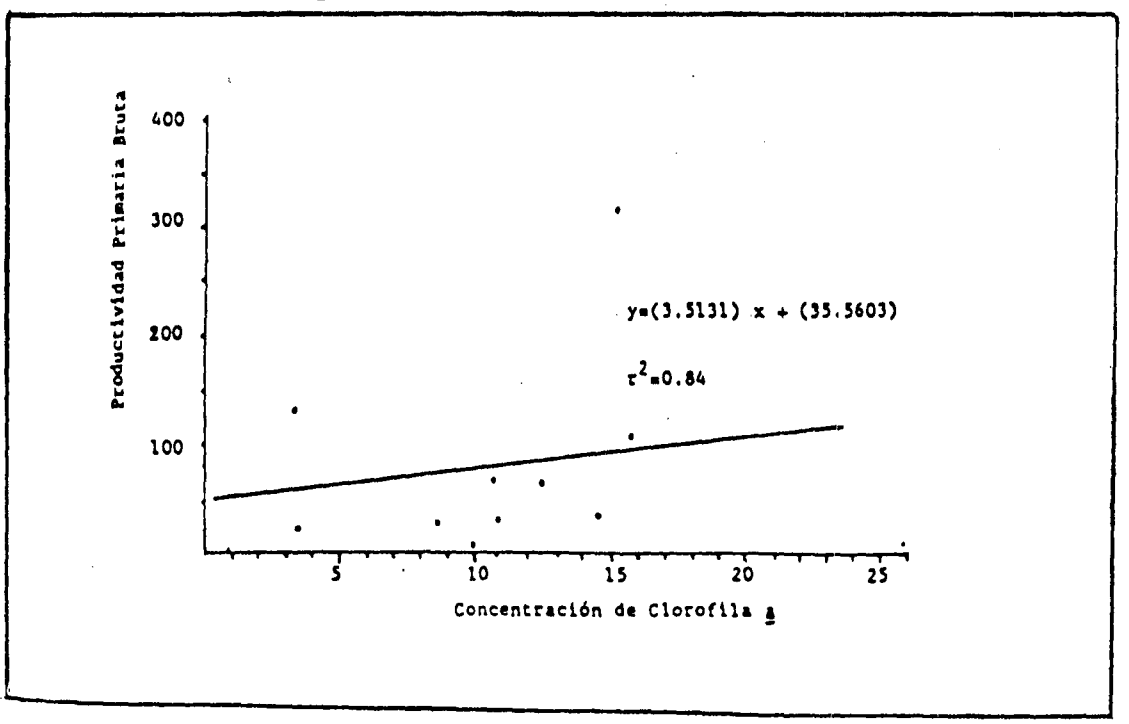


Figura 11 . Relación entre clorofila a y la productividad primaria bruta (según métodos de botellas claras y obscuras).



Carvajal-Zamora (en preparación) encontró que las clorof
es el grupo más abundante (61%) en la laguna. Le siguen en or
de abundancia las diatomeas (25%), las cianofitas (17%), las
glenofitas (4%) y las dinoflageladas (1%). El mayor número (7
géneros correspondió al grupo de las diatomeas. Durante gran
te del año, el género más abundante fue el de las Clamidomona
(54%); cuando no, lo fue el género Oocystis (7%) y Oscillator
(8%). De acuerdo a los datos de Carvajal-Zamora (idem) la den
dad del fitoplancton osciló entre 3,000 (junio 1974) y 52,100
nero, 1974) células/ml. El USGS (1978) reportó concentracione
entre 22,000 (abril 1975) a 6,539,000 (mayo 1971) células/ml
rante los meses de febrero de 1975 a agosto de 1976. Los géne
dominantes en este periodo lo fueron Anabaena, Anacystis, Osc
llatoria, Oocystis y Geminella. En todos los casos y en época
diferentes, la abundancia relativa de estos géneros fue mayor
81%. El grupo dominante durante gran parte del tiempo lo fue
de las algas azul-verdosas.

Según Pérez (com. pers.) las larvas nauplius constituyen
forma consistente el grupo dominante en la laguna (53%). Le s
guen en abundancia los ciclópodos (29%) y los rotíferos (17.5

Pesca

Según los pescadores del área y observaciones personales
la laguna se capturan sábalos, robalos y mojarras.

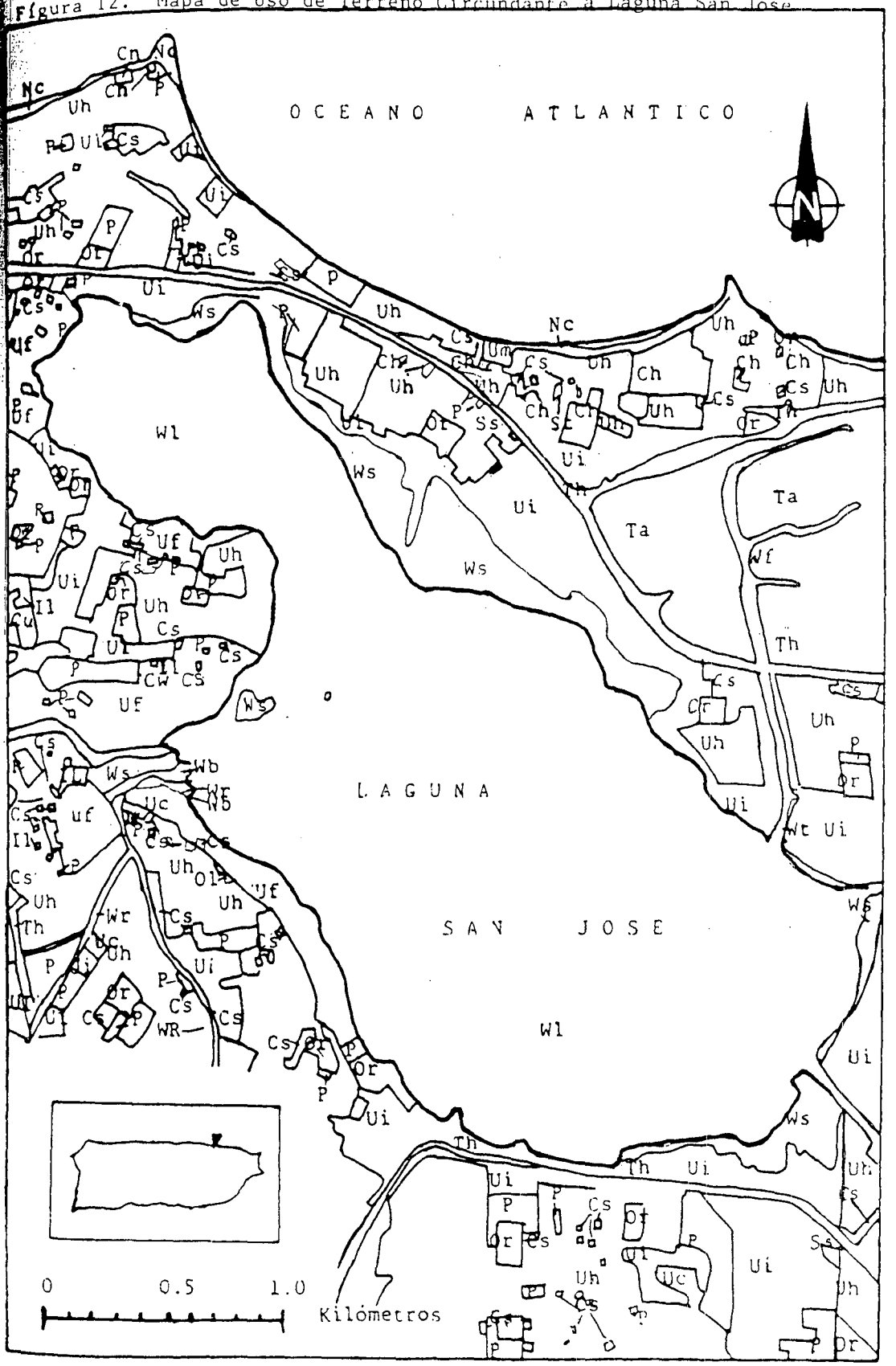
Vegetación del Litoral

La escasa vegetación en el litoral de la Laguna San José
tá compuesta mayormente de Rhizophora mangle, Laguncularia ra
mosa y Avicennia germinans.

Uso dominante del terreno

Los terrenos circundantes a la Laguna San José están ded
cados prácticamente en su totalidad a usos urbanos. Desafortu
damente muchos de los terrenos contiguos a la laguna han sido
utilizados como vertederos de chatarra y demás desperdicios
sólidos (Fig.12).

Figura 12. Mapa de Uso de Terreno Circundante a Laguna San José



Leyenda de La Codificación de Los Usos Dominantes del Terreno

AGRICULTURA

- As Caña
- Ap Piña
- Aq Cocos
- Ax Pastos
- Af Floricultura
- At Tabaco
- Ac Café
- Am Agricultura mixta, frutos menores
- Ao Citircas
- Ab Plátanos, guineos
- Ay Fincas especializadas
- Ai Agricultura inactiva
- Aa Areas agrícolas activas relacionadas con (d,B,E,f,P-15)
- Ar Arroz

BOSQUES

- Fx Arbustos y maleza
- Fb Arboleda densa, de mediana altura y copa pequeña
- Ft Arboleda poco densa
- Fd Arboleda alta y muy densa, copa grande
- Fp Bosque Público (Estado)

RECURSOS DE AGUA

- Wc Cuerpo artificial de agua (+1 acre)
- Wr Río canal (50' + ancho)
- Wt Canales sujetos a flujo y reflujo de mareas
- We Aguas costeras protegidas
- Wo Mar
- Wl Laguna
- Wn Cuerpo Natural de agua (+1 acre)

TERRENOS HUMEDOS Y PANTANOSOS

- Ws Mangle
- Wb Pantano con maleza
- Wm Ciénaga agua salobre
- Wf Ciénaga agua dulce

TERRENOS IMPRODUCTIVOS

- Nr Afloramiento rocoso
- Nc Arena de playa y de zona costera
- Ne Arena no costera (ríos)
- Nb Rocas y promontorios de costas
- No Arrecifes

RESIDENCIAL

URBANO		RURAL
Ul	Baja densidad	Rl
Um	Mediana densidad	Rm
Uh	Alta densidad	Rh
Uf	Arrabal	--
Us	Franja residencial	Rs
Ui	Areas no construidas dentro de zona urbana	--
Uc	Bajo construcción	--
--	Residencial temporario en zona rural	Rt
--	Residencias con frente de playa	Rk
--	Parcelas	Rp

RECREACION AL AIRE LIBRE

- Or Todos los tipos

USO PUBLICO

- P Todos los tipos

COMERCIAL

- Cu Area de mayor concentración comercial en zona urbana
- Cc Centro Comercial
- Co Area de Oficinas comerciales (3 + edificios)
- Cs Franja comercial
- Ch Hotel, motel
- Cj Comercio de chatarra
- Cw Almacén comercial

INDUSTRIAL

- Il Industria liviana
- Ih Industria pesada
- Ip Parque Industrial (3 + fábricas)

AREAS DE EXTRACCION

- Eq Canteras
- Ep Tosqueros
- Ee Grava y arena (ríos)
- Eb Arena de playa
- Ed Salinas
- Em Otra minería

COMUNICACIONES

- Ss Sub-estación de energía eléctrica
- Sp Planta generadora de electricidad
- St Estaciones telefónicas
- Sr Area antenas de radio (s-6)
- Sv Area antenas de TV (s-8)
- Sf Faros (s-7)

TRANSPORTACION

- Th Carretera primera categoría (3 + carriles)
- Ta Aeropuerto, pistas aéreas
- Tb Puerto
- Tc Facilidades portuarias comerciales
- Tn Facilidades portuarias no comerciales

18 - CIENAGA ESPINAR

19 - FARO DE ARECIBO Y FORTIN VICTOR ROJAS

20 - CAÑO TIBURONES

21 - CUEVA DEL INDIO

22 - HACIENDA LA ESPERANZA

23 - LAGUNA TORTUGUERO

24 - BOSQUE PTEROCARPUS EN DORADO

25 - ISLA DE LA MONA

26 - BAHIAS FOSFORESCENTES DE VIEQUES

A.I.S. — A.P.C.

A - BOCA DE CANGREJOS

B - AREA DE PANDURA
SIERRA DE GUARDARRAYA

C - AREA DE LA BAHIA DE JOBOS

D - AREA DEL SUROESTE

E - AREA DE ISABELA

F - AREA DE LAGUNA TORTUGUERO

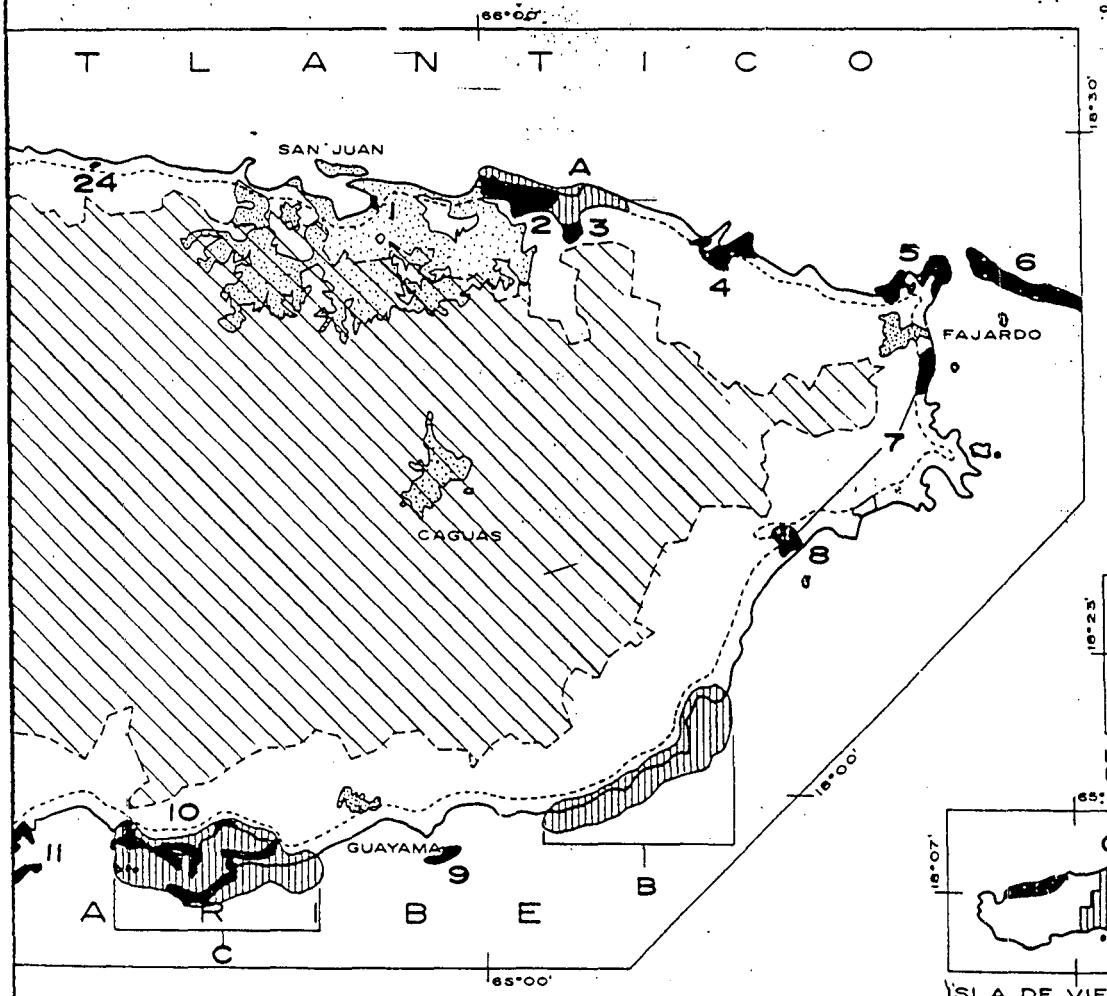
G - VIEQUES
TODOS LOS MANGLARES

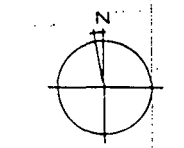
LAR AREAS OF PARTICULAR CONCERN

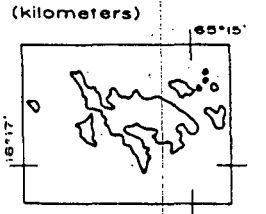
ION AREAS FOR PRESERVATION AND RESTORATION

Financial assistance provided in part by Coastal Zone Management Act of 1972, administered by Office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

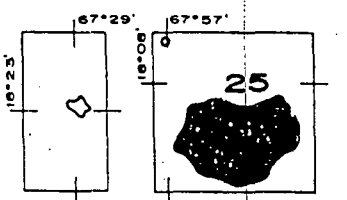
NOTA:
Aunque este mapa no demuestra los limites de los terrenos federales, dichos terrenos estan excluidos por ley de la zona costanera.



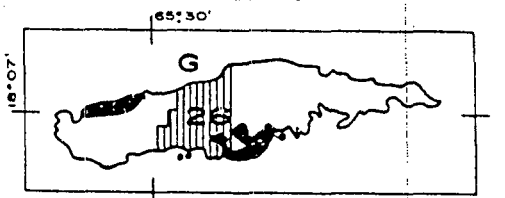




ISLA DE CULEBRA



ISLA DESECHEO ISLA MONA



ISLA DE VIEQUES

CION ESPECIAL Y RESERVAS NATURALES
SPECIAL PLANNING AREAS AND NATURAL RESERVES

29

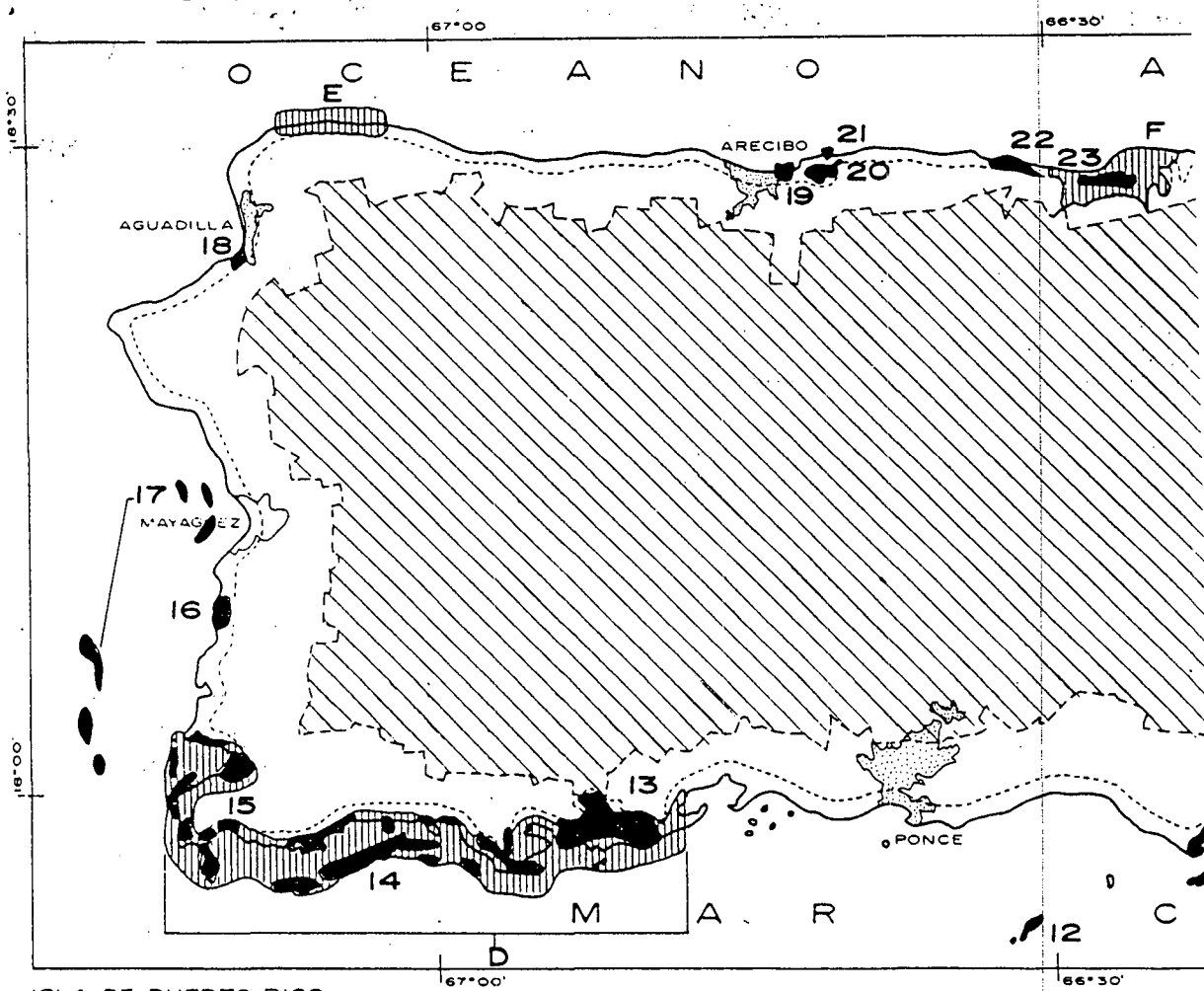
A.R.P. — A.P.R.

1 - PANTANO PUENTE DE LA CONSTITUCION
2 - BOSQUE DE PIÑONES
3 - BOSQUE PTEROCARPUS EN TORRECILLA ALTA
4 - DESEMBOCADURA DEL RIO ESPIRITU SANTO
5 - CABO SAN JUAN - EL FARO
6 - ARRECIFE LA CORDILLERA
7 - BOSQUE ESTATAL DE CEIBA
8 - PANTANO DE HUMACAO Y BOSQUE PTEROCARPUS
9 - ARRECIFES DE GUAYAMA
10 - BAHIA DE JOBOS Y MAR NEGR
11 - PUNTA PETRONA
12 - CAJA DE MUERTOS
13 - BOSQUE DE GUANICA
14 - LA PARGUERA
15 - BOQUERON
16 - LAGUNA JOYUDA
17 - ARRECIFE TOURMALINE

AREAS DE INTERES SINGUI

AREAS DE PRESERVACION Y RESTAURAC

LIMITE TERRESTRE APROXIMADO DE LA ZONA COSTANERA ---------- APROXIMATE COASTAL ZONE INLAND BOUNDARY
LIMITE TERRESTRE DEL AREA DE ESTUDIO -------- STUDY AREA INLAND BOUNDARY



ISLA DE PUERTO RICO

FUENTE DE INFORMACION/ SOURCE:

DEPARTAMENTO DE RECURSOS NATURALES
Y JUNTA DE PLANIFICACION.

AREAS DE PLANIFICA

REFERENCE: 44

PIÑONES
FOREST

SUMMARY OF BACKGROUND INFORMATION FOR THE PIÑONES FOREST

PHYSIOGRAPHY

The Piñones Forest lies in the northern coastal plain of Puerto Rico between the cities of San Juan and Loíza Aldea. Total area approximates 1560 acres (625 ha.), and the point of highest elevation is only 3 feet (1 m).

About 70 percent of the forest area is mangrove or cleared; the remaining 30 percent is lagoon. Politically, the entire forest is situated in the municipio of Loíza.

GEOLOGY

The geologic past of the Piñones area involved a series of marine transgressions in which the presence of eolianite resulted in the development of a mature barrier island facies. Subsequently, the barrier was breached by marine forces and/or riverine action, and probably through interaction with rising groundwater, formed the lagoons in the backshore area.

SOILS

About 95 percent of the soils of Piñones Forest are classified as tidal swamp, tidal flats or salt water marsh. The remaining five percent includes coastal beaches, Cataño Loamy Sand and Corcega Sands. The Sand is characterized by shallow depth to water.

CLIMATE

Mean monthly rainfall ranges from a low of 2.20 inches (56 mm) in March to a high of 7.13 inches (180 mm) during August, with an annual total of 64.21 inches (1630 mm). February, March and April constitute the dry season. Mean monthly temperature varies from 74.4°F (24°C) during January and February to 80.9°F (27°C) during August, with an annual average of 78.0°F (26°C).

LAGOON-MANGROVE COMPLEX

The importance of the lagoon and mangrove complex lies principally in wildlife benefits, including fish, waterfowl and bioluminescent organisms, as well as its undeveloped recreational potential. The complext provides rich protected substrate provides a habitat for a large variety of organisms, which in turn, serve as a food base for marine fauna. Some fish of commercial importance are found among the mangrove roots, while others spend part of their life cycle there breeding and spawning. Moreover, mangroves provide nesting grounds for both native and migratory birds, some of which are hunted as game.

FOREST TYPES (Map 1)

About 60 percent of the Piñones Forest is mangrove, a pioneer vegetation of shorelines with quiet salt water, all of which have specialized root systems forming an intertwining mass beneath the water surface.

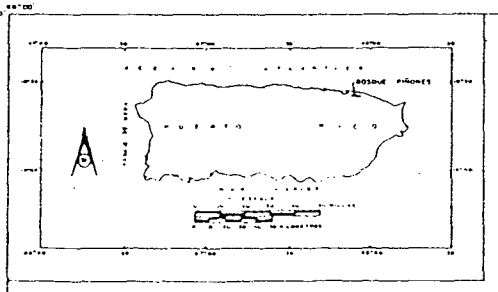
Red Mangrove - A fringe of Red Mangrove bounds all major and most minor waterways in the Piñones Forest, and constitutes approximately five percent of the total forest area. The "stilt roots" of this species are the initial protection of the mangrove against the battering waves and currents of the open ocean.

Black-White Mangrove - Black and White Mangroves are the dominant tree species within the mangrove type, and constitute approximately 55 percent of the total forest area. Within this type, limited exploitation of timber for production of charcoal has occurred along some of the canals east of Finca Piñones. Cut-over areas regenerate relatively rapidly, and provide a somewhat more diverse habitat within the mangrove complex.

WILDLIFE

There are six principal types of wildlife habitat within the Piñones Forest including:

(1) isolated bays adjacent to major lagoons,
(2) small saline ponds within the mangroves,
(3) mangrove canals and channels,
(4) islets within major lagoons,



ESTADO LIBRE ASOCIADO DE PUERTO RICO
DEPARTAMENTO DE RECURSOS NATURALES
OFICINA DE RECURSOS FORESTALES

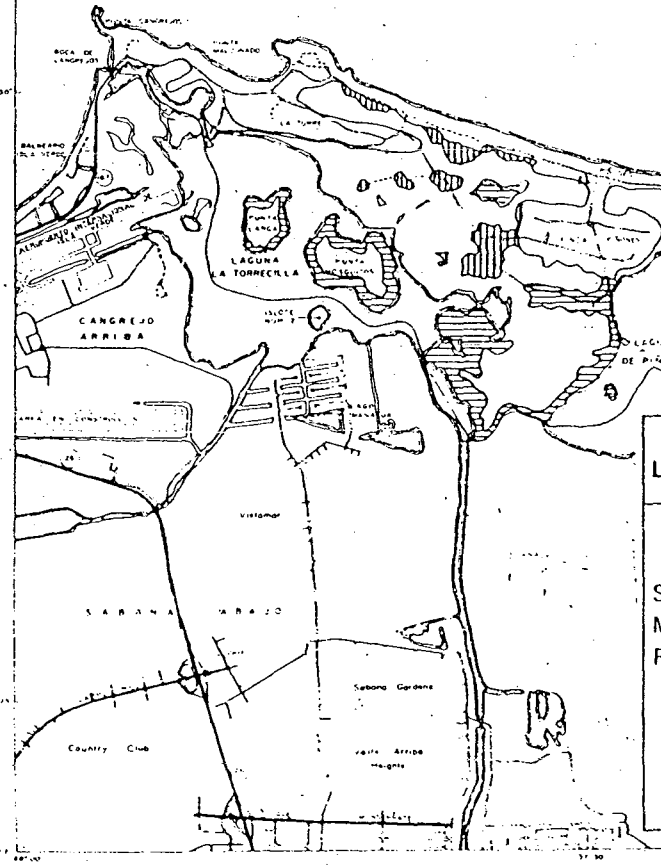
BOSQUE PIÑONES

1974

ESCALA

LIMITE DE MUNICIPIO
LIMITE DE BOSQUE
CARRETERA
PUEBLOS
RIOS
CAMINOS
QUEBRADAS

O C E A N O A T L A N T I C O



LIFE ZONE	SYMBOL	ASSOCIATION NAME	LOCAL NAME	AREA (CUERDAS)	% TOTAL
Subtropical Moist Forest		Tidally inundated, saline, firm-silty to silty-sand soil	Black and white mangroves or basin mangrove	1,159.4	74.3
		Tidal, saline, silty swamp woodland	Red mangrove or fringe mangrove	319.4	20.5
		Salt-wind exposed sandy beach thicket	Beach thicket	81.2	5.2
			TOTAL	1560	100.0

(5) large lagoons, and
(6) extensive closed mangrove forest.

The Piñones-Punta Vacia Talega area contains at least 38 species of fish and over 46 species of birds, some of which are rare and endangered. The lagoons serve as feeding grounds for the waterbirds and fishes, and indirectly provide wildlife for sport hunting and fishing.

LAND USE AND RECREATION

Recreation - Extensive recreation uses including swimming, beach-combing, snorkling, shell collecting, hiking, picknicking, fishing, motor boating and water skiing are carried out in the Piñones Forest.

Special Use Permits - About 30 acres (12 ha.) of Piñones Forest are being used according to the conditions of Special Use Permits issued since 1937. Among the uses are: (a) five residences, (b) two pastures, (c) one coconut harvesting operation, (d) one store and (e) four business related to boat launching and repair.

UNIQUE NATURAL AREAS (Map 2)

Unique natural areas are relatively undisturbed lands which contain distinct vegetation, wildlife and/or environmental features not readily available, either separately or as a composite, in near-by areas. Under this definition, the entire Piñones Forest and immediately surrounding areas qualify as a unique natural area. Within this relatively large unique area are several smallers plots which themselves are unique. The smaller unique areas include:

The Phosphorescent Piñones Lagoon - Only a few places in the world have environmental conditions which support large populations of bioluminescent dinoflagellates. One of these areas in Puerto Rico is the Piñones Lagoon within the Piñones Forest. The prominent luminiscence of the organisms, their rarity and importance to marine biology, as well as the proximity of the area to metropolitan San Juan, make the lagoon a significant natural area not only biologically, but possibly also as a tourist curiosity.

The Freshwater Swamp (Pajonal) - The "Pajonal" is largely overgrown with cattails and contains scattered ponds and isolated groves of pure Pterocarpus Forest, the last remaining stands in Puerto Rico.

According to hunters, the rare and endangered West Indian Tree Duck and the endangered Masked Duck are found in this area.

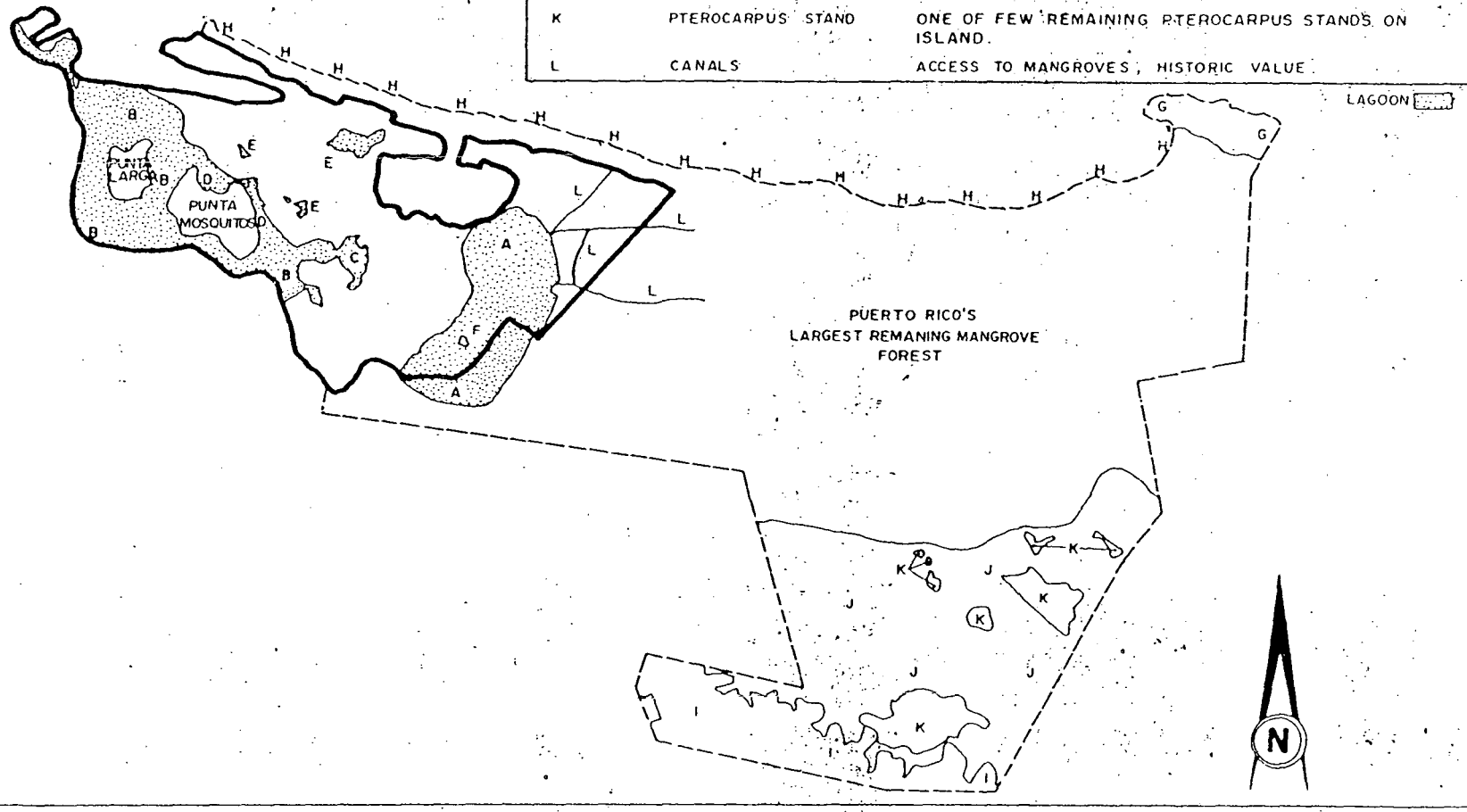
The Limestone Hills (Mogotes) - The mogotes bounding the mangrove on the south are remnants of upland limestone worn through solutional destruction. Small caves and passages are common. At one time, this area served as the feeding grounds for thousands of White-crowned Pigeons during the late summer months. Presently, the area is being intruded by urbanization.

Punto Vacia Talega - The outstanding feature of Punto Vacia Talega is the exposure of ancient barrier dunes which were cemented during Pleistocene glaciations. The rugged coastline and elevated nature of Punto Vacia Talega add a distinct geological curiosity to an area already rich in unique habitats.

Numerous Wildlife Habitats - The Piñones Forest and adjacent mangrove area is rich in wildlife. The Torrecillas and Piñones Lagoons support 38 known species of fish, and the attractive lagoons, small saline ponds, mangrove channels, islets and mangrove forest provide habitat for no fewer than 46 bird species, many of them waterfowl not readily found outside the forest.

MAP 2
PIÑONES FOREST AND ADJACENT LANDS UNIQUE AND NATURAL AREAS

CODE	NAME OF AREA	IMPORTANT CHARACTERISTICS
A	PIÑONES LAGOON	"PHOSPHORESCENTES" EMIT LIGHT WHEN DISTURBED.
B	TORRECILLAS LAGOON	38 SPECIES OF FISH, MANY OF WHICH SERVE AS FOOD
C	ISOLATED BAYS OFF MAJOR LAGOONS	HERON ROOST; WILDLIFE FEEDING AREA.
D	MOSQUITO CHANNEL	FEEDING GROUNDS FOR HERONS, EGRETS AND OSPREY
E	SALT PONDS	FEEDING GROUNDS FOR SHOREBIRDS - WILDLIFE AREA
F	CARMELITO ISLAND	HERON ROOST AND ROOKERY, YEAR-ROUND COLONY OF CATTLE EGRETS, LARGEST POPULATION OF SNOWY EGRETS IN PUERTO RICO, LOUISIANA HERONS, LITTLE BLUE HERONS, GREAT EGRETS, GREAT BLUE HERONS, AND BROWN PELICANS
G	PUNTO VACIA TALEGA	EXPOSE ANCIENT BARRIER DUNES CEMENTED DURING THE PLEISTOCENE, TAINO INDIAN REMAINS, EXCELLENT OCEAN VIEW AND UNDERCUT SHORELINE
H	UNDISTURBED BEACH	EXCELLENT, EXPANSIVE BEACH
I	LIMESTONE HILLS	SOLUTIONAL GEOLOGY, XEROPHYTIC VEGETATION, CAVES, RARE WHITE-CROWNED PIGEON, EXCELLENT VIEW OF MANGROVE FOREST
J	FRESHWATER SWAMP	UNIQUE PTEROCARPUS FOREST; RARE AND ENDANGERED WEST INDIAN TREE DUCK AND ENDANGERED MASKED DUCK - WILDLIFE AREA.
K	PTEROCARPUS STAND	ONE OF FEW REMAINING PTEROCARPUS STANDS ON ISLAND.
L	CANALS	ACCESS TO MANGROVES, HISTORIC VALUE



REFERENCE: 45

INFORMACIÓN GENERAL

Censo 2000: Población por Barrios - Municipio de San Juan

Barrio	Habitantes
Caimito	20,832
Cupey	36,659
El Cinco	7,149
Gobernador Piñero	47,779
Hato Rey Central	20,867
Hato Rey Norte	16,461
Hato Rey Sur	10,868
Monacillo	12,425
Monacillo Urbano	29,309
Oriente	34,799
Pueblo	9,391
Quebrada Arenas	2,753
Sabana Llana Norte	32,361
Sabana Llana Sur	43,839
San Juan Antiguo	7,963
Santurce	94,067
Tortugo	4,351
Universidad	2,501
Total	**434,374**

Fuente: Negociado del Censo de los E.E.U.U., Censo 2000.

Seleccione un municipio de la lista: San Juan

Imprimir

Comisión Estatal de Elecciones de Puerto Rico - Derechos Reservados, © 1998-2001
Estado Libre Asociado de Puerto Rico

INFORMACIÓN GENERAL

Censo 2000: Población por Barrios - Municipio de Guaynabo

Barrio	Habitantes
Camarones	6,311
Frailes	33,023
Guaraguao	4,145
Guaynabo Pueblo	3,056
Hato Nuevo	3,115
Mamey	3,165
Pueblo Viejo	26,109
Río	2,811
Santa Rosa	16,981
Sonadora	1,337
Total	**100,053**

Fuente: Negociado del Censo de los E.E.U.U., Censo 2000.

Seleccione un municipio de la lista: Guaynabo

Imprimir

Comisión Estatal de Elecciones de Puerto Rico - Derechos Reservados, © 1998-2001
Estado Libre Asociado de Puerto Rico

INFORMACIÓN GENERAL

Censo 2000: Población por Barrios - Municipio de Carolina

Barrio	Habitantes
Barrazas	4,076
Cacao	3,668
Cangrejo Arriba	18,681 → 3-Y
Canovanillas	10,748
Carolina Pueblo	1,398
Carruzos	2,481
Cedro	1,918
Hoyo Mulas	33,914
Martín González	24,656
Sabana Abajo	62,238 → 3-Y
San Antón	10,465
Santa Cruz	2,025
Trujillo Bajo	9,808
Total	**186,076**

Fuente: Negociado del Censo de los E.E.U.U., Censo 2000.

Seleccione un municipio de la lista: Carolina

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Comisión Estatal de Elecciones de Puerto Rico - Derechos Reservados, © 1998-2001
Estado Libre Asociado de Puerto Rico

Censo 2000: Población por Barrios - Municipio de Cataño

Barrio	Habitantes
Cataño Pueblo	4,628
Palmas	25,443
Total	**30,071**

Fuente: Negociado del Censo de los E.E.U.U., Censo 2000.

Seleccione un municipio de la lista: Cataño

Imprimir

Comisión Estatal de Elecciones de Puerto Rico - Derechos Reservados, © 1998-2001
Estado Libre Asociado de Puerto Rico

INFORMACIÓN GENERAL

Censo 2000: Población por Barrios - Municipio de Bayamón

Barrio	Habitantes
Bayamón Pueblo	5,336
Buena Vista	15,878
Cerro Gordo	34,161
Dajaos	2,691
Guaraguao Abajo	8,494
Guaraguao Arriba	1,681
Hato Tejas	46,528
Juan Sánchez	25,747
Minillas	42,617
Nuevo	2,394
Pájaros	32,855
Santa Olaya	5,662
Total	**224,044**

Fuente: Negociado del Censo de los E.E.U.U., Censo 2000.

Seleccione un municipio de la lista: Bayamón

Imprimir

Comisión Estatal de Elecciones de Puerto Rico - Derechos Reservados, © 1998-2001
Estado Libre Asociado de Puerto Rico

DISTANCIA (millas)	BARRIO O SECTOR	MUNICIPIO	POBLACION	CUERTO DE AGUA
0-¼	Eleanor Roosevelt	San Juan	5,287	***
¼-½	Hato Rey Central	San Juan	22,504	***
½-1	Baldrich	San Juan		Caño de Martín Peña (N)
	~~Floral Park~~	~~SJ~~	~~[illegible]~~ 49,427	Laguna San José (NW)
	~~Hato Rey Norte~~		+ 6,133	Quebrada Buena Vista (S)
	Héctor Piñero	SJ	49,427 x 502 x 2751	Rio Piedras (SW)
	Hyde Park	SJ	6,133	
	Martín Peña	SJ	(2,55[illegible] x 2)	
	Nemesio Canales		Total: 58,813	
1-2	Bechara			Canal Margarita (W)
	Buenos Aires	SJ	13,44[illegible]	Laguna Los Corozos (NE)
	Cantera			Quebrada Doña Ana (S)
	El Cinco	SJ	8,426	Quebrada Juan Mendez (E)
	Las Americas			Rio Puerto Nuevo (NW)
	Las Casas	SJ	8,244	
	Las Palmas	SJ	2,896	
	Marruecos	SJ	[illegible],534	
	Monte Flores	SJ	[illegible]	
	Puerto Nuevo	SJ		
	Rio Piedras			
	Rio Piedras Pueblo	SJ	501	
	Santa Ana			
	Santa Rita	SJ	2,[illegible]46	
	Truman			
	University Gardens			
	Valencia			
	Villa Borinquen			
	Villa Nevarez			
	Villa Palmera	SJ	2,[illegible]	32,184
2-3	Caparra Heights			Bahía de Puerto Nuevo (NW)
	~~Caparra Hills~~			Bahía de San Juan (NW)
	Las Lomas			Laguna Condado (NW)
	Los Caobos			Oceano Atlántico (N)
	Luis Llorens Torres			Quebrada Guaracana (SE)
	Miramar	SJ	3,266	
	Monacillos Urbano	SJ	13,[illegible]	
	Ocean Park	SJ	2,034	
	~~Parkside~~			
	Pueblo Viejo	Guayabo	[illegible]	
	Sabana Llanas	SJ	3,[illegible]	
	San Patricio			
	Santa Teresita			
	Tras Talleres		3,[illegible]	155,725
	Zona Portuaria			
3-4	Altamesa			Caño San Antonio (NW)
	~~Campo Rico~~			
	Cangrejo Arriba	Carolina	18,869	
	~~Country Club~~			
	Cupey	SJ	31,072	
	~~Garden Hills~~			
	Los Angeles			
	Sabana Abajo	CAROLINA	62,534	
	San Juan Antiguo	SJ	9,696	122,176
	Santa Maria			
	Santiago Iglesias			

368,898

U.S. Census Bureau
American FactFinder
10 Years on the We

Data Set: **Census 2000 Summary File 1 (SF 1) 100-Percent Data**

Result contains 19 rows.

	P001001
	Total population:
County subdivisions not defined, San Juan Municipio, Puerto	0
Caimito barrio, San Juan Municipio, Puerto Rico	20,832
Cupey barrio, San Juan Municipio, Puerto Rico	36,659
El Cinco barrio, San Juan Municipio, Puerto Rico	7,149
Gobernador Piñero barrio, San Juan Municipio, Puerto Rico	47,779
Hato Rey Central barrio, San Juan Municipio, Puerto Rico	20,867
Hato Rey Norte barrio, San Juan Municipio, Puerto Rico	16,461
Hato Rey Sur barrio, San Juan Municipio, Puerto Rico	10,868
Monacillo barrio, San Juan Municipio, Puerto Rico	12,425
Monacillo Urbano barrio, San Juan Municipio, Puerto Rico	29,309
Oriente barrio, San Juan Municipio, Puerto Rico	34,799
Pueblo barrio, San Juan Municipio, Puerto Rico	9,391
Quebrada Arenas barrio, San Juan Municipio, Puerto Rico	2,753
Sabana Llana Norte barrio, San Juan Municipio, Puerto Rico	32,361
Sabana Llana Sur barrio, San Juan Municipio, Puerto Rico	43,839
San Juan Antiguo barrio, San Juan Municipio, Puerto Rico	7,963
Santurce barrio, San Juan Municipio, Puerto Rico	94,067
Tortugo barrio, San Juan Municipio, Puerto Rico	4,351
Universidad barrio, San Juan Municipio, Puerto Rico	2,501

434,374

NOTE: A hyphen (-) indicates that data are not available for this geographic area for the selected data element (column) in your custom table. Please consult the Census 2000 Summary File 1 (SF 1) 100-Percent Data Technical Documentation (PDF 9.1MB) for more information.

REFERENCE: 46

REF. 46

POPULATION ON SAN JUAN MUNICIPALITY		
Celia's Laundry, Inc. 247 Eleanor Roosevelt Street, San Juan, P.R.		
Ward	Distance-Miles	Population
Hato Rey Central	0- ¼	20,867
Hato Rey Norte	¼ - ½	16,461
Gobernador Piñero	½ -1	47,779
Hato Rey Sur	½ -1	10,868
Santurce	1-2	94,067
Universidad,	2-3	2,501
Monacillo Urbano	2-3	29,309
Monacillo	2-3	12,425
Guaynabo Pueblo	3-4	3,056
Cangrejo Arriba	3-4	18,681
Sabana Abajo	3-4	62,238
Cataño Pueblo	3-4	4,638
		322,890

REFERENCE: 47

Plan Integral de Manejo y Conservación para el Estuario de la Bahía de San Juan

Programa del Estuario de la Bahía de San Juan

Post-It® Fax Note 7671		Date 4 abril 2002	# of pages ▶ 2
To Miriam Ortiz		From Luis Jorge Rivera Herrera	
Co./Dept. JCA - Superfund		Co. Prog. Estuario	
Phone #		Phone # 725-8162	
Fax # 767-8181 ext. 2240		Fax # 725-8161	

Calidad de Agua y Sedimentos

Desechos Acuáticos

Hábitat, Peces y Vida Silvestre

Educación y Participación Pública

Tabla 4. Elementos críticos (plantas y animales endémicos, raros, vulnerables y en peligro de extinción) en la cuenca del EBSJ.

Nombre Común en Inglés	Nombre Común en Español	Nombre Científico
	Aves	
Brown Pelican	Pelícano pardo	*Pelecanus occidentalis*
Magnificent Frigate Bird	Tijerilla	*Fregatta magnificens*
Reddish Egret	Garza rojiza	*Egretta rufescens*
West Indian Whistling-Duck	Chiriría antillana	*Dendrocygna arborea*
Ruddy Duck	Pato chorizo	*Oxyura jamaicensis*
Masked Duck	Pato dominico	*Oxyura dominica*
Peregrine Falcon	Falcón peregrino	*Falco peregrinus*
Caribbean Coot	Gallinazo nativo	*Fulica caribaea*
Snowy Plover	Playero blanco	*Charadrius alexandrinus*
Roseate Tern	Palometa	*Sterna dougalli*
Least Tern	Gaviota chica	*Sterna antillarum*
White-crowned Pigeon	Paloma cabeciblanca	*Columba leucocephala*
Puerto Rican Emerald	Zumbadorcito de Puerto Rico	*Chlorostilbon maugaeus*
Puerto Rican Woodpecker	Carpintero de Puerto Rico	*Melanerpes portoricensis*
Puerto Rican Vireo	Julián Chiví	*Vireo latimeri*
Puerto Rican Striped-Headed Taneger	Reina mora de Puerto Rico	*Spindalis portoricenis*
Puerto Rican Bullfinch	Come ñame	*Loxigilla portoricensis*
Yellow-shouldered Blackbird	Mariquita de Puerto Rico	*Agelaius xanthomus*
	Anfibios, Reptiles y Mamíferos	
Coqui	Coquí	*Eleutherodactylus coqui*
Leatherback Turtle	Tinglar	*Dermochelys coriacea*
Green Turtle	Peje blanco	*Chelonia mydas*
Hawksbill Turtle	Carey	*Eretmochelys imbricata*
Puerto Rican Boa	Boa de Puerto Rico	*Epicrates inornatus*
West Indian Manatee	Manatí	*Trichechus manatus*
	Plantas	
Water Fern*	Helecho*	*Marsilea polycarpa*
Shrub*	Arbusto*	*Schoepfia arenaria*
Tree*	Uvero de monte	*Coccoloba sintenissii*
Sea-purslane	Herbácea suculenta	*Sesuvium maritimum*
Water-lily	Yerba acuática	*Nymphaea pulchella*
Gray nickers	Haba de San Antonio	*Caesalpinia bonduc*
Tree*	Cóbana negra	*Stahlia monosperma*
Herbaceous*	Cadillo anaranjado	*Pavonia paniculata*
Maga wood	Maga	*Thespesia grandiflora*
Tree*	Zapote de costa	*Manilkara pleeana*
Vine*	Bejuco*	*Aniseia martinicensis*
Herbaceous*	Herbácea*	*Hyptis spicigera*
Herbaceous*	Herbácea*	*Hyptis verticillata*
Intermediate Arrow-head	Herbácea rastrera	*Sagittaria intermedia*
Beakrush	Herbácea*	*Rhynchospora rufa*
Herbaceous*	Cortadora	*Scleria mitis*

* no tiene nombre común

FACTOR/SUB-FACTOR	RISKS	INITIAL ACTIONS	LEAD
Long-Term Consequences (Continued)			
Environmental Impacts	1. San Juan Bay Estuary is an EPA protected estuary. 2. Endangered species of birds are present in the area. 3. There are turtle nesting grounds to the east of San Juan. 4. Western side of harbor (by Pier 16) requires environmental protection.	The potential for problems can be prevented by provision of up-to-date information about other traffic, and by control of vessel movements. **Implement VTIS**	-
		Improve Port Control capabilities and skill level to point where responsibilities can be properly discharged.	PRPA
		If timely action to improve Port Control capabilities is not forthcoming determine appropriate federal action (See discussion in the body of this report)	COTP
		Encourage port community to develop appropriate operating practices including, but not limited to: • Use of standby tugs • Standard criteria for pilots to use in determining whether or not to move a vessel • Communications and information exchange practices	COTP
Health and Safety Impacts	1. Trade winds will drive toxic plumes to the Southwest 2. The large population located about the harbor cannot be evacuated in an emergency LNG ins received at Catano	The potential for problems can be prevented by provision of up-to-date information about other traffic, and by control of vessel movements.	-
		Improve Port Control capabilities and skill level to point where responsibilities can be properly discharged	PRPA
		If timely action to improve Port Control capabilities is not forthcoming determine appropriate federal action (See discussion in the body of this report)	
		Encourage port community to develop appropriate operating practices including, but not limited to: • Use of standby tugs • Standard criteria for pilots to use in determining whether or not to move a vessel • Communications and information exchange practice	COTP

REFERENCE: 48

TABLE II
TARGET COMPOUND INORGANIC SOIL AND ORGANIC AQUEOUS SAMPLES

Substances	SS-01 MBPH 90	SS-02 MBPH 91	SS-03 MBPH 92	SS-04 MBPH 93	SS-05 MBPH 94	SS-06 MBPH 95	SS-07 MBPH 96	SS-08 MBPH 97 Background	SS-09 MBPH 98 Background	CRDL'S (mg/kg)
Lead	160	230	260	260	210	170	140	41	35	2
Mercury	.68	.36	.32	.33	.56	.51	.36	.08	.19	.1
Zinc	1,200	500	5,550	530	1,400	880	810	76	67	12
AQUEOUR SAMPLES										
Substances	GW-01 MBPH 99	GW-02 MBPJ 00 Dupl.of GW-01		GW-03 MBPJ 01						CRDL'S (µg/L)
Aluminum	ND	400		ND						200
Calcium	39,000	38,000		36,000						5,000
Copper	31	60		ND						25
Iron	4,700	2,200		1,500						100
Magnesium	7,900	8,000		6,400						5,000
Manganese	170	190		87						15
Sodium	66,000	65,000		100,000						5,000
Pesticides Organics Analysis										
Substances	GW-01 BQR00	GW-02 BQR01 Dupl.of GW-01		GW-03 BQR02						CRQL'S (µg/L)
Aldrin	ND	.086		ND						0.01
Dieldrin	ND	ND		0.21						0.02
4,4'-DDE	ND	0.21		ND						0.02
Endrin	ND	0.24		0.24						0.02
4,4'-DDT	ND	0.21		ND						0.02

[ ] - Highest Concentration
ND-Non Detected

REFERENCE: 49

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

DATE: 7/29/2004
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: Hazardous Waste Support Section
TO: ESAT/RSCC

Attached is the following ORGANIC Data Package to be reviewed for Quality Assurance

SITE: Celia's Laundry Inc. CASE #: 32903

SAMPLER: PREQB SDG#: BQQ91

PROJ. CODE: QB SITE SPILL #: ZZ #SAMPLES: 9 MATRIX: soil

LAB: CEIMIC OU: 00

TURN-AROUND-TIME: 21 day

CERCLIS ID #: PR0002196368 FRACTION: Full TCL

Contaminant(s) of Concern (If known)

REGION II RSCC DATA TRANSFER LOG

Relinquished By		Received By	
Signature	Date/Time	Signature	Date/Time
[signature]	8/5/04	[signature]	8/5/04
[signature]	8/19/04	[signature]	8/19/04
[signature]	8/25/04	[signature]	8/25/04

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 5.3(g/mL) G Lab File ID: OG370

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	12	U
74-87-3	Chloromethane	12	U
75-01-4	Vinyl Chloride	12	U
74-83-9	Bromomethane	12	U
75-00-3	Chloroethane	12	U
75-69-4	Trichlorofluoromethane	12	U
75-35-4	1,1-Dichloroethene	12	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	12	U
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	12	U
79-20-9	Methyl Acetate	12	U
75-09-2	Methylene Chloride	~~8~~ 12	~~JB~~ U
156-60-5	trans-1,2-Dichloroethene	12	U
1634-04-4	Methyl tert-Butyl Ether	12	U
75-34-3	1,1-Dichloroethane	12	U
156-59-2	cis-1,2-Dichloroethene	12	U
78-93-3	2-Butanone	12	U
67-66-3	Chloroform	12	U
71-55-6	1,1,1-Trichloroethane	12	U
110-82-7	Cyclohexane	12	U
56-23-5	Carbon Tetrachloride	12	U
71-43-2	Benzene	12	U
107-06-2	1,2-Dichloroethane	12	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 5.3(g/mL) G Lab File ID: OG370

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	12	U
108-87-2	Methylcyclohexane	12	U
78-87-5	1,2-Dichloropropane	12	U
75-27-4	Bromodichloromethane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
108-10-1	4-Methyl-2-Pentanone	12	U
108-88-3	Toluene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
79-00-5	1,1,2-Trichloroethane	12	U
127-18-4	Tetrachloroethene	8	J
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	12	U
106-93-4	1,2-Dibromoethane	12	U
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	12	U
1330-20-7	Xylene (Total)	12	U
100-42-5	Styrene	12	U
75-25-2	Bromoform	12	U
98-82-8	Isopropylbenzene	2	J
79-34-5	1,1,2,2-Tetrachloroethane	12	U
541-73-1	1,3-Dichlorobenzene	12	U
106-46-7	1,4-Dichlorobenzene	12	U
95-50-1	1,2-Dichlorobenzene	12	U
96-12-8	1,2-Dibromo-3-chloropropane	12	U
120-82-1	1,2,4-Trichlorobenzene	12	U

1F

EPA SAMPLE NO. 4

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 5.3 (g/mL) G Lab File ID: OG370

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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5.					
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EPA SAMPLE NO. 5

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 5.6(g/mL) G Lab File ID: OG371

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume:_____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	11	U
74-87-3	Chloromethane	11	U
75-01-4	Vinyl Chloride	11	U
74-83-9	Bromomethane	11	U
75-00-3	Chloroethane	11	U
75-69-4	Trichlorofluoromethane	11	U
75-35-4	1,1-Dichloroethene	11	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	11	U
67-64-1	Acetone	2	J
75-15-0	Carbon Disulfide	11	U
79-20-9	Methyl Acetate	11	U
75-09-2	Methylene Chloride	~~10~~ 11	~~JB~~ U
156-60-5	trans-1,2-Dichloroethene	11	U
1634-04-4	Methyl tert-Butyl Ether	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
78-93-3	2-Butanone	11	U
67-66-3	Chloroform	11	U
71-55-6	1,1,1-Trichloroethane	11	U
110-82-7	Cyclohexane	11	U
56-23-5	Carbon Tetrachloride	11	U
71-43-2	Benzene	11	U
107-06-2	1,2-Dichloroethane	11	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 6

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 5.6(g/mL) G Lab File ID: OG371

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	11	U
108-87-2	Methylcyclohexane	11	U
78-87-5	1,2-Dichloropropane	11	U
75-27-4	Bromodichloromethane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
108-10-1	4-Methyl-2-Pentanone	11	U
108-88-3	Toluene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
79-00-5	1,1,2-Trichloroethane	11	U
127-18-4	Tetrachloroethene	6	J
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	11	U
106-93-4	1,2-Dibromoethane	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
1330-20-7	Xylene (Total)	11	U
100-42-5	Styrene	11	U
75-25-2	Bromoform	11	U
98-82-8	Isopropylbenzene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
96-12-8	1,2-Dibromo-3-chloropropane	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U

1F

EPA SAMPLE NO. 7

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 5.6 (g/mL) G Lab File ID: OG371

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	17.98	13	J
2.	473-13-2	NAPHTHALENE, 1,2,3,4,4A,5,6,	18.32	~~25~~	~~NJ~~ R
3.					
4.					
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EPA SAMPLE NO. 8

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 5.5(g/mL) G Lab File ID: OG372

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	11	U
74-87-3	Chloromethane	11	U
75-01-4	Vinyl Chloride	11	U
74-83-9	Bromomethane	11	U
75-00-3	Chloroethane	11	U
75-69-4	Trichlorofluoromethane	1	J
75-35-4	1,1-Dichloroethene	11	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	11	U
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	11	U
79-20-9	Methyl Acetate	11	U
75-09-2	Methylene Chloride	10	JB
156-60-5	trans-1,2-Dichloroethene	11	U
1634-04-4	Methyl tert-Butyl Ether	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
78-93-3	2-Butanone	11	U
67-66-3	Chloroform	11	U
71-55-6	1,1,1-Trichloroethane	11	U
110-82-7	Cyclohexane	11	U
56-23-5	Carbon Tetrachloride	11	U
71-43-2	Benzene	11	U
107-06-2	1,2-Dichloroethane	11	U

EPA SAMPLE NO. 9

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 5.5(g/mL) G Lab File ID: OG372

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	11	U
108-87-2	Methylcyclohexane	11	U
78-87-5	1,2-Dichloropropane	11	U
75-27-4	Bromodichloromethane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
108-10-1	4-Methyl-2-Pentanone	11	U
108-88-3	Toluene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
79-00-5	1,1,2-Trichloroethane	11	U
127-18-4	Tetrachloroethene	11	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	11	U
106-93-4	1,2-Dibromoethane	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
1330-20-7	Xylene (Total)	11	U
100-42-5	Styrene	11	U
75-25-2	Bromoform	11	U
98-82-8	Isopropylbenzene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
96-12-8	1,2-Dibromo-3-chloropropane	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U

1F

EPA SAMPLE NO.

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 5.5 (g/mL) G Lab File ID: OG372

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
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EPA SAMPLE NO. 11

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 5.1(g/mL) G Lab File ID: OG373

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 19 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	12	U
74-87-3	Chloromethane	12	U
75-01-4	Vinyl Chloride	12	U
74-83-9	Bromomethane	12	U
75-00-3	Chloroethane	12	U
75-69-4	Trichlorofluoromethane	12	U
75-35-4	1,1-Dichloroethene	12	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	12	U
67-64-1	Acetone	6	J
75-15-0	Carbon Disulfide	12	U
79-20-9	Methyl Acetate	12	U
75-09-2	Methylene Chloride	12	B U
156-60-5	trans-1,2-Dichloroethene	12	U
1634-04-4	Methyl tert-Butyl Ether	12	U
75-34-3	1,1-Dichloroethane	12	U
156-59-2	cis-1,2-Dichloroethene	12	U
78-93-3	2-Butanone	12	U
67-66-3	Chloroform	12	U
71-55-6	1,1,1-Trichloroethane	12	U
110-82-7	Cyclohexane	12	U
56-23-5	Carbon Tetrachloride	12	U
71-43-2	Benzene	12	U
107-06-2	1,2-Dichloroethane	12	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 12

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 5.1(g/mL) G Lab File ID: OG373

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 19 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	12	U
108-87-2	Methylcyclohexane	12	U
78-87-5	1,2-Dichloropropane	12	U
75-27-4	Bromodichloromethane	12	U
10061-01-5	cis-1,3-Dichloropropene	12	U
108-10-1	4-Methyl-2-Pentanone	12	U
108-88-3	Toluene	12	U
10061-02-6	trans-1,3-Dichloropropene	12	U
79-00-5	1,1,2-Trichloroethane	12	U
127-18-4	Tetrachloroethene	12	U
591-78-6	2-Hexanone	12	U
124-48-1	Dibromochloromethane	12	U
106-93-4	1,2-Dibromoethane	12	U
108-90-7	Chlorobenzene	12	U
100-41-4	Ethylbenzene	12	U
1330-20-7	Xylene (Total)	12	U
100-42-5	Styrene	12	U
75-25-2	Bromoform	12	U
98-82-8	Isopropylbenzene	12	U
79-34-5	1,1,2,2-Tetrachloroethane	12	U
541-73-1	1,3-Dichlorobenzene	12	U
106-46-7	1,4-Dichlorobenzene	12	U
95-50-1	1,2-Dichlorobenzene	12	U
96-12-8	1,2-Dibromo-3-chloropropane	12	U
120-82-1	1,2,4-Trichlorobenzene	12	U

1F

EPA SAMPLE NO. 13

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 5.1 (g/mL) G Lab File ID: OG373

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 19 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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EPA SAMPLE NO. 14

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG374

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 29 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	14	U
74-87-3	Chloromethane	14	U
75-01-4	Vinyl Chloride	14	U
74-83-9	Bromomethane	14	U
75-00-3	Chloroethane	14	U
75-69-4	Trichlorofluoromethane	14	U
75-35-4	1,1-Dichloroethene	14	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	14	U
67-64-1	Acetone	4	J
75-15-0	Carbon Disulfide	14	U
79-20-9	Methyl Acetate	14	U
75-09-2	Methylene Chloride	14	B U
156-60-5	trans-1,2-Dichloroethene	14	U
1634-04-4	Methyl tert-Butyl Ether	14	U
75-34-3	1,1-Dichloroethane	14	U
156-59-2	cis-1,2-Dichloroethene	14	U
78-93-3	2-Butanone	14	U
67-66-3	Chloroform	14	U
71-55-6	1,1,1-Trichloroethane	14	U
110-82-7	Cyclohexane	14	U
56-23-5	Carbon Tetrachloride	14	U
71-43-2	Benzene	14	U
107-06-2	1,2-Dichloroethane	14	U

1B

EPA SAMPLE NO. 15

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG374

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 29 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	14	U
108-87-2	Methylcyclohexane	14	U
78-87-5	1,2-Dichloropropane	14	U
75-27-4	Bromodichloromethane	14	U
10061-01-5	cis-1,3-Dichloropropene	14	U
108-10-1	4-Methyl-2-Pentanone	14	U
108-88-3	Toluene	14	U
10061-02-6	trans-1,3-Dichloropropene	14	U
79-00-5	1,1,2-Trichloroethane	14	U
127-18-4	Tetrachloroethene	14	U
591-78-6	2-Hexanone	14	U
124-48-1	Dibromochloromethane	14	U
106-93-4	1,2-Dibromoethane	14	U
108-90-7	Chlorobenzene	14	U
100-41-4	Ethylbenzene	14	U
1330-20-7	Xylene (Total)	14	U
100-42-5	Styrene	14	U
75-25-2	Bromoform	14	U
98-82-8	Isopropylbenzene	14	U
79-34-5	1,1,2,2-Tetrachloroethane	14	U
541-73-1	1,3-Dichlorobenzene	14	U
106-46-7	1,4-Dichlorobenzene	14	U
95-50-1	1,2-Dichlorobenzene	14	U
96-12-8	1,2-Dibromo-3-chloropropane	14	U
120-82-1	1,2,4-Trichlorobenzene	14	U

1F

EPA SAMPLE NO. 16

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 5.0 (g/mL) G Lab File ID: OG374

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 29 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
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10.					
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EPA SAMPLE NO. 17

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 4.7(g/mL) G Lab File ID: OG375

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	14	U
74-87-3	Chloromethane	14	U
75-01-4	Vinyl Chloride	14	U
74-83-9	Bromomethane	14	U
75-00-3	Chloroethane	14	U
75-69-4	Trichlorofluoromethane	14	U
75-35-4	1,1-Dichloroethene	14	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	14	U
67-64-1	Acetone	14	U
75-15-0	Carbon Disulfide	14	U
79-20-9	Methyl Acetate	14	U
75-09-2	Methylene Chloride	14 ~~12~~	~~JB~~ U
156-60-5	trans-1,2-Dichloroethene	14	U
1634-04-4	Methyl tert-Butyl Ether	14	U
75-34-3	1,1-Dichloroethane	14	U
156-59-2	cis-1,2-Dichloroethene	14	U
78-93-3	2-Butanone	14	U
67-66-3	Chloroform	14	U
71-55-6	1,1,1-Trichloroethane	14	U
110-82-7	Cyclohexane	14	U
56-23-5	Carbon Tetrachloride	14	U
71-43-2	Benzene	14	U
107-06-2	1,2-Dichloroethane	14	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 18

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 4.7(g/mL) G Lab File ID: OG375

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	14	U
108-87-2	Methylcyclohexane	14	U
78-87-5	1,2-Dichloropropane	14	U
75-27-4	Bromodichloromethane	14	U
10061-01-5	cis-1,3-Dichloropropene	14	U
108-10-1	4-Methyl-2-Pentanone	14	U
108-88-3	Toluene	14	U
10061-02-6	trans-1,3-Dichloropropene	14	U
79-00-5	1,1,2-Trichloroethane	14	U
127-18-4	Tetrachloroethene	2	J
591-78-6	2-Hexanone	14	U
124-48-1	Dibromochloromethane	14	U
106-93-4	1,2-Dibromoethane	14	U
108-90-7	Chlorobenzene	14	U
100-41-4	Ethylbenzene	14	U
1330-20-7	Xylene (Total)	14	U
100-42-5	Styrene	14	U
75-25-2	Bromoform	14	U
98-82-8	Isopropylbenzene	14	U
79-34-5	1,1,2,2-Tetrachloroethane	14	U
541-73-1	1,3-Dichlorobenzene	14	U
106-46-7	1,4-Dichlorobenzene	14	U
95-50-1	1,2-Dichlorobenzene	14	U
96-12-8	1,2-Dibromo-3-chloropropane	14	U
120-82-1	1,2,4-Trichlorobenzene	14	U

1F

EPA SAMPLE NO. 19

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 4.7 (g/mL) G Lab File ID: OG375

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 22 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
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1A

EPA SAMPLE NO. 20

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 5.3(g/mL) G Lab File ID: OG376

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 25 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	13	U
74-87-3	Chloromethane	13	U
75-01-4	Vinyl Chloride	13	U
74-83-9	Bromomethane	13	U
75-00-3	Chloroethane	13	U
75-69-4	Trichlorofluoromethane	13	U
75-35-4	1,1-Dichloroethene	13	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	13	U
67-64-1	Acetone	2	J
75-15-0	Carbon Disulfide	13	U
79-20-9	Methyl Acetate	13	U
75-09-2	Methylene Chloride	12 ~~11~~ JB	U
156-60-5	trans-1,2-Dichloroethene	13	U
1634-04-4	Methyl tert-Butyl Ether	13	U
75-34-3	1,1-Dichloroethane	13	U
156-59-2	cis-1,2-Dichloroethene	5	J
78-93-3	2-Butanone	13	U
67-66-3	Chloroform	13	U
71-55-6	1,1,1-Trichloroethane	13	U
110-82-7	Cyclohexane	13	U
56-23-5	Carbon Tetrachloride	13	U
71-43-2	Benzene	13	U
107-06-2	1,2-Dichloroethane	13	U

VOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 5.3(g/mL) G Lab File ID: OG376

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 25 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	4	J
108-87-2	Methylcyclohexane	13	U
78-87-5	1,2-Dichloropropane	13	U
75-27-4	Bromodichloromethane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
108-10-1	4-Methyl-2-Pentanone	13	U
108-88-3	Toluene	13	U
10061-02-6	trans-1,3-Dichloropropene	13	U
79-00-5	1,1,2-Trichloroethane	13	U
127-18-4	Tetrachloroethene	10	J
591-78-6	2-Hexanone	13	U
124-48-1	Dibromochloromethane	13	U
106-93-4	1,2-Dibromoethane	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
1330-20-7	Xylene (Total)	13	U
100-42-5	Styrene	13	U
75-25-2	Bromoform	13	U
98-82-8	Isopropylbenzene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	13	U
95-50-1	1,2-Dichlorobenzene	2	J
96-12-8	1,2-Dibromo-3-chloropropane	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U

1F

EPA SAMPLE NO. 22

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 5.3 (g/mL) G Lab File ID: OG376

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 25 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
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17.					
18.					
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28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 23

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 5.8(g/mL) G Lab File ID: OG377

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	11	U
74-87-3	Chloromethane	11	U
75-01-4	Vinyl Chloride	11	U
74-83-9	Bromomethane	11	U
75-00-3	Chloroethane	11	U
75-69-4	Trichlorofluoromethane	11	U
75-35-4	1,1-Dichloroethene	11	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	11	U
67-64-1	Acetone	4	J
75-15-0	Carbon Disulfide	11	U
79-20-9	Methyl Acetate	11	U
75-09-2	Methylene Chloride	10	JB
156-60-5	trans-1,2-Dichloroethene	11	U
1634-04-4	Methyl tert-Butyl Ether	11	U
75-34-3	1,1-Dichloroethane	11	U
156-59-2	cis-1,2-Dichloroethene	11	U
78-93-3	2-Butanone	11	U
67-66-3	Chloroform	11	U
71-55-6	1,1,1-Trichloroethane	11	U
110-82-7	Cyclohexane	11	U
56-23-5	Carbon Tetrachloride	11	U
71-43-2	Benzene	11	U
107-06-2	1,2-Dichloroethane	11	U

EPA SAMPLE NO. 24

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 5.8(g/mL) G Lab File ID: OG377

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	11	U
108-87-2	Methylcyclohexane	11	U
78-87-5	1,2-Dichloropropane	11	U
75-27-4	Bromodichloromethane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
108-10-1	4-Methyl-2-Pentanone	11	U
108-88-3	Toluene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
79-00-5	1,1,2-Trichloroethane	11	U
127-18-4	Tetrachloroethene	11	U
591-78-6	2-Hexanone	11	U
124-48-1	Dibromochloromethane	11	U
106-93-4	1,2-Dibromoethane	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
1330-20-7	Xylene (Total)	11	U
100-42-5	Styrene	11	U
75-25-2	Bromoform	11	U
98-82-8	Isopropylbenzene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
541-73-1	1,3-Dichlorobenzene	11	U
106-46-7	1,4-Dichlorobenzene	11	U
95-50-1	1,2-Dichlorobenzene	11	U
96-12-8	1,2-Dibromo-3-chloropropane	11	U
120-82-1	1,2,4-Trichlorobenzene	11	U

1F

EPA SAMPLE NO. 25

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 5.8 (g/mL) G Lab File ID: OG377

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 20 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKOWN ALKYNE	2.89	6	J
2.		CYCLIC ALKENE	17.95	6	J
3.					
4.					
5.					
6.					
7.					
8.					
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15.					
16.					
17.					
18.					
19.					
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22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 24

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 6.1(g/mL) G Lab File ID: OG380

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 16 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
79-20-9	Methyl Acetate	10	U
75-09-2	Methylene Chloride	8	J
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl tert-Butyl Ether	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	10	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon Tetrachloride	10	U
71-43-2	Benzene	10	U
107-06-2	1,2-Dichloroethane	10	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 29

BQQ99 FB

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 6.1(g/mL) G Lab File ID: OG380

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 16 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	10	U
108-87-2	Methylcyclohexane	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
1330-20-7	Xylene (Total)	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U

1F

EPA SAMPLE NO. 27

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 6.1 (g/mL) G Lab File ID: OG380

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: not dec. 16 Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
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16.					
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27.					
28.					
29.					
30.					

1A

EPA SAMPLE NO. 27

VOLATILE ORGANICS ANALYSIS DATA SHEET

VBLKOX

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150520-B1

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG365

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
79-20-9	Methyl Acetate	10	U
75-09-2	Methylene Chloride	8	J
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl tert-Butyl Ether	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	10	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon Tetrachloride	10	U
71-43-2	Benzene	10	U
107-06-2	1,2-Dichloroethane	10	U

1B

EPA SAMPLE NO. 30

VOLATILE ORGANICS ANALYSIS DATA SHEET

VBLKOX

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150520-B1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: OG365

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	10	U
108-87-2	Methylcyclohexane	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
1330-20-7	Xylene (Total)	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U

1F

EPA SAMPLE NO. 31

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

VBLKOX

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150520-B1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: OG365

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/20/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____ (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 32

VBLKOY

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150521-B1

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG389

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume:_____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U
75-35-4	1,1-Dichloroethene	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
79-20-9	Methyl Acetate	10	U
75-09-2	Methylene Chloride	6	J
156-60-5	trans-1,2-Dichloroethene	10	U
1634-04-4	Methyl tert-Butyl Ether	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	10	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon Tetrachloride	10	U
71-43-2	Benzene	10	U
107-06-2	1,2-Dichloroethane	10	U

1B

EPA SAMPLE NO. 33

VOLATILE ORGANICS ANALYSIS DATA SHEET

VBLKOY

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150521-B1

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG389

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	10	U
108-87-2	Methylcyclohexane	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
1330-20-7	Xylene (Total)	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U J
120-82-1	1,2,4-Trichlorobenzene	10	U

1F

EPA SAMPLE NO. 34

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

VBLKOY

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: V150521-B1

Sample wt/vol: 5.0 (g/mL) G Lab File ID: OG389

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 35

VHBLK01

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-21

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG391

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
75-71-8	Dichlorodifluoromethane	10	U
74-87-3	Chloromethane	10	U
75-01-4	Vinyl Chloride	10	U
74-83-9	Bromomethane	10	U
75-00-3	Chloroethane	10	U
75-69-4	Trichlorofluoromethane	10	U J
75-35-4	1,1-Dichloroethene	10	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	10	U J
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U J
79-20-9	Methyl Acetate	10	U
75-09-2	Methylene Chloride	6	JB
156-60-5	trans-1,2-Dichloroethene	10	U J
1634-04-4	Methyl tert-Butyl Ether	10	U
75-34-3	1,1-Dichloroethane	10	U
156-59-2	cis-1,2-Dichloroethene	10	U
78-93-3	2-Butanone	10	U
67-66-3	Chloroform	10	U
71-55-6	1,1,1-Trichloroethane	10	U
110-82-7	Cyclohexane	10	U
56-23-5	Carbon Tetrachloride	10	U
71-43-2	Benzene	10	U
107-06-2	1,2-Dichloroethane	10	U

1B

VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 36

VHBLK01

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-21

Sample wt/vol: 5.0(g/mL) G Lab File ID: OG391

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
79-01-6	Trichloroethene	10	U
108-87-2	Methylcyclohexane	10	U
78-87-5	1,2-Dichloropropane	10	U
75-27-4	Bromodichloromethane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
108-88-3	Toluene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
79-00-5	1,1,2-Trichloroethane	10	U
127-18-4	Tetrachloroethene	10	U
591-78-6	2-Hexanone	10	U
124-48-1	Dibromochloromethane	10	U
106-93-4	1,2-Dibromoethane	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
1330-20-7	Xylene (Total)	10	U
100-42-5	Styrene	10	U
75-25-2	Bromoform	10	U
98-82-8	Isopropylbenzene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
96-12-8	1,2-Dibromo-3-chloropropane	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U

1F

EPA SAMPLE NO. 37

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

VHBLK01

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-21

Sample wt/vol: 5.0 (g/mL) G Lab File ID: OG391

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 05/21/04

GC Column: DB-624 ID: 0.25 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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EPA SAMPLE NO. 38

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 30.1(g/mL) G Lab File ID: DH395

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 19 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	410	U J
108-95-2	Phenol	410	U
111-44-4	bis(2-Chloroethyl)Ether	410	U
95-57-8	2-Chlorophenol	410	U
95-48-7	2-Methylphenol	410	U
108-60-1	2,2'-oxybis(1-Chloropropane)	410	U
98-86-2	Acetophenone	410	U
106-44-5	4-Methylphenol	410	U
621-64-7	N-Nitroso-di-n-propylamine	410	U
67-72-1	Hexachloroethane	410	U
98-95-3	Nitrobenzene	410	U
78-59-1	Isophorone	410	U
88-75-5	2-Nitrophenol	410	U
105-67-9	2,4-Dimethylphenol	410	U
111-91-1	bis(2-Chloroethoxy)methane	410	U
120-83-2	2,4-Dichlorophenol	410	U
91-20-3	Naphthalene	410	U
106-47-8	4-Chloroaniline	410	U
87-68-3	Hexachlorobutadiene	410	U
105-60-2	Caprolactam	410	U
59-50-7	4-Chloro-3-Methylphenol	410	U
91-57-6	2-Methylnaphthalene	410	U
77-47-4	Hexachlorocyclopentadiene	410	U
88-06-2	2,4,6-Trichlorophenol	410	U
95-95-4	2,4,5-Trichlorophenol	1000	U
92-52-4	1,1'-Biphenyl	410	U
91-58-7	2-Chloronaphthalene	410	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	410	U
606-20-2	2,6-Dinitrotoluene	410	U
208-96-8	Acenaphthylene	410	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	410	U

EPA SAMPLE NO. 39

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 30.1(g/mL) G Lab File ID: DH395

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 19 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	410	U
121-14-2	2,4-Dinitrotoluene	410	U
84-66-2	Diethylphthalate	410	U
86-73-7	Fluorene	410	U
7005-72-3	4-Chlorophenyl-phenylether	410	U
100-01-6	4-Nitroaniline	1000	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
86-30-6	N-nitrosodiphenylamine (1)	410	U
101-55-3	4-Bromophenyl-phenylether	410	U
118-74-1	Hexachlorobenzene	410	U
1912-24-9	Atrazine	410	U
87-86-5	Pentachlorophenol	1000	U
85-01-8	Phenanthrene	410	U
120-12-7	Anthracene	410	U
86-74-8	Carbazole	410	U
84-74-2	Di-n-butylphthalate	410	U
206-44-0	Fluoranthene	410	U
129-00-0	Pyrene	410	U
85-68-7	Butylbenzylphthalate	410	U
91-94-1	3,3'-Dichlorobenzidine	410	U
56-55-3	Benzo(a)anthracene	410	U
218-01-9	Chrysene	410	U
117-81-7	bis(2-Ethylhexyl)phthalate	970	B U
117-84-0	Di-n-octylphthalate	410	U
205-99-2	Benzo(b)fluoranthene	410	U
207-08-9	Benzo(k)fluoranthene	410	U
50-32-8	Benzo(a)pyrene	410	U
193-39-5	Indeno(1,2,3-cd)pyrene	410	U
53-70-3	Dibenzo(a,h)anthracene	410	U
191-24-2	Benzo(g,h,i)perylene	410	U

(1) - Cannot be separated from Diphenylamine

1G
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO. 40

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 30.1 (g/mL) G Lab File ID: DH395

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 19 Decanted: (Y/N) N Date Extracted: 05/20/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 05/27/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7 Extraction: (Type) SONC

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 123-42-2	2-PENTANONE, 4-HYDROXY-4-MET	4.53	4800	NJ
2. 11029-06-4	ELEMENE	9.14	1300	NJ
3.	UNKNOWN	11.00	420	J
4. 57-10-3	HEXADECANOIC ACID	12.16	~~760~~	~~NJ~~ K
5.	UNKNOWN	15.52	260	J
6.	UNKNOWN	24.03	440	J
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 1/1

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 30.3(g/mL) G Lab File ID: DH396

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.3 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	450	U
108-95-2	Phenol	450	U
111-44-4	bis(2-Chloroethyl)Ether	450	U
95-57-8	2-Chlorophenol	450	U
95-48-7	2-Methylphenol	450	U
108-60-1	2,2'-oxybis(1-Chloropropane)	450	U
98-86-2	Acetophenone	450	U
106-44-5	4-Methylphenol	450	U
621-64-7	N-Nitroso-di-n-propylamine	450	U
67-72-1	Hexachloroethane	450	U
98-95-3	Nitrobenzene	450	U
78-59-1	Isophorone	450	U
88-75-5	2-Nitrophenol	450	U
105-67-9	2,4-Dimethylphenol	450	U
111-91-1	bis(2-Chloroethoxy)methane	450	U
120-83-2	2,4-Dichlorophenol	450	U
91-20-3	Naphthalene	450	U
106-47-8	4-Chloroaniline	450	U
87-68-3	Hexachlorobutadiene	450	U
105-60-2	Caprolactam	450	U
59-50-7	4-Chloro-3-Methylphenol	450	U
91-57-6	2-Methylnaphthalene	450	U
77-47-4	Hexachlorocyclopentadiene	450	U
88-06-2	2,4,6-Trichlorophenol	450	U
95-95-4	2,4,5-Trichlorophenol	1100	U
92-52-4	1,1'-Biphenyl	450	U
91-58-7	2-Chloronaphthalene	450	U
88-74-4	2-Nitroaniline	1100	U
131-11-3	Dimethylphthalate	450	U
606-20-2	2,6-Dinitrotoluene	450	U
208-96-8	Acenaphthylene	450	U
99-09-2	3-Nitroaniline	1100	U
83-32-9	Acenaphthene	450	U

EPA SAMPLE NO. 42

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 30.3(g/mL) G Lab File ID: DH396

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.3 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1100	U
100-02-7	4-Nitrophenol	1100	U
132-64-9	Dibenzofuran	450	U
121-14-2	2,4-Dinitrotoluene	450	U
84-66-2	Diethylphthalate	450	U
86-73-7	Fluorene	450	U
7005-72-3	4-Chlorophenyl-phenylether	450	U
100-01-6	4-Nitroaniline	1100	U
534-52-1	4,6-Dinitro-2-methylphenol	1100	U
86-30-6	N-nitrosodiphenylamine (1)	450	U
101-55-3	4-Bromophenyl-phenylether	450	U
118-74-1	Hexachlorobenzene	450	U
1912-24-9	Atrazine	450	U
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	450	U
120-12-7	Anthracene	450	U
86-74-8	Carbazole	450	U
84-74-2	Di-n-butylphthalate	450	U
206-44-0	Fluoranthene	450	U
129-00-0	Pyrene	450	U
85-68-7	Butylbenzylphthalate	170	J
91-94-1	3,3'-Dichlorobenzidine	450	U
56-55-3	Benzo(a)anthracene	450	U
218-01-9	Chrysene	450	U
117-81-7	bis(2-Ethylhexyl)phthalate	570	B U
117-84-0	Di-n-octylphthalate	450	U
205-99-2	Benzo(b)fluoranthene	450	U
207-08-9	Benzo(k)fluoranthene	450	U
50-32-8	Benzo(a)pyrene	450	U
193-39-5	Indeno(1,2,3-cd)pyrene	450	U
53-70-3	Dibenzo(a,h)anthracene	450	U
191-24-2	Benzo(g,h,i)perylene	450	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 43

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 30.3 (g/mL) G Lab File ID: DH396

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.3 Extraction: (Type) SONC

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	57-10-3	HEXADECANOIC ACID	12.16	~~1100~~	~~NJ~~
2.		UNKNOWN	12.85	450	J
3.					
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210A

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 44

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 30.4 (g/mL) G Lab File ID: DH397

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 64 Decanted: (Y/N) N Date Extracted: 05/20/04

Concentrated Extract Volume: 500 (uL) Date Analyzed: 05/27/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.4 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	900	U J
108-95-2	Phenol	900	U
111-44-4	bis(2-Chloroethyl)Ether	900	U
95-57-8	2-Chlorophenol	900	U
95-48-7	2-Methylphenol	900	U
108-60-1	2,2'-oxybis(1-Chloropropane)	900	U
98-86-2	Acetophenone	900	U
106-44-5	4-Methylphenol	900	U
621-64-7	N-Nitroso-di-n-propylamine	900	U
67-72-1	Hexachloroethane	900	U
98-95-3	Nitrobenzene	900	U
78-59-1	Isophorone	900	U
88-75-5	2-Nitrophenol	900	U
105-67-9	2,4-Dimethylphenol	900	U
111-91-1	bis(2-Chloroethoxy)methane	900	U
120-83-2	2,4-Dichlorophenol	900	U
91-20-3	Naphthalene	900	U
106-47-8	4-Chloroaniline	900	U
87-68-3	Hexachlorobutadiene	900	U
105-60-2	Caprolactam	900	U
59-50-7	4-Chloro-3-Methylphenol	900	U
91-57-6	2-Methylnaphthalene	900	U
77-47-4	Hexachlorocyclopentadiene	900	U
88-06-2	2,4,6-Trichlorophenol	900	U
95-95-4	2,4,5-Trichlorophenol	2300	U
92-52-4	1,1'-Biphenyl	900	U
91-58-7	2-Chloronaphthalene	900	U
88-74-4	2-Nitroaniline	2300	U
131-11-3	Dimethylphthalate	900	U
606-20-2	2,6-Dinitrotoluene	900	U
208-96-8	Acenaphthylene	900	U
99-09-2	3-Nitroaniline	2300	U
83-32-9	Acenaphthene	900	U

1D

EPA SAMPLE NO. 5

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 30.4(g/mL) G Lab File ID: DH397

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 64 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.4 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	2300	U
100-02-7	4-Nitrophenol	2300	U
132-64-9	Dibenzofuran	900	U
121-14-2	2,4-Dinitrotoluene	900	U
84-66-2	Diethylphthalate	900	U
86-73-7	Fluorene	900	U
7005-72-3	4-Chlorophenyl-phenylether	900	U
100-01-6	4-Nitroaniline	2300	U
534-52-1	4,6-Dinitro-2-methylphenol	2300	U
86-30-6	N-nitrosodiphenylamine (1)	900	U
101-55-3	4-Bromophenyl-phenylether	900	U
118-74-1	Hexachlorobenzene	900	U
1912-24-9	Atrazine	900	U
87-86-5	Pentachlorophenol	2300	U
85-01-8	Phenanthrene	900	U
120-12-7	Anthracene	900	U
86-74-8	Carbazole	900	U
84-74-2	Di-n-butylphthalate	900	U
206-44-0	Fluoranthene	900	U
129-00-0	Pyrene	900	U
85-68-7	Butylbenzylphthalate	900	U
91-94-1	3,3'-Dichlorobenzidine	900	U
56-55-3	Benzo(a)anthracene	900	U
218-01-9	Chrysene	900	U
117-81-7	bis(2-Ethylhexyl)phthalate	900 ~~510~~	J B U
117-84-0	Di-n-octylphthalate	900	U
205-99-2	Benzo(b)fluoranthene	900	U
207-08-9	Benzo(k)fluoranthene	900	U
50-32-8	Benzo(a)pyrene	900	U
193-39-5	Indeno(1,2,3-cd)pyrene	900	U
53-70-3	Dibenzo(a,h)anthracene	900	U
191-24-2	Benzo(g,h,i)perylene	900	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 44

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 30.4 (g/mL) G Lab File ID: DH397

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 64 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.4 Extraction: (Type) SONC

Number TICs found: 6 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	11029-06-4	ELEMENE	9.14	840	NJ
2.	1002-84-2	PENTADECANOIC ACID	12.17	1900	NJ
3.		UNKNOWN	12.69	930	J
4.		UNKNOWN	12.88	970	J
5.		UNKNOWN	17.67	2800	J
6.		UNKNOWN	17.76	1500	J
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EPA SAMPLE NO. 47

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 30.1(g/mL) G Lab File ID: DH398

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 12 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	370	UJ
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)Ether	370	U
95-57-8	2-Chlorophenol	370	U
95-48-7	2-Methylphenol	370	U
108-60-1	2,2'-oxybis(1-Chloropropane)	370	U
98-86-2	Acetophenone	370	U
106-44-5	4-Methylphenol	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
67-72-1	Hexachloroethane	370	U
98-95-3	Nitrobenzene	370	U
78-59-1	Isophorone	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
91-20-3	Naphthalene	370	U
106-47-8	4-Chloroaniline	370	U
87-68-3	Hexachlorobutadiene	370	U
105-60-2	Caprolactam	370	U
59-50-7	4-Chloro-3-Methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	940	U
92-52-4	1,1'-Biphenyl	370	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	940	U
131-11-3	Dimethylphthalate	370	U
606-20-2	2,6-Dinitrotoluene	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	940	U
83-32-9	Acenaphthene	370	U

EPA SAMPLE NO. 48

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 30.1(g/mL) G Lab File ID: DH398

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 12 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	940	U
100-02-7	4-Nitrophenol	940	U
132-64-9	Dibenzofuran	370	U
121-14-2	2,4-Dinitrotoluene	370	U
84-66-2	Diethylphthalate	370	U
86-73-7	Fluorene	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
100-01-6	4-Nitroaniline	940	U
534-52-1	4,6-Dinitro-2-methylphenol	940	U
86-30-6	N-nitrosodiphenylamine (1)	370	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
1912-24-9	Atrazine	370	U
87-86-5	Pentachlorophenol	940	U
85-01-8	Phenanthrene	370	U
120-12-7	Anthracene	370	U
86-74-8	Carbazole	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	77	J
129-00-0	Pyrene	150	J
85-68-7	Butylbenzylphthalate	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
56-55-3	Benzo(a)anthracene	95	J
218-01-9	Chrysene	99	J
117-81-7	bis(2-Ethylhexyl)phthalate	270 ~~110~~	~~U~~
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	60	J
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenzo(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 49

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ94

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 30.1 (g/mL) G Lab File ID: DH398

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 12 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

Number TICs found: 4 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	57-10-3	HEXADECANOIC ACID	12.16	~~400~~ ~~NJ~~ K	
2.		UNKNOWN	12.68	350	J
3.		UNKNOWN	17.63	590	J
4.		UNKNOWN	17.73	320	J
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EPA SAMPLE NO. 50

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 30.4(g/mL) G Lab File ID: DH406

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.7 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	450	U J
108-95-2	Phenol	450	U
111-44-4	bis(2-Chloroethyl)Ether	450	U
95-57-8	2-Chlorophenol	450	U
95-48-7	2-Methylphenol	450	U
108-60-1	2,2'-oxybis(1-Chloropropane)	450	U
98-86-2	Acetophenone	450	U
106-44-5	4-Methylphenol	450	U
621-64-7	N-Nitroso-di-n-propylamine	450	U
67-72-1	Hexachloroethane	450	U
98-95-3	Nitrobenzene	450	U
78-59-1	Isophorone	450	U
88-75-5	2-Nitrophenol	450	U
105-67-9	2,4-Dimethylphenol	450	U
111-91-1	bis(2-Chloroethoxy)methane	450	U
120-83-2	2,4-Dichlorophenol	450	U
91-20-3	Naphthalene	450	U
106-47-8	4-Chloroaniline	450	U
87-68-3	Hexachlorobutadiene	450	U
105-60-2	Caprolactam	450	U
59-50-7	4-Chloro-3-Methylphenol	450	U
91-57-6	2-Methylnaphthalene	450	U
77-47-4	Hexachlorocyclopentadiene	450	U
88-06-2	2,4,6-Trichlorophenol	450	U
95-95-4	2,4,5-Trichlorophenol	1100	U
92-52-4	1,1'-Biphenyl	450	U
91-58-7	2-Chloronaphthalene	450	U
88-74-4	2-Nitroaniline	1100	U
131-11-3	Dimethylphthalate	450	U
606-20-2	2,6-Dinitrotoluene	450	U
208-96-8	Acenaphthylene	450	U
99-09-2	3-Nitroaniline	1100	U
83-32-9	Acenaphthene	450	U

1D

EPA SAMPLE NO. 5/

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 30.4(g/mL) G Lab File ID: DH406

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.7 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1100	U
100-02-7	4-Nitrophenol	1100	U
132-64-9	Dibenzofuran	450	U
121-14-2	2,4-Dinitrotoluene	450	U
84-66-2	Diethylphthalate	450	U
86-73-7	Fluorene	450	U
7005-72-3	4-Chlorophenyl-phenylether	450	U
100-01-6	4-Nitroaniline	1100	U
534-52-1	4,6-Dinitro-2-methylphenol	1100	U
86-30-6	N-nitrosodiphenylamine (1)	450	U
101-55-3	4-Bromophenyl-phenylether	450	U
118-74-1	Hexachlorobenzene	450	U
1912-24-9	Atrazine	450	U
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	450	U
120-12-7	Anthracene	450	U
86-74-8	Carbazole	450	U
84-74-2	Di-n-butylphthalate	450	U
206-44-0	Fluoranthene	450	U
129-00-0	Pyrene	450	U
85-68-7	Butylbenzylphthalate	360	J
91-94-1	3,3'-Dichlorobenzidine	450	U
56-55-3	Benzo(a)anthracene	450	U
218-01-9	Chrysene	450	U
117-81-7	bis(2-Ethylhexyl)phthalate	2400	~~B~~ U
117-84-0	Di-n-octylphthalate	450	U
205-99-2	Benzo(b)fluoranthene	450	U
207-08-9	Benzo(k)fluoranthene	450	U
50-32-8	Benzo(a)pyrene	450	U
193-39-5	Indeno(1,2,3-cd)pyrene	450	U
53-70-3	Dibenzo(a,h)anthracene	450	U
191-24-2	Benzo(g,h,i)perylene	450	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 52

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 30.4 (g/mL) G Lab File ID: DH406

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 28 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.7 Extraction: (Type) SONC

Number TICs found: 3

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	57-10-3	HEXADECANOIC ACID	12.18	4500	~~NJ~~ K
2.	2091-29-4	9-HEXADECENOIC ACID	12.88	3100	NJ
3.		UNKNOWN	15.41	300	J
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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 53

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 30.5(g/mL) G Lab File ID: DH400

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 36 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.9 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	510	U 5
108-95-2	Phenol	510	U
111-44-4	bis(2-Chloroethyl)Ether	510	U
95-57-8	2-Chlorophenol	510	U
95-48-7	2-Methylphenol	510	U
108-60-1	2,2'-oxybis(1-Chloropropane)	510	U
98-86-2	Acetophenone	510	U
106-44-5	4-Methylphenol	510	U
621-64-7	N-Nitroso-di-n-propylamine	510	U
67-72-1	Hexachloroethane	510	U
98-95-3	Nitrobenzene	510	U
78-59-1	Isophorone	510	U
88-75-5	2-Nitrophenol	510	U
105-67-9	2,4-Dimethylphenol	510	U
111-91-1	bis(2-Chloroethoxy)methane	510	U
120-83-2	2,4-Dichlorophenol	510	U
91-20-3	Naphthalene	510	U
106-47-8	4-Chloroaniline	510	U
87-68-3	Hexachlorobutadiene	510	U
105-60-2	Caprolactam	510	U
59-50-7	4-Chloro-3-Methylphenol	510	U
91-57-6	2-Methylnaphthalene	510	U
77-47-4	Hexachlorocyclopentadiene	510	U
88-06-2	2,4,6-Trichlorophenol	510	U
95-95-4	2,4,5-Trichlorophenol	1300	U
92-52-4	1,1'-Biphenyl	510	U
91-58-7	2-Chloronaphthalene	510	U
88-74-4	2-Nitroaniline	1300	U
131-11-3	Dimethylphthalate	510	U
606-20-2	2,6-Dinitrotoluene	510	U
208-96-8	Acenaphthylene	510	U
99-09-2	3-Nitroaniline	1300	U
83-32-9	Acenaphthene	510	U

EPA SAMPLE NO. 54

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 30.5(g/mL) G Lab File ID: DH400

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 36 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.9 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1300	U
100-02-7	4-Nitrophenol	1300	U
132-64-9	Dibenzofuran	510	U
121-14-2	2,4-Dinitrotoluene	510	U
84-66-2	Diethylphthalate	510	U
86-73-7	Fluorene	510	U
7005-72-3	4-Chlorophenyl-phenylether	510	U
100-01-6	4-Nitroaniline	1300	U
534-52-1	4,6-Dinitro-2-methylphenol	1300	U
86-30-6	N-nitrosodiphenylamine (1)	510	U
101-55-3	4-Bromophenyl-phenylether	510	U
118-74-1	Hexachlorobenzene	510	U
1912-24-9	Atrazine	510	U
87-86-5	Pentachlorophenol	1300	U
85-01-8	Phenanthrene	510	U
120-12-7	Anthracene	510	U
86-74-8	Carbazole	510	U
84-74-2	Di-n-butylphthalate	150	J
206-44-0	Fluoranthene	510	U
129-00-0	Pyrene	110	J
85-68-7	Butylbenzylphthalate	500	J
91-94-1	3,3'-Dichlorobenzidine	510	U
56-55-3	Benzo(a)anthracene	74	J
218-01-9	Chrysene	110	J
117-81-7	bis(2-Ethylhexyl)phthalate	1900	B U
117-84-0	Di-n-octylphthalate	510	U
205-99-2	Benzo(b)fluoranthene	200	J
207-08-9	Benzo(k)fluoranthene	130	J
50-32-8	Benzo(a)pyrene	510	U
193-39-5	Indeno(1,2,3-cd)pyrene	510	U
53-70-3	Dibenzo(a,h)anthracene	510	U
191-24-2	Benzo(g,h,i)perylene	510	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 55

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 30.5 (g/mL) G Lab File ID: DH400

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 36 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.9 Extraction: (Type) SONC

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	9.14	460	J
2.	2387-78-2	3H-3A,7-METHANOAZULENE, 2,4,	9.37	900	NJ
3.					
4.					
5.					
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30.					

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EPA SAMPLE NO. 56

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 30.4(g/mL) G Lab File ID: DH404

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 10 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	360	U J
108-95-2	Phenol	360	U
111-44-4	bis(2-Chloroethyl)Ether	360	U
95-57-8	2-Chlorophenol	360	U
95-48-7	2-Methylphenol	360	U
108-60-1	2,2'-oxybis(1-Chloropropane)	360	U
98-86-2	Acetophenone	360	U
106-44-5	4-Methylphenol	360	U
621-64-7	N-Nitroso-di-n-propylamine	360	U
67-72-1	Hexachloroethane	360	U
98-95-3	Nitrobenzene	360	U
78-59-1	Isophorone	360	U
88-75-5	2-Nitrophenol	360	U
105-67-9	2,4-Dimethylphenol	360	U
111-91-1	bis(2-Chloroethoxy)methane	360	U
120-83-2	2,4-Dichlorophenol	360	U
91-20-3	Naphthalene	360	U
106-47-8	4-Chloroaniline	360	U
87-68-3	Hexachlorobutadiene	360	U
105-60-2	Caprolactam	360	U
59-50-7	4-Chloro-3-Methylphenol	360	U
91-57-6	2-Methylnaphthalene	360	U
77-47-4	Hexachlorocyclopentadiene	360	U
88-06-2	2,4,6-Trichlorophenol	360	U
95-95-4	2,4,5-Trichlorophenol	910	U
92-52-4	1,1'-Biphenyl	360	U
91-58-7	2-Chloronaphthalene	360	U
88-74-4	2-Nitroaniline	910	U
131-11-3	Dimethylphthalate	360	U
606-20-2	2,6-Dinitrotoluene	360	U
208-96-8	Acenaphthylene	360	U
99-09-2	3-Nitroaniline	910	U
83-32-9	Acenaphthene	360	U

1D

EPA SAMPLE NO. 57

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 30.4(g/mL) G Lab File ID: DH404

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 10 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	910	U
100-02-7	4-Nitrophenol	910	U
132-64-9	Dibenzofuran	360	U
121-14-2	2,4-Dinitrotoluene	360	U
84-66-2	Diethylphthalate	360	U
86-73-7	Fluorene	360	U
7005-72-3	4-Chlorophenyl-phenylether	360	U
100-01-6	4-Nitroaniline	910	U
534-52-1	4,6-Dinitro-2-methylphenol	910	U
86-30-6	N-nitrosodiphenylamine (1)	360	U
101-55-3	4-Bromophenyl-phenylether	360	U
118-74-1	Hexachlorobenzene	360	U
1912-24-9	Atrazine	360	U
87-86-5	Pentachlorophenol	910	U
85-01-8	Phenanthrene	360	U
120-12-7	Anthracene	360	U
86-74-8	Carbazole	360	U
84-74-2	Di-n-butylphthalate	360	U
206-44-0	Fluoranthene	360	U
129-00-0	Pyrene	360	U
85-68-7	Butylbenzylphthalate	220	J
91-94-1	3,3'-Dichlorobenzidine	360	U
56-55-3	Benzo(a)anthracene	360	U
218-01-9	Chrysene	360	U
117-81-7	bis(2-Ethylhexyl)phthalate	580	U
117-84-0	Di-n-octylphthalate	360	U
205-99-2	Benzo(b)fluoranthene	360	U
207-08-9	Benzo(k)fluoranthene	360	U
50-32-8	Benzo(a)pyrene	360	U
193-39-5	Indeno(1,2,3-cd)pyrene	360	U
53-70-3	Dibenzo(a,h)anthracene	360	U
191-24-2	Benzo(g,h,i)perylene	360	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 57

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 30.4 (g/mL) G Lab File ID: DH404

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 10 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8 Extraction: (Type) SONC

Number TICs found: 6 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	5.22	460	J
2.	57-10-3	HEXADECANOIC ACID	12.19	~~1700~~ NJ	
3.		UNKNOWN	12.75	340	J
4.		UNKNOWN	12.89	1100	J
5.		UNKNOWN	15.57	320	J
6.		UNKNOWN	18.30	490	J
7.					
8.					
9.					
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1C

EPA SAMPLE NO. 59

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 30.0(g/mL) G Lab File ID: DH401

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 46 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.5 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	610	U J
108-95-2	Phenol	610	U
111-44-4	bis(2-Chloroethyl)Ether	610	U
95-57-8	2-Chlorophenol	610	U
95-48-7	2-Methylphenol	610	U
108-60-1	2,2'-oxybis(1-Chloropropane)	610	U
98-86-2	Acetophenone	610	U
106-44-5	4-Methylphenol	610	U
621-64-7	N-Nitroso-di-n-propylamine	610	U
67-72-1	Hexachloroethane	610	U
98-95-3	Nitrobenzene	610	U
78-59-1	Isophorone	610	U
88-75-5	2-Nitrophenol	610	U
105-67-9	2,4-Dimethylphenol	610	U
111-91-1	bis(2-Chloroethoxy)methane	610	U
120-83-2	2,4-Dichlorophenol	610	U
91-20-3	Naphthalene	610	U
106-47-8	4-Chloroaniline	610	U
87-68-3	Hexachlorobutadiene	610	U
105-60-2	Caprolactam	610	U
59-50-7	4-Chloro-3-Methylphenol	610	U
91-57-6	2-Methylnaphthalene	610	U
77-47-4	Hexachlorocyclopentadiene	610	U
88-06-2	2,4,6-Trichlorophenol	610	U
95-95-4	2,4,5-Trichlorophenol	1500	U
92-52-4	1,1'-Biphenyl	610	U
91-58-7	2-Chloronaphthalene	610	U
88-74-4	2-Nitroaniline	1500	U
131-11-3	Dimethylphthalate	610	U
606-20-2	2,6-Dinitrotoluene	610	U
208-96-8	Acenaphthylene	610	U
99-09-2	3-Nitroaniline	1500	U
83-32-9	Acenaphthene	610	U

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 30.0(g/mL) G Lab File ID: DH401

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 46 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.5 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1500	U
100-02-7	4-Nitrophenol	1500	U
132-64-9	Dibenzofuran	610	U
121-14-2	2,4-Dinitrotoluene	610	U
84-66-2	Diethylphthalate	610	U
86-73-7	Fluorene	610	U
7005-72-3	4-Chlorophenyl-phenylether	610	U
100-01-6	4-Nitroaniline	1500	U
534-52-1	4,6-Dinitro-2-methylphenol	1500	U
86-30-6	N-nitrosodiphenylamine (1)	610	U
101-55-3	4-Bromophenyl-phenylether	610	U
118-74-1	Hexachlorobenzene	610	U
1912-24-9	Atrazine	610	U
87-86-5	Pentachlorophenol	1500	U
85-01-8	Phenanthrene	610	U
120-12-7	Anthracene	610	U
86-74-8	Carbazole	610	U
84-74-2	Di-n-butylphthalate	610	U
206-44-0	Fluoranthene	610	U
129-00-0	Pyrene	610	U
85-68-7	Butylbenzylphthalate	610	U
91-94-1	3,3'-Dichlorobenzidine	610	U
56-55-3	Benzo(a)anthracene	610	U
218-01-9	Chrysene	610	U
117-81-7	bis(2-Ethylhexyl)phthalate	610	U
117-84-0	Di-n-octylphthalate	610	U
205-99-2	Benzo(b)fluoranthene	610	U
207-08-9	Benzo(k)fluoranthene	610	U
50-32-8	Benzo(a)pyrene	610	U
193-39-5	Indeno(1,2,3-cd)pyrene	610	U
53-70-3	Dibenzo(a,h)anthracene	610	U
191-24-2	Benzo(g,h,i)perylene	610	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 61

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 30.0 (g/mL) G Lab File ID: DH401

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 46 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.5 Extraction: (Type) SONC

Number TICs found: 2 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	57-10-3	HEXADECANOIC ACID	12.17	2700	NJ
2.	2091-29-4	9-HEXADECENOIC ACID	12.87	3200	NJ
3.					
4.					
5.					
6.					
7.					
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EPA SAMPLE NO. 6-

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 30.5(g/mL) G Lab File ID: DH405

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 13 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	370	U J
108-95-2	Phenol	370	U
111-44-4	bis(2-Chloroethyl)Ether	370	U
95-57-8	2-Chlorophenol	370	U
95-48-7	2-Methylphenol	370	U
108-60-1	2,2'-oxybis(1-Chloropropane)	370	U
98-86-2	Acetophenone	370	U
106-44-5	4-Methylphenol	370	U
621-64-7	N-Nitroso-di-n-propylamine	370	U
67-72-1	Hexachloroethane	370	U
98-95-3	Nitrobenzene	370	U
78-59-1	Isophorone	370	U
88-75-5	2-Nitrophenol	370	U
105-67-9	2,4-Dimethylphenol	370	U
111-91-1	bis(2-Chloroethoxy)methane	370	U
120-83-2	2,4-Dichlorophenol	370	U
91-20-3	Naphthalene	370	U
106-47-8	4-Chloroaniline	370	U
87-68-3	Hexachlorobutadiene	370	U
105-60-2	Caprolactam	370	U
59-50-7	4-Chloro-3-Methylphenol	370	U
91-57-6	2-Methylnaphthalene	370	U
77-47-4	Hexachlorocyclopentadiene	370	U
88-06-2	2,4,6-Trichlorophenol	370	U
95-95-4	2,4,5-Trichlorophenol	940	U
92-52-4	1,1'-Biphenyl	370	U
91-58-7	2-Chloronaphthalene	370	U
88-74-4	2-Nitroaniline	940	U
131-11-3	Dimethylphthalate	370	U
606-20-2	2,6-Dinitrotoluene	370	U
208-96-8	Acenaphthylene	370	U
99-09-2	3-Nitroaniline	940	U
83-32-9	Acenaphthene	370	U

1D

EPA SAMPLE NO. 63

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 30.5(g/mL) G Lab File ID: DH405

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 13 Decanted: (Y/N)N Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	940	U
100-02-7	4-Nitrophenol	940	U
132-64-9	Dibenzofuran	370	U
121-14-2	2,4-Dinitrotoluene	370	U
84-66-2	Diethylphthalate	370	U
86-73-7	Fluorene	370	U
7005-72-3	4-Chlorophenyl-phenylether	370	U
100-01-6	4-Nitroaniline	940	U
534-52-1	4,6-Dinitro-2-methylphenol	940	U
86-30-6	N-nitrosodiphenylamine (1)	370	U
101-55-3	4-Bromophenyl-phenylether	370	U
118-74-1	Hexachlorobenzene	370	U
1912-24-9	Atrazine	370	U
87-86-5	Pentachlorophenol	940	U
85-01-8	Phenanthrene	370	U
120-12-7	Anthracene	370	U
86-74-8	Carbazole	370	U
84-74-2	Di-n-butylphthalate	370	U
206-44-0	Fluoranthene	370	U
129-00-0	Pyrene	370	U
85-68-7	Butylbenzylphthalate	370	U
91-94-1	3,3'-Dichlorobenzidine	370	U
56-55-3	Benzo(a)anthracene	370	U
218-01-9	Chrysene	370	U
117-81-7	bis(2-Ethylhexyl)phthalate	180	JB
117-84-0	Di-n-octylphthalate	370	U
205-99-2	Benzo(b)fluoranthene	370	U
207-08-9	Benzo(k)fluoranthene	370	U
50-32-8	Benzo(a)pyrene	370	U
193-39-5	Indeno(1,2,3-cd)pyrene	370	U
53-70-3	Dibenzo(a,h)anthracene	370	U
191-24-2	Benzo(g,h,i)perylene	370	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 64

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 30.5 (g/mL) G Lab File ID: DH405

Level: (low/med) LOW Date Received: 05/18/04

% Moisture: 13 Decanted: (Y/N) N Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/27/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2 Extraction: (Type) SONC

Number TICs found: 1 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	57-10-3	HEXADECANOIC ACID	12.17	1200	NJ
2.					
3.					
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25.					
26.					
27.					
28.					
29.					
30.					

EPA SAMPLE NO. 65

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SBLKDM

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: S0520-B1D

Sample wt/vol: 30.0(g/mL) G Lab File ID: DH340

Level: (low/med) LOW Date Received: _____

% Moisture: _____ Decanted: (Y/N)___ Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/25/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
100-52-7	Benzaldehyde	330	U
108-95-2	Phenol	330	U
111-44-4	bis(2-Chloroethyl)Ether	330	U
95-57-8	2-Chlorophenol	330	U
95-48-7	2-Methylphenol	330	U
108-60-1	2,2'-oxybis(1-Chloropropane)	330	U
98-86-2	Acetophenone	330	U
106-44-5	4-Methylphenol	330	U
621-64-7	N-Nitroso-di-n-propylamine	330	U
67-72-1	Hexachloroethane	330	U
98-95-3	Nitrobenzene	330	U
78-59-1	Isophorone	330	U
88-75-5	2-Nitrophenol	330	U
105-67-9	2,4-Dimethylphenol	330	U
111-91-1	bis(2-Chloroethoxy)methane	330	U
120-83-2	2,4-Dichlorophenol	330	U
91-20-3	Naphthalene	330	U
106-47-8	4-Chloroaniline	330	U
87-68-3	Hexachlorobutadiene	330	U
105-60-2	Caprolactam	330	U
59-50-7	4-Chloro-3-Methylphenol	330	U
91-57-6	2-Methylnaphthalene	330	U
77-47-4	Hexachlorocyclopentadiene	330	U
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	830	U
92-52-4	1,1'-Biphenyl	330	U
91-58-7	2-Chloronaphthalene	330	U
88-74-4	2-Nitroaniline	830	U
131-11-3	Dimethylphthalate	330	U
606-20-2	2,6-Dinitrotoluene	330	U
208-96-8	Acenaphthylene	330	U
99-09-2	3-Nitroaniline	830	U
83-32-9	Acenaphthene	330	U

1D

EPA SAMPLE NO. SBLKDM

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: S0520-B1D

Sample wt/vol: 30.0(g/mL) G Lab File ID: DH340

Level: (low/med) LOW Date Received: _____

% Moisture: _____ Decanted: (Y/N)___ Date Extracted: 05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/25/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	830	U
100-02-7	4-Nitrophenol	830	U
132-64-9	Dibenzofuran	330	U
121-14-2	2,4-Dinitrotoluene	330	U
84-66-2	Diethylphthalate	330	U
86-73-7	Fluorene	330	U
7005-72-3	4-Chlorophenyl-phenylether	330	U
100-01-6	4-Nitroaniline	830	U
534-52-1	4,6-Dinitro-2-methylphenol	830	U
86-30-6	N-nitrosodiphenylamine (1)	330	U
101-55-3	4-Bromophenyl-phenylether	330	U
118-74-1	Hexachlorobenzene	330	U
1912-24-9	Atrazine	330	U
87-86-5	Pentachlorophenol	830	U
85-01-8	Phenanthrene	330	U
120-12-7	Anthracene	330	U
86-74-8	Carbazole	330	U
84-74-2	Di-n-butylphthalate	330	U
206-44-0	Fluoranthene	330	U
129-00-0	Pyrene	330	U
85-68-7	Butylbenzylphthalate	330	U
91-94-1	3,3'-Dichlorobenzidine	330	U
56-55-3	Benzo(a)anthracene	330	U
218-01-9	Chrysene	330	U
117-81-7	bis(2-Ethylhexyl)phthalate	150	J
117-84-0	Di-n-octylphthalate	330	U
205-99-2	Benzo(b)fluoranthene	330	U
207-08-9	Benzo(k)fluoranthene	330	U
50-32-8	Benzo(a)pyrene	330	U
193-39-5	Indeno(1,2,3-cd)pyrene	330	U
53-70-3	Dibenzo(a,h)anthracene	330	U
191-24-2	Benzo(g,h,i)perylene	330	U

(1) - Cannot be separated from Diphenylamine

1G

EPA SAMPLE NO. 67

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SBLKDM

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: S0520-B1D

Sample wt/vol: 30.0 (g/mL) G Lab File ID: DH340

Level: (low/med) LOW Date Received: _____

% Moisture: _____ Decanted: (Y/N)___ Date Extracted:05/20/04

Concentrated Extract Volume: 500(uL) Date Analyzed: 05/25/04

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Extraction: (Type) SONC

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
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30.					

EPA SAMPLE NO. 68

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ91

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-01

Sample wt/vol: 30.0(g/mL) G Lab File ID: _____

% Moisture: 19 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.7 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.1	U
319-85-7	beta-BHC	2.1	U
319-86-8	delta-BHC	2.1	U
58-89-9	gamma-BHC (Lindane)	2.1	U
76-44-8	Heptachlor	2.1	U
309-00-2	Aldrin	2.1	U
1024-57-3	Heptachlor epoxide	2.1	U
959-98-8	Endosulfan I	2.1	U
60-57-1	Dieldrin	4.1	U
72-55-9	4,4'-DDE	15	
72-20-8	Endrin	4.1	U
33213-65-9	Endosulfan II	4.1	U
72-54-8	4,4'-DDD	4.1	U
1031-07-8	Endosulfan sulfate	4.1	U
50-29-3	4,4'-DDT	30	~~PB~~ UJ
72-43-5	Methoxychlor	21	U
53494-70-5	Endrin ketone	4.1	U
7421-93-4	Endrin aldehyde	4.1	U
5103-71-9	alpha-Chlordane	2.1	U
5103-74-2	gamma-Chlordane	2.1	U
8001-35-2	Toxaphene	210	U
12674-11-2	Aroclor-1016	41	U
11104-28-2	Aroclor-1221	83	U
11141-16-5	Aroclor-1232	41	U
53469-21-9	Aroclor-1242	41	U
12672-29-6	Aroclor-1248	41	U
11097-69-1	Aroclor-1254	41	U
11096-82-5	Aroclor-1260	67	

1E

EPA SAMPLE NO. 04

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ92

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-02

Sample wt/vol: 30.1(g/mL) G Lab File ID: _____

% Moisture: 28 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.3 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.4	U
319-85-7	beta-BHC	2.4	U
319-86-8	delta-BHC	2.4	U
58-89-9	gamma-BHC (Lindane)	2.4	U
76-44-8	Heptachlor	2.4	U
309-00-2	Aldrin	2.4	U
1024-57-3	Heptachlor epoxide	2.4	U
959-98-8	Endosulfan I	2.4	U
60-57-1	Dieldrin	4.6	U
72-55-9	4,4'-DDE	17	
72-20-8	Endrin	4.6	U
33213-65-9	Endosulfan II	4.6	U
72-54-8	4,4'-DDD	4.6	U
1031-07-8	Endosulfan sulfate	4.6	U
50-29-3	4,4'-DDT	9.3	~~PB~~ UJ
72-43-5	Methoxychlor	24	U
53494-70-5	Endrin ketone	4.6	U
7421-93-4	Endrin aldehyde	4.6	U
5103-71-9	alpha-Chlordane	2.4	U
5103-74-2	gamma-Chlordane	2.4	U
8001-35-2	Toxaphene	240	U
12674-11-2	Aroclor-1016	46	U
11104-28-2	Aroclor-1221	93	U
11141-16-5	Aroclor-1232	46	U
53469-21-9	Aroclor-1242	46	U
12672-29-6	Aroclor-1248	46	U
11097-69-1	Aroclor-1254	46	U
11096-82-5	Aroclor-1260	53	

1E

EPA SAMPLE NO. 70

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-03

Sample wt/vol: 30.4(g/mL) G Lab File ID: _____

% Moisture: 64 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.4 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
319-84-6	alpha-BHC	4.7	U	
319-85-7	beta-BHC	4.7	U	
319-86-8	delta-BHC	4.7	U	
58-89-9	gamma-BHC (Lindane)	4.7	U	
76-44-8	Heptachlor	4.7	U	
309-00-2	Aldrin	4.7	U	
1024-57-3	Heptachlor epoxide	4.7	U	
959-98-8	Endosulfan I	4.7	U	
60-57-1	Dieldrin	21		
72-55-9	4,4'-DDE	280 ~~290~~	EP UJ	*
72-20-8	Endrin	9.0	U	
33213-65-9	Endosulfan II	9.0	U	
72-54-8	4,4'-DDD	9.0	U	
1031-07-8	Endosulfan sulfate	9.0	U	
50-29-3	4,4'-DDT	120 ~~150~~	EB UJ	*
72-43-5	Methoxychlor	47	U	
53494-70-5	Endrin ketone	9.0	U	
7421-93-4	Endrin aldehyde	9.0	U	
5103-71-9	alpha-Chlordane	4.7	U	
5103-74-2	gamma-Chlordane	4.7	U	
8001-35-2	Toxaphene	470	U	
12674-11-2	Aroclor-1016	90	U	
11104-28-2	Aroclor-1221	180	U	
11141-16-5	Aroclor-1232	90	U	
53469-21-9	Aroclor-1242	90	U	
12672-29-6	Aroclor-1248	90	U	
11097-69-1	Aroclor-1254	90	U	
11096-82-5	Aroclor-1260	53	JP	

* From BQQ73DL

1E

EPA SAMPLE NO. 71

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ94
Dup - BQQ93

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-04

Sample wt/vol: 30.2(g/mL) G Lab File ID: _____

% Moisture: 12 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC (Lindane)	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	5.1	
72-55-9	4,4'-DDE	91 ~~82~~	~~E~~ X
72-20-8	Endrin	3.7	U
33213-65-9	Endosulfan II	3.7	U
72-54-8	4,4'-DDD	3.7	U
1031-07-8	Endosulfan sulfate	3.7	U
50-29-3	4,4'-DDT	42	~~B~~ U
72-43-5	Methoxychlor	19	U
53494-70-5	Endrin ketone	3.7	U
7421-93-4	Endrin aldehyde	3.7	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	190	U
12674-11-2	Aroclor-1016	37	U
11104-28-2	Aroclor-1221	76	U
11141-16-5	Aroclor-1232	37	U
53469-21-9	Aroclor-1242	37	U
12672-29-6	Aroclor-1248	37	U
11097-69-1	Aroclor-1254	37	U
11096-82-5	Aroclor-1260	28	J

* From BQQ94DL

1E
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 72

BQQ95

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-05

Sample wt/vol: 30.0 (g/mL) G Lab File ID: _____

% Moisture: 28 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 05/28/04

Injection Volume: 1.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.7 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.4	U
319-85-7	beta-BHC	2.4	U
319-86-8	delta-BHC	2.4	U
58-89-9	gamma-BHC (Lindane)	2.4	U
76-44-8	Heptachlor	2.4	U
309-00-2	Aldrin	2.4	U
1024-57-3	Heptachlor epoxide	2.4	U
959-98-8	Endosulfan I	2.4	U
60-57-1	Dieldrin	22	
72-55-9	4,4'-DDE	180 ~~130~~	~~E~~ *
72-20-8	Endrin	4.6	U
33213-65-9	Endosulfan II	4.6	U
72-54-8	4,4'-DDD	27	
1031-07-8	Endosulfan sulfate	4.6	U
50-29-3	4,4'-DDT	180 ~~170~~	~~E~~ BUJ
72-43-5	Methoxychlor	24	U
53494-70-5	Endrin ketone	4.6	U
7421-93-4	Endrin aldehyde	4.6	U
5103-71-9	alpha-Chlordane	3.5	~~P~~ J
5103-74-2	gamma-Chlordane	3.2	~~P~~ JN
8001-35-2	Toxaphene	240	U
12674-11-2	Aroclor-1016	46	U
11104-28-2	Aroclor-1221	93	U
11141-16-5	Aroclor-1232	46	U
53469-21-9	Aroclor-1242	46	U
12672-29-6	Aroclor-1248	46	U
11097-69-1	Aroclor-1254	46	U
11096-82-5	Aroclor-1260	52	~~P~~ J

* From BQQ95DL

558
Jmaulsh
~~554~~

1E

EPA SAMPLE NO. 93

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ96

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-06

Sample wt/vol: 30.3(g/mL) G Lab File ID: _____

% Moisture: 36 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.9 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.6	U
319-85-7	beta-BHC	2.6	U
319-86-8	delta-BHC	2.6	U
58-89-9	gamma-BHC (Lindane)	2.6	U
76-44-8	Heptachlor	2.6	U
309-00-2	Aldrin	2.6	U
1024-57-3	Heptachlor epoxide	2.6	U
959-98-8	Endosulfan I	2.6	U
60-57-1	Dieldrin	5.7	
72-55-9	4,4'-DDE	260 ~~210~~	~~DP~~ X
72-20-8	Endrin	5.1	U
33213-65-9	Endosulfan II	5.1	U
72-54-8	4,4'-DDD	20	
1031-07-8	Endosulfan sulfate	5.1	U
50-29-3	4,4'-DDT	35	~~P~~ BQJ
72-43-5	Methoxychlor	26	U
53494-70-5	Endrin ketone	5.1	U
7421-93-4	Endrin aldehyde	5.1	U
5103-71-9	alpha-Chlordane	3.1	
5103-74-2	gamma-Chlordane	4.0	~~P~~ J
8001-35-2	Toxaphene	260	U
12674-11-2	Aroclor-1016	51	U
11104-28-2	Aroclor-1221	100	U
11141-16-5	Aroclor-1232	51	U
53469-21-9	Aroclor-1242	51	U
12672-29-6	Aroclor-1248	51	U
11097-69-1	Aroclor-1254	51	U
11096-82-5	Aroclor-1260	100	~~P~~ J

* From BQQ96DL

1E

EPA SAMPLE NO. 74

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ97

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-07

Sample wt/vol: 30.5(g/mL) G Lab File ID: _____

% Moisture: 10 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC (Lindane)	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	3.6	U
72-55-9	4,4'-DDE	4.5	
72-20-8	Endrin	3.6	U
33213-65-9	Endosulfan II	3.6	U
72-54-8	4,4'-DDD	3.6	U
1031-07-8	Endosulfan sulfate	3.6	U
50-29-3	4,4'-DDT	6.9	~~B~~ UJ
72-43-5	Methoxychlor	19	U
53494-70-5	Endrin ketone	3.6	U
7421-93-4	Endrin aldehyde	3.6	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	2.4	
8001-35-2	Toxaphene	190	U
12674-11-2	Aroclor-1016	36	U
11104-28-2	Aroclor-1221	73	U
11141-16-5	Aroclor-1232	36	U
53469-21-9	Aroclor-1242	36	U
12672-29-6	Aroclor-1248	36	U
11097-69-1	Aroclor-1254	36	U
11096-82-5	Aroclor-1260	36	U

EPA SAMPLE NO. 35

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ98

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-08

Sample wt/vol: 30.0(g/mL) G Lab File ID: _____

% Moisture: 46 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.5 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	3.1	U
319-85-7	beta-BHC	3.1	U
319-86-8	delta-BHC	3.1	U
58-89-9	gamma-BHC (Lindane)	3.1	U
76-44-8	Heptachlor	3.1	U
309-00-2	Aldrin	3.1	U
1024-57-3	Heptachlor epoxide	3.1	U
959-98-8	Endosulfan I	3.1	U
60-57-1	Dieldrin	6.1	U
72-55-9	4,4'-DDE	6.1	U
72-20-8	Endrin	6.1	U
33213-65-9	Endosulfan II	6.1	U
72-54-8	4,4'-DDD	6.1	U
1031-07-8	Endosulfan sulfate	6.1	U
50-29-3	4,4'-DDT	6.1	U
72-43-5	Methoxychlor	31	U
53494-70-5	Endrin ketone	6.1	U
7421-93-4	Endrin aldehyde	6.1	U
5103-71-9	alpha-Chlordane	3.1	U
5103-74-2	gamma-Chlordane	3.1	U
8001-35-2	Toxaphene	310	U
12674-11-2	Aroclor-1016	61	U
11104-28-2	Aroclor-1221	120	U
11141-16-5	Aroclor-1232	61	U
53469-21-9	Aroclor-1242	61	U
12672-29-6	Aroclor-1248	61	U
11097-69-1	Aroclor-1254	61	U
11096-82-5	Aroclor-1260	61	U

EPA SAMPLE NO. 76

PESTICIDE ORGANICS ANALYSIS DATA SHEET

BQQ99

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: 040415-09

Sample wt/vol: 30.5(g/mL) G Lab File ID: _____

% Moisture: 13 Decanted: (Y/N) N Date Received: 05/18/04

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC (Lindane)	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	3.7	U
72-55-9	4,4'-DDE	3.7	U
72-20-8	Endrin	3.7	U
33213-65-9	Endosulfan II	3.7	U
72-54-8	4,4'-DDD	3.7	U
1031-07-8	Endosulfan sulfate	3.7	U
50-29-3	4,4'-DDT	3.7	U
72-43-5	Methoxychlor	19	U
53494-70-5	Endrin ketone	3.7	U
7421-93-4	Endrin aldehyde	3.7	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	190	U
12674-11-2	Aroclor-1016	37	U
11104-28-2	Aroclor-1221	76	U
11141-16-5	Aroclor-1232	37	U
53469-21-9	Aroclor-1242	37	U
12672-29-6	Aroclor-1248	37	U
11097-69-1	Aroclor-1254	37	U
11096-82-5	Aroclor-1260	37	U

1E

EPA SAMPLE NO. 77

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PBLK01

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: P0520-B2

Sample wt/vol: 30.0(g/mL) G Lab File ID: _____

% Moisture: 0 Decanted: (Y/N) N Date Received: _____

Extraction: (Type) SONC Date Extracted: 05/20/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	7.8	
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	170	U
12674-11-2	Aroclor-1016	33	U
11104-28-2	Aroclor-1221	67	U
11141-16-5	Aroclor-1232	33	U
53469-21-9	Aroclor-1242	33	U
12672-29-6	Aroclor-1248	33	U
11097-69-1	Aroclor-1254	33	U
11096-82-5	Aroclor-1260	33	U

1E

EPA SAMPLE NO. 95

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PBLK02

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) SOIL Lab Sample ID: P0607-B4

Sample wt/vol: 30.0(g/mL) G Lab File ID: _____

% Moisture: 0 Decanted: (Y/N) N Date Received: _____

Extraction: (Type) SONC Date Extracted: 06/07/04

Concentrated Extract Volume: 5000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.7	U
319-85-7	beta-BHC	1.7	U
319-86-8	delta-BHC	1.7	U
58-89-9	gamma-BHC (Lindane)	1.7	U
76-44-8	Heptachlor	1.7	U
309-00-2	Aldrin	1.7	U
1024-57-3	Heptachlor epoxide	1.7	U
959-98-8	Endosulfan I	1.7	U
60-57-1	Dieldrin	3.3	U
72-55-9	4,4'-DDE	3.3	U
72-20-8	Endrin	3.3	U
33213-65-9	Endosulfan II	3.3	U
72-54-8	4,4'-DDD	3.3	U
1031-07-8	Endosulfan sulfate	3.3	U
50-29-3	4,4'-DDT	3.3	U
72-43-5	Methoxychlor	17	U
53494-70-5	Endrin ketone	3.3	U
7421-93-4	Endrin aldehyde	3.3	U
5103-71-9	alpha-Chlordane	1.7	U
5103-74-2	gamma-Chlordane	1.7	U
8001-35-2	Toxaphene	170	U
12674-11-2	Aroclor-1016	33	U
11104-28-2	Aroclor-1221	67	U
11141-16-5	Aroclor-1232	33	U
53469-21-9	Aroclor-1242	33	U
12672-29-6	Aroclor-1248	33	U
11097-69-1	Aroclor-1254	33	U
11096-82-5	Aroclor-1260	33	U

1E

EPA SAMPLE NO. 79

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0A

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0A

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/21/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 80

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0C

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0C

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 91

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0D

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0D

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 2

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0E

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 73

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0F

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0F

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0G

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0G

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) _____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/29/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK0H

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0H

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/30/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO.

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0J

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0J

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/30/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK0K

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0K

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/09/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK0L

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0L

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) _____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 39

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0M

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0M

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 90

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0N

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0N

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

EPA SAMPLE NO. 91

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0P

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0P

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/11/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 92

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0Q

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0Q

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 93

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0R

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0R

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 94

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0S

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0S

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

EPA SAMPLE NO. 95

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0T

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0T

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/13/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 96

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0U

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0U

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 27

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK0V

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0V

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

EPA SAMPLE NO. PIBLK0W

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK0W

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. 79

PIBLK1A

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1A

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/21/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 00

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1C

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1C

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/27/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 101

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1D

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1D

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 102

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1E

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1E

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 103

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1F

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1F

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/28/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

EPA SAMPLE NO. PIBLK1G

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1G

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/29/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK1H

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1H

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/30/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK1J

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1J

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 05/30/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 107

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1K

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1K

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/09/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 07

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1L

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1L

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 104

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1M

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1M

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 110

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1N

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1N

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/10/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

EPA SAMPLE NO. PIBLK1P

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1P

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/11/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. PIBLK1Q

PESTICIDE ORGANICS ANALYSIS DATA SHEET

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1Q

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 113

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1R

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1R

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: __.__ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 114

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1S

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1S

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/12/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 115

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1T

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1T

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/13/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 11

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1U

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1U

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 17

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1V

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1V

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1E

EPA SAMPLE NO. 1/3

PESTICIDE ORGANICS ANALYSIS DATA SHEET

PIBLK1W

Lab Name: CEIMIC CORP Contract: 68-W-03-018

Lab Code: CEIMIC Case No.: 32903 SAS No.: SDG No.: BQQ91

Matrix: (soil/water) WATER Lab Sample ID: PIBLK1W

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ Decanted: (Y/N) ___ Date Received: _____

Extraction: (Type) ____ Date Extracted:

Concentrated Extract Volume: 10000(uL) Date Analyzed: 06/14/04

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: _____ Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

I. Functional Guidelines for Evaluating Organic Analysis

CASE # 32903 SDG #BQQ91
LAB:CEIMIC SITE: Celia's Laundry

The current Functional Guidelines for evaluating organic data have been applied.

All data are valid and acceptable except those analytes which have been qualified with a "J" (estimated), "N" (presumptive evidence for the presence of the material), "U" (non-detects), "R" (unusable), or "JN" (presumptive evidence for the presence of the material at an estimated value). All action is detailed on the attached sheets.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Analytical data qualified as "JN" or "R" may not be used to demonstrate compliance with Toxicity Characteristic or Land Ban Regulations.

Reviewer's Signature: David Rosenberg **Date:** 08 /12 /2004

Verified By: **Date:** 8/25/2004

1. HOLDING TIMES:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following analytes in the samples shown were qualified because of holding time:

Qualification: Holding Time **Protocol: VOA**

No defects found.

Qualification: Holding Time
Protocol: BNA

No defects found.

Qualification: Holding Time
Protocol: PES

DC-4 The following pesticide soil samples are outside primary extraction holding time criteria. **Hits are qualified "J" and non-detects are qualified "UJ".**

BQQ91RE, BQQ92RE, BQQ93RE, BQQ93REDL, BQQ94RE, BQQ94REDL, BQQ95MS, BQQ95MSD,
BQQ95RE, BQQ95REDL, BQQ96RE, BQQ96REDL, BQQ97RE, BQQ99RE

Note: If properly preserved, aqueous samples maintained at 4°C must be analyzed within fourteen (14) days of collection. If unpreserved, aqueous samples must be analyzed within seven (7) days for aromatic hydrocarbons. Soil/Solid samples must be analyzed within ten (10) days of collection.

2. BLANK CONTAMINATION:

Quality Assurance (QA) blanks [i.e., method, trip, field or rinse blanks] are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the samples shown were qualified with "U" for these reasons:

A) Method Blank Contamination

Qualification: Laboratory Blanks Protocol: VOA

DC-6 The following volatile samples have analyte concentrations reported above the CRQL and less than or equal to ten times (10X) the associated method blank concentration. Hits are qualified "U" and non-detects are not flagged.

Methylene Chloride
BQQ94, BQQ95, BQQ98MS, BQQ98MSD

DC-13 The following volatile samples have analyte concentrations reported below the CRQL and less than or equal to ten times (10X) the associated method blank concentration. Reported sample concentrations have been elevated to the CRQL. Hits are qualified "U" and non-detects are not flagged.

Methylene Chloride
BQQ91, BQQ92, BQQ93, BQQ96, BQQ97, BQQ98, BQQ99

DC-19 The following volatile samples are associated with a contaminated storage blank. Hits are qualified "U" and non-detects are not flagged.

Methylene Chloride
BQQ91, BQQ92, BQQ93, BQQ94, BQQ95, BQQ96, BQQ97, BQQ98, BQQ98MS, BQQ98MSD, BQQ99

VOA - The following TICs were rejected "R" in the indicated samples due to detection in the associated method blank:

	TIC	Associated Method Blank	Associated Samples
BNA	**naphthalene**	**BQQ92**	
	hexadecanoic acid	**BQQ91, BQQ92, BQQ94, BQQ95, BQQ97**	

Qualification: Laboratory Blanks Protocol: BNA

DC-6 The following semivolatile samples have analyte concentrations reported above the CRQL and less than or equal to ten times (10X) the associated method blank concentration. Hits are qualified "U" and non-detects are not flagged.

bis(2-Ethylhexyl)phthalate
BQQ91, BQQ92, BQQ97

DC-10 The following semivolatile samples have analyte concentrations reported below the CRQL and less than or equal to ten times (10X) the associated method blank concentration. Reported

sample concentrations have been elevated to the CRQL. Hits are qualified "U" and non-detects are not flagged.

bis(2-Ethylhexyl)phthalate
BQQ93, BQQ94, BQQ99

Qualification: Laboratory Blanks **Protocol: PES**

The narrative relates that the lab equipment was contaminated by a previous group of samples very high in DDT. All the samples in SDG BQQ91 have been judged to be contaminated by this event in spite of the lab's efforts to clean up. The lab re-extracted the samples but exceeded the technical holding time. (See part 11. For further comments)

2. BLANK CONTAMINATION (continued):

B) Field or Rinse Blank Contamination ("water blanks" or "distilled water blanks" are validated like any other sample)

VOA - The following compounds were qualified as non-detected "U" in the associated samples due to rinse blank contamination:

Compound Associated Samples

No problems found.

C) Trip Blank Contamination

VOA - The following compounds were qualified as non-detected "U" in the associated samples due to trip blank contamination:

Compound Associated Samples

No problems found.

D) TIC Blank Contamination

VOA/BNA - The following TIC common laboratory contaminants were rejected "R" in the associated samples because the levels detected are either < 100 *u*g/L for aqueous samples or < 4000 *u*g/Kg for soil/sediment samples:

Fraction TIC Associated Samples

VOA **No problems found.**

VOA/BNA - The following TIC contaminants were rejected "R" in the indicated samples because these compounds are target TCL compounds also present in the associated volatile or semi-volatile fraction analyses:

Fraction TIC Samples

No problems were found.

Note: TIC compounds associated with a "best match" spectra and CAS

number were qualified as presumptive evidence of a compound at an estimated value "JN" by the data reviewer. TICs not associated with a CAS number were qualified as estimated "J" by the data reviewer in the sample data.

3. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds, and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is bromofluorobenzene (BFB) and for semi-volatiles is decafluorotriphenyl-phosphine (DFTPP).

If the mass calibration is in error or missing, all associated data will be classified as unusable "R". The following samples shown were qualified with "R" because of tuning:

Qualification: IPC/Tune **Protocol: VOA**

No defects found.

Qualification: IPC/Tune **Protocol: BNA**

No defects found.

4. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

Response Factor:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the VOA/BNA Target Compound List (TCL) must be ≥ 0.05 in both the initial and continuing calibrations. A value ≤ 0.05 indicates a serious detection and quantitation problem (poor sensitivity). If the mean RRF of the initial calibration or the continuing calibration has a response factor <0.05 for any analyte, those analytes detected in environmental samples will be qualified as estimated "J". All non-detects for those compounds will be rejected "R". The following analytes in the samples shown were qualified because of response factor: Initial Calibration

VOA - The following compounds were either qualified as estimated "J" (positive values only) or "R" for non-detects in the associated samples because the Initial Calibration Mean RRF value is < 0.05:

Compound Associated Sample(s)

no problems found

5. CALIBRATION:

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 30% and % D must be < 25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If % RSD and % D grossly exceed QC criteria, non-detects data may be qualified "R".

The following analytes in the samples shown were qualified for %RSD and %D:

Initial Calibration

VOA -:

DC-9 The following volatile samples are associated with a continuing calibration relative response factor (RRF50) outside primary criteria. Hits are flagged "J" and non-detects are not qualified.

1,2-Dibromo-3-chloropropane
BQQ91, BQQ92, BQQ93, BQQ94, BQQ95, BQQ96, BQQ97, BQQ98, BQQ98MS, BQQ98MSD, BQQ99, VBLKOX, VBLKOY, VHBLK01

Qualification: Calibrations **Protocol: BNA**

DC-9 The following semivolatile samples are associated with a continuing calibration whose corresponding initial calibration has percent relative standard deviation (%RSD) outside primary criteria. Hits are qualified "J" and non-detects are not flagged.

Benzaldehyde
SBLKDM

Qualification: Calibrations
Protocol: PES

No defects found.

Continuing Calibration:

VOA - The following compounds were qualified as estimated "J" because the Continuing Calibration %D is between 25-90% when the RRF50 is > 0.05:

Qualification: Calibrations **Protocol: VOA**

DC-8 The following volatile samples are associated with a continuing percent difference (%D) outside primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

Trichlorofluoromethane
BQQ98MS, VBLKOY, VHBLK01

1,1,2-Trichloro-1,2,2-trifluoroethane
BQQ98MS, VBLKOY, VHBLK01

Carbon Disulfide
BQQ98MS, VBLKOY, VHBLK01

trans-1,2-Dichloroethane
BQQ98MS, VBLKOY, VHBLK01

DC-11 The following semivolatile samples are associated with a continuing calibration percent
difference (%D) outside primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

Benzaldehyde
BQQ91, BQQ92, BQQ93, BQQ94, BQQ95, BQQ96, BQQ97, BQQ98, BQQ98MS, BQQ98MSD, BQQ99

2,4-Dinitrophenol
SBLKDM

6. SURROGATES/SYSTEM MONITORING COMPOUNDS (SMC):

All samples are spiked with surrogate/SMC compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate/SMC concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below. The following analytes for the samples shown were qualified because of surrogate/SMC recovery:

VOA - The following compounds were either qualified as estimated "J" or rejected "R" due to surrogate recovery outside specified QC limits:

Qualification: SMC **Protocol: VOA**

No defects found.

Qualification: Surrogate
Protocol: BNA

No defects found.

Qualification: Surrogate
Protocol: PES

DC-2 The following pesticide samples have surrogate percent recoveries which exceed the upper limit of the criteria window. If %R for both both surrogates on both column are > contract limit, hits are flagged "J".

BQQ91, BQQ91RE, BQQ93, BQQ93DL, BQQ93RE, BQQ93REDL, BQQ94, BQQ94DL, BQQ94RE, BQQ94REDL, BQQ95, BQQ95DL, BQQ95MS, BQQ95MSD, BQQ95RE, BQQ95REDL, BQQ96,

BQQ96DL, BQQ96RE, BQQ96REDL, BQQ97, BQQ97RE

DC-5 The following pesticide samples have surrogate percent recoveries outside the lower limit of the criteria window, but greater than 10%. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ97RE

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to 100%) from the associated continuing calibration standard. If the area count is outside the -50% to 100% range of the associated standard, then all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects as "UJ". If the IS area is > 25% (a severe loss of sensitivity) then all non-detects associated with that IS are qualified as "R" and all positive results for compounds quantitated using that IS are qualified as estimated "J".

The retention time of the internal standard must not vary more than ± 30 seconds from the associated continuing calibration standard. If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction. The following analytes in the samples shown were qualified because of internal standard performance:

VOA The following compounds were either qualified as estimated "J" or rejected "R" in the associated samples due to exceeding Internal Standard (IS) QC criteria (within -50% to +100% of the Continuing Calibration 12-hour standard):

Internal Standard	Percent IS Area Count of the 12-Hour Standard	Qualifier	Sample(s)

Qualification: Internal Standards **Protocol: VOA**

No defects found.

Qualification: Internal Standards **Protocol: BNA**

No defects found.

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound, and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the Tentatively Identified Compounds (TICs) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. The following analytes in the samples shown were

qualified for compound identification:

The following compounds were qualified as estimated "J" in the indicated samples because they could not be chromatographically resolved:

Fraction	Compounds	Samples

No problems were found.

B) PESTICIDE FRACTION:

The retention time of the reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract. The percent difference (%D) of the positive results obtained on the two GC columns would be ≤25%. The following analytes in the samples shown were qualified because of compound identification:

Compound	%D + Qualifier			
	25-75%	75-100%	>100%	>50% + <CRQL
	"J"	"JN"	"R"	"U"
4,4'- DDE	BQQ93 BQQ96			
4,4'- DDT	BQQ91 BQQ92 BQQ94DL			
alpha-Chlordane	BQQ95	BQQ95		
gamma-Chlordane	BQQ96			
Aroclor-1260	BQQ95 BQQ96			

Note: During the initial calibration sequence, absolute retention times are determined for all single response pesticides, the surrogates, and at least three major peaks of each multi-component analyte. Windows are centered around the mean absolute retention time for the analyte established during the initial calibration. Analytes are identified when peaks are observed in the retention time window for the compound on both GC columns. The quant reports listed many potential pesticide compounds for consideration. Comparison of the sample retention times to the retention time windows established during the initial calibration revealed that no additional pesticide compounds were detected in the associated samples. In addition, no shifts for surrogate compound retention times were noted to occur that might require consideration of compounds outside respective retention time windows.

9. MATRIX SPIKES

The LCS data are generated to determine the long-term precision and accuracy of the analytical method. The LCS may be used in conjunction with other QC criteria for some additional qualification of the data. The following analytes, for the samples shown, were qualified because of LCS:

Qualification: Matrix Spikes **Protocol: VOA**

DC-2 The relative percent difference (RPD) between the following volatile matrix spike and matrix spike duplicate recoveries is outside criteria. Hits and non-detects are not flagged.

BQQ98MS
Toluene, Chlorobenzene

BQQ98MSD
Toluene, Chlorobenzene

Qualification: Matrix Spikes
Protocol: BNA

DC-1 The relative percent difference (RPD) between the following semivolatile matrix spike and matrix spike duplicate recoveries is outside criteria. Hits and non-detects are not flagged.

BQQ98MS
Phenol, N-Nitroso-di-n-propylamine, Acenaphthene

BQQ98MSD
Phenol, N-Nitroso-di-n-propylamine, Acenaphthene

DC-2 The following semivolatile matrix spike/matrix spike duplicate samples have percent recovery outside criteria. Hits and non-detects in the unspiked sample are qualified based on p rofessional judgement.

BQQ98MS
N-Nitroso-di-n-propylamine

Qualification: Matrix Spikes
Protocol: PES

DC-1 The relative percent difference (RPD) between the following pesticide matrix spike and matrix spike duplicate recoveries is outside criteria. Use professional judgement to qualify the data.

BQQ95MS
Dieldrin

BQQ95MSD
Dieldrin

DC-2 The following pesticide matrix spike/matrix spike duplicate samples have percent recovery outside criteria. Use professional judgement to qualify the data.

BQQ95MS
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin, Endrin, 4,4-DDT

BQQ95MSD
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin, Endrin, 4,4-DDT

10. OTHER QC DATA OUT OF SPECIFICATION:

VOA - The following compounds were qualified as estimated "J" in the associated aqueous and/or soil/sediment field duplicate samples because the Relative Percent Difference (RPD) between the sample and field duplicate sample is > 50% for aqueous samples, or > 100% for soil/sediment samples:

Compound	Matrix% RPD	Associated Field Duplicate Samples

No problems found.

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT:
Due to professional judgement, the following compounds were not transferred from the indicated dilution sample analyses to the undiluted sample analyses because the reported values of these compounds are either diluted out in the associated dilution sample analyses or are qualified as non-detected "U" due to blank contamination QC criteria:

Qualification: System Performance **Protocol: PES**

No defects found.

Note: All the samples have been qualified as contaminated by DDT and were marked U or UJ. Evidence to support this conclusion comes from sample BQQ99 which was clean while the re-extracted sample BQQ99RE shows detectable DDT. Although the Method Blank , PBLK02, for the re-extracted samples was clean, residual DDT was still in the equipment or glassware, since sample BQQ99 was taken far from area of contamination and did not show any detectable DDT in first analysis. In conclusion, it cannot be determined from these data whether DDT is present in these samples.

Qualification: Percent Moisture **Protocol: VOA**

No defects found.

Qualification: Percent Moisture
Protocol: BNA

DC-1 Percent moisture content of the following semivolatile soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ93

Qualification: Percent Moisture
Protocol: PES

DC-1 Percent moisture content of the following pesticide soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ93, BQQ93DL, BQQ93RE, BQQ93REDL

12. CONTRACT PROBLEMS/NON-COMPLIANCE:

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No problems found.

13. This package contain re-extraction, re-analysis or dilution results. Upon reviewing the QA results, the following Form I(s) are identified to be used:

PEST/PCB Fraction: Use Sample(s)	Do Not Use Sample(s)
BQQ91	BQQ91RE
BQQ92	BQQ92RE
BQQ93	BQQ93RE, BQQ93DL
BQQ94	BQQ94RE, BQQ94REDL
BQQ95	BQQ95DL, BQQ95RE, BQQ95REDL
BQQ96	BQQ96DL, BQQ96RE, BQQ96REDL
BQQ97	BQQ97RE
BQQ99	BQQ99RE

[1] Due to professional judgement, data from the indicated sample will be used instead of data from the associated sample re-analysis and/or dilution analysis because overall QC criteria is better met in the original sample analysis.

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SDG Narrative

The enclosed data package is in response to USEPA, Region II, Case No. 32903, and SDG No. BQQ91, Contract No. 68-W-03-018. Under this SDG there are 11 VOA, 11 SVOA and 10 PEST/PCB samples received at Ceimic Corporation on May 18, 2004.

EPA ID:	CEIMIC ID:	Analysis
BQQ91	040415-01	VOA, SVOA, PEST/PCB
BQQ92	040415-02	VOA, SVOA, PEST/PCB
BQQ93	040415-03	VOA, SVOA, PEST/PCB
BQQ94	040415-04	VOA, SVOA, PEST/PCB
BQQ95	040415-05	VOA, SVOA, PEST/PCB
BQQ95MS	040415-05MS	PEST/PCB
BQQ95MSD	040415-05MSD	PEST/PCB
BQQ96	040415-06	VOA, SVOA, PEST/PCB
BQQ97	040415-07	VOA, SVOA, PEST/PCB
BQQ98	040415-08	VOA, SVOA
BQQ98MS	040415-08MS	VOA, SVOA
BQQ98MSD	040415-08MSD	VOA, SVOA
BQQ99	040415-09	VOA, SVOA, PEST/PCB

(1) Sample Receipt

Cooler Temperatures upon receipt were 2°C.

(2) Instrumentation and Column Identification

The following instruments were used for the analyses:

GC/ECD Analysis

A. VOA

MS15 HP5972 GC/MS, 30m, 0.25mm ID, 1.4 um, DB-624 capillary column. OI trap #10 (8cm Tenax, 8cm silica gel, 8cm carbon molecular sieve)

B. SVOA

MS4 HP5890SeriesII GC, HP5970BMS,30 m,0.25 mm ID, ZB-5 fused silica capillary column

C. PEST/PCB

AD6: HP5890II (GC8) using 30m x 0.53mm ID, DB5 megabore column

AD7: HP5890II (GC8) using 30m x 0.53mm ID, DB35 megabore column

(3) Sample Information

An "x" qualifier is flagged by Target Thru-put software whenever the data is manually edited. The letter "M" for GC/MS and for GC is used on the raw data of the quantitation report whenever a manual integration is performed. Manual integrations are performed on GC/MS and GC standards and samples when computer generated integration picks up only a portion of the chromatographic peak, due to software limitations. When manual integrations are required, these integrations are performed using sound defensible professional judgment, in order to report accurate data. Each manual integration is signed and dated, and reviewed by both the lab supervisor and the GC/MS Interpretation Specialist for GC/MS or the Organic Lab Manager for Pest/PCB.

A. VOA Fraction (Method CLP SOW OLM04.3)

The %moistures of the soil samples were:

Client ID:	Ceimic ID:	%M:
BQQ91	040415-01	22
BQQ92	040415-02	20
BQQ93	040415-03	20
BQQ94	040415-04	19
BQQ95	040415-05	29
BQQ96	040415-06	22
BQQ97	040415-07	25
BQQ98	040415-08	20
BQQ99	040415-09	16

The Relative Percent Differences (RPD) of toluene and chlorobenzene were flagged as outliers in the comparison of the duplicate matrix spikes.

B. SVOA Fraction (Method CLP SOW OLM04.3)

The pH and %moisture of the soil samples were:

Client ID:	Ceimic ID:	pH	%M
BQQ91	040415-01	7.7	19
BQQ92	040415-02	8.3	28
BQQ93	040415-03	7.4	64
BQQ94	040415-04	7.0	12
BQQ95	040415-05	6.7	28
BQQ96	040415-06	7.9	36
BQQ97	040415-07	6.8	10
BQQ98	040415-08	6.5	46
BQQ99	040415-09	7.2	13

BQQ96DL, BQQ96RE, BQQ96REDL, BQQ97, BQQ97RE

DC-5 The following pesticide samples have surrogate percent recoveries outside the lower limit of the criteria window, but greater than 10%. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ97RE

7. INTERNAL STANDARDS PERFORMANCE:

Internal standard (IS) performance criteria ensure that the GC/MS sensitivity and response are stable during every experimental run. The internal standard area count must not vary by more than a factor of 2 (-50% to 100%) from the associated continuing calibration standard. If the area count is outside the -50% to 100% range of the associated standard, then all of the positive results for compounds quantitated using that IS are qualified as estimated "J", and all non-detects as "UJ". If the IS area is > 25% (a severe loss of sensitivity) then all non-detects associated with that IS are qualified as "R" and all positive results for compounds quantitated using that IS are qualified as estimated "J".

The retention time of the internal standard must not vary more than ± 30 seconds from the associated continuing calibration standard. If an internal standard retention time varies by more than 30 seconds, the reviewer will use professional judgement to determine either partial or total rejection of the data for that sample fraction. The following analytes in the samples shown were qualified because of internal standard performance:

VOA The following compounds were either qualified as estimated "J" or rejected "R" in the associated samples due to exceeding Internal Standard (IS) QC criteria (within -50% to +100% of the Continuing Calibration 12-hour standard):

Internal Standard	Percent IS Area Count of the 12-Hour Standard	Qualifier	Sample(s)

Qualification: Internal Standards **Protocol: VOA**

No defects found.

Qualification: Internal Standards **Protocol: BNA**

No defects found.

8. COMPOUND IDENTIFICATION:

A) VOLATILE AND SEMI-VOLATILE FRACTIONS:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound, and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the Tentatively Identified Compounds (TICs) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications. The following analytes in the samples shown were

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qualified for compound identification:

The following compounds were qualified as estimated "J" in the indicated samples because they could not be chromatographically resolved:

Fraction	Compounds	Samples

No problems were found.

B) PESTICIDE FRACTION:

The retention time of the reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10 ng/ml in the final sample extract. The percent difference (%D) of the positive results obtained on the two GC columns would be ≤25%. The following analytes in the samples shown were qualified because of compound identification:

Compound	%D + Qualifier			
	25-75%	75-100%	>100%	>50% + <CRQL
	"J"	"JN"	"R"	"U"
4,4'- DDE	BQQ93 BQQ96			
4,4'- DDT	BQQ91 BQQ92 BQQ94DL			
alpha-Chlordane	BQQ95	BQQ95		
gamma-Chlordane	BQQ96			
Aroclor-1260	BQQ95 BQQ96			

Note: During the initial calibration sequence, absolute retention times are determined for all single response pesticides, the surrogates, and at least three major peaks of each multi-component analyte. Windows are centered around the mean absolute retention time for the analyte established during the initial calibration. Analytes are identified when peaks are observed in the retention time window for the compound on both GC columns. The quant reports listed many potential pesticide compounds for consideration. Comparison of the sample retention times to the retention time windows established during the initial calibration revealed that no additional pesticide compounds were detected in the associated samples. In addition, no shifts for surrogate compound retention times were noted to occur that might require consideration of compounds outside respective retention time windows.

9. MATRIX SPIKES

The LCS data are generated to determine the long-term precision and accuracy of the analytical method. The LCS may be used in conjunction with other QC criteria for some additional qualification of the data. The following analytes, for the samples shown, were qualified because of LCS:

Qualification: Matrix Spikes **Protocol: VOA**

DC-2 The relative percent difference (RPD) between the following volatile matrix spike and matrix spike duplicate recoveries is outside criteria. Hits and non-detects are not flagged.

BQQ98MS
Toluene, Chlorobenzene

BQQ98MSD
Toluene, Chlorobenzene

Qualification: Matrix Spikes
Protocol: BNA

DC-1 The relative percent difference (RPD) between the following semivolatile matrix spike and matrix spike duplicate recoveries is outside criteria. Hits and non-detects are not flagged.

BQQ98MS
Phenol, N-Nitroso-di-n-propylamine, Acenaphthene

BQQ98MSD
Phenol, N-Nitroso-di-n-propylamine, Acenaphthene

DC-2 The following semivolatile matrix spike/matrix spike duplicate samples have percent recovery outside criteria. Hits and non-detects in the unspiked sample are qualified based on p rofessional judgement.

BQQ98MS
N-Nitroso-di-n-propylamine

Qualification: Matrix Spikes
Protocol: PES

DC-1 The relative percent difference (RPD) between the following pesticide matrix spike and matrix spike duplicate recoveries is outside criteria. Use professional judgement to qualify the data.

BQQ95MS
Dieldrin

BQQ95MSD
Dieldrin

DC-2 The following pesticide matrix spike/matrix spike duplicate samples have percent recovery outside criteria. Use professional judgement to qualify the data.

BQQ95MS
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin, Endrin, 4,4-DDT

BQQ95MSD
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin, Endrin, 4,4-DDT

10. OTHER QC DATA OUT OF SPECIFICATION:

VOA - The following compounds were qualified as estimated "J" in the associated aqueous and/or soil/sediment field duplicate samples because the Relative Percent Difference (RPD) between the sample and field duplicate sample is > 50% for aqueous samples, or > 100% for soil/sediment samples:

Compound	Matrix% RPD	Associated Field Duplicate Samples

No problems found.

11. SYSTEM PERFORMANCE AND OVERALL ASSESSMENT:
Due to professional judgement, the following compounds were not transferred from the indicated dilution sample analyses to the undiluted sample analyses because the reported values of these compounds are either diluted out in the associated dilution sample analyses or are qualified as non-detected "U" due to blank contamination QC criteria:

Qualification: System Performance **Protocol: PES**

No defects found.

Note: All the samples have been qualified as contaminated by DDT and were marked U or UJ. Evidence to support this conclusion comes from sample BQQ99 which was clean while the re-extracted sample BQQ99RE shows detectable DDT. Although the Method Blank , PBLK02, for the re-extracted samples was clean, residual DDT was still in the equipment or glassware, since sample BQQ99 was taken far from area of contamination and did not show any detectable DDT in first analysis. In conclusion, it cannot be determined from these data whether DDT is present in these samples.

Qualification: Percent Moisture **Protocol: VOA**

No defects found.

Qualification: Percent Moisture
Protocol: BNA

DC-1 Percent moisture content of the following semivolatile soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ93

Qualification: Percent Moisture
Protocol: PES

DC-1 Percent moisture content of the following pesticide soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BQQ93, BQQ93DL, BQQ93RE, BQQ93REDL

12. CONTRACT PROBLEMS/NON-COMPLIANCE:

No problems found.

13. This package contain re-extraction, re-analysis or dilution results. Upon reviewing the QA results, the following Form I(s) are identified to be used:

PEST/PCB Fraction: Use Sample(s)	Do Not Use Sample(s)
BQQ91	BQQ91RE
BQQ92	BQQ92RE
BQQ93	BQQ93RE, BQQ93DL
BQQ94	BQQ94RE, BQQ94REDL
BQQ95	BQQ95DL, BQQ95RE, BQQ95REDL
BQQ96	BQQ96DL, BQQ96RE, BQQ96REDL
BQQ97	BQQ97RE
BQQ99	BQQ99RE

[1] Due to professional judgement, data from the indicated sample will be used instead of data from the associated sample re-analysis and/or dilution analysis because overall QC criteria is better met in the original sample analysis.

YES NO N/A

PACKAGE COMPLETENESS AND DELIVERABLES

ASE NUMBER: 32903 LABORATORY: CEIMIC

ITE NAME: Celia's Laundry SDG Number(s): BQQ91

.0 Chain of Custody and Sampling Trip Reports

1.1 Are the Traffic Reports/Chain-of-Custody Records present for all samples? ☑ ___ ___

ACTION: If no, contact RSCC, or contact the WAM to obtain replacement of missing or illegible copies from the lab.

1.2 Is the Sampling Trip Report present for all samples and all fractions? ☑ ___ ___

ACTION: If no, contact either RSCC or ask the WAM to obtain this information from the prime contractor.

.0 Data Completeness and Deliverables

2.1 Have any missing deliverables been received and added to the data package? ___ ☑

NOTE: The lab is required to submit data for only two analyses, for each fraction. (i.e., the original sample and one dilution, or the most concentrated dilution analyzed and one further dilution.)

ACTION: Contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the package in the Contract Problems/Non-compliance section of the Data Assessment.

2.2 Was CLASS CCS checklist included with package? ☑ ___ ___

	YES	NO	N/A
2.3 Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Report and Sample Tags?	___	[✓]	___

ACTION: If yes, contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

3.1 Is the Narrative or Cover Letter Present?	[✓]	___	___
3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.6.1)? **EPA sample numbers in the SDG, detailed documentation of any quality control, sample, shipment, and/or analytical problems encountered in processing the samples? Corrective action taken?**	[✓]	___	___
3.3 Does the narrative contain the following information:			
VOA: description of trap and columns used for sample analyses?	[✓]	___	___
VOA: **a NOTE stating whether Volatile low level soil samples prepared according to the modified SW-846 Method 5035? (p. B-9/VOA, sec 2.6.1)**	[ ]	___	[✓]
VOA: **any discrepancies between low level soil weights determined in the field and in the Laboratory? (p. B-10/VOA, sec. 2.6.1)**	___	[✓]	___
BNA: description of columns used for sample analyses?	[✓]	___	___
Pest: description of columns used for sample analyses?	[✓]	___	___

NOTE: As per section 6.23.3.1 SOW/p. D-11/Pest,

	YES	NO	N/A

Packed columns are not permitted.

3.4 Does the narrative, VOA and BNA sections, contain a list of all TIC's identified as alkanes and their estimated concentrations? [✓] ___ ___

3.5 **Is the temperature indicator bottle present in the cooler? If not, did the Laboratory document in the SDG Narrative the alternative technique used to determine the cooler temperature? (Exhibit A/ p. A-5 sec. 4.2.1.2.3.3)** [✓] ___ ___

3.6 Does the narrative contain a record of all cooler temperatures? If the temperature of a cooler was exceeded, > 10° C, the lab must list by fraction and sample number, all affected samples. [✓] ___ ___

3.7 **Does the Narrative contain a list of sample reanalyses submitted? Did the Lab distinguish whether the reanalysis is billable, and if so why?** [✓] ___ ___

3.8 Does the narrative contain a list of the pH values determined for each water sample submitted for volatile analysis (SOW Exhibit B, section 2.6.1.2)? [✓] ___ ___

3.9 Does the Case Narrative contain the statement, "verbatim", as required in Section B of the SOW? [✓] ___ ___

ACTION: If "No", to any question in this section, contact the TOPO to obtain all necessary resubmittals. If information is not available, document in the Data Assessment under Contract Problems/Non-Compliance section.

.0 Data Validation Checklist

4.1 Check the package for the following discrepancies:

a. Is the package paginated in ascending order starting from the SDG narrative? [✓] ___ ___

	YES	NO	N/A
b. Are all forms and copies legible?	[/]		
c. Is each fraction assembled in the order set forth in the SOW?	[/]		

The following checklist is divided into three parts. Part A is for any VOA analyses, Part B is for BNA's and Part C is Pesticide/PCB's.

Does this package contain:

VOA Data?	/	
BNA Data?	/	
Pesticide/PCB data?	/	

ACTION: Complete corresponding parts of checklist.

YES NO N/A

PART A: VOA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? ___ 1/1 ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data **shall** be flagged as estimated (J). If a soil sample other than TCLP contains more than 90% water, then **qualify positive results "J", and non-detects "R".**

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (> 10° C), then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: The smallest soil size permitted is 0.5g. If any soil sample is smaller than 0.5g, document in the Data Assessment under Contract Problems/Non-Compliance.

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ 1/1 ___

Technical Holding Times for AQUEOUS AND SOIL NON-ENCORE SAMPLES: If unpreserved, aqueous samples, maintained at 4° C for aromatic hydrocarbons analysis must be analyzed within 7 days of collection. If

YES NO N/A

preserved with HCl (pH < 2) and stored at 4° C, then aqueous samples must be analyzed within 14 days of collection. If uncertain about preservation, contact sampler to determine whether or not samples were preserved. The holding time for non-Encore soils is 10 days from date of collection.

ACTION: If technical holding times **for aqueous samples and soil non-Encore samples** are exceeded, flag all positive results as estimated "J" and sample quantitation limits as estimated "UJ", and document in the Data Assessment that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results must be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times are exceeded by more than 28 days, all non detect data are unusable "R".

NOTE: Contractual Holding Times: Analysis of water samples must be completed within 10 days of Validated Time of Sample Receipt (VTSR). This requirement does not apply to Performance Evaluation (PE) samples.

Technical Holding Times for soils Encore samples:

i) If sample was preserved ≤ 2 days of VTSR:

1. **and analyzed ≤ 14 days from DoC, NO action needed.**
2. **and analyzed > 14 days from DoC, qualify positive results "J" and non-detects "UJ".**
3. **and analyzed > 28 days from DoC, qualify positive results "J" and non-detects "R".**

ii) If sample was NOT preserved, or preserved > 2 days of VTSR

1. **and analyzed ≤ 7 days from DoC, No action needed.**
2. **and analyzed > 7 days from DoC, qualify AROMATIC analytes**

only, both positive and non-detects, as estimated "J".

3. and analyzed > 10 days from DoC, qualify ALL positive analytes "J" and ALL non-detects as "UJ".
4. and analyzed ≥ 20 days from DoC, qualify positive results "J" and non-detects "R".

Note: CONTRACT holding times for soil Encore samples are:

1. Samples must be preserved within two (2) days of VTSR and must be analyzed within ten (10) days of VTSR.

2. Samples NOT preserved within two (2) days of VTSR must be analyzed within two (2) days of VTSR.

ACTION: If contractual holding times are exceeded, document in the Data Assessment.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

Table of Holding Time Violations

(See Chain-of-Custody Records)

Sample ID	Sample Matrix	Was Sample Preserved?	Date Sampled	Date Lab Received	Date Analyzed

	YES	NO	N/A

3.0 System Monitoring Compound (SMC) Recovery (Form II)

3.1 Are the VOA SMC Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water?	[ ]	___	✓
b. Low Soil?	[✓]	___	___
c. Med Soil?	[ ]	___	___
3.2 Are all the VOA samples listed on the appropriate System Monitoring Compound Recovery Summary for each of the following matrices:			
a. Low Water?	[ ]	___	✓
b. Low Soil?	[✓]	___	___
c. Med Soil?	[ ]	___	___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[✓]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Was one or more VOA system monitoring compound recovery outside of contract specifications for any sample or method blank?	___	[✓]	___
If yes, were samples re-analyzed?	[ ]	___	___
Were method blanks re-analyzed?	[ ]	___	___

ACTION: If recoveries are ≥ 10%, but 1 or more compounds fail to meet SOW specifications:

1. All positive results are qualified as estimated "J".

2. Flag all non-detects as estimated detection limits "UJ" where recovery is less than the lower acceptance limit.

3. If SMC recoveries are above allowable levels, **qualify positive results "J" and** do not qualify non-detects.

ACTION: If any system monitoring compound recovery is < 10%:

1. Flag all positive results as estimated "J".

2. Flag all non-detects as unusable "R".

Professional judgement should be used to qualify data that only have method blank SMC recoveries out of specification in both original and re-analyses. Check the internal standard areas.

NOTE: Contractual requirements state that if any SMC fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: The laboratory must submit the following data:

1. If SMC recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If an SMC recovery and/or internal standard response fails to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

(Refer to section 11.4.3.2, page D-45/VOA of the

	YES	NO	N/A

SOW for more information.)

3.5 Are there any transcription/calculation errors between raw data and Form II? — [✓] —

ACTION: If large errors exist, contact the TOPO to obtain an explanation or resubmittal of corrected deliverables from the laboratory. Make any necessary corrections and note the effect in the Data Assessment.

.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [✓] — —

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water? [ ] — [✓]

b. Low Soil? [✓] — —

c. Med Soil? [ ] — [✓]

ACTION: If any matrix spike data are missing, take the action specified in section 3.2 above.

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the MS/MSD results may be used in conjunction with other QC criteria to determine the need for qualification of the data.

ACTION: Circle all outliers with red pencil.

Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [✓] — —

5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed during every 12-hour time period on each

		YES	NO	N/A
	GC/MS system, before any samples, and for each matrix? (water, low soil or medium soil)	[/]	___	___
5.3	Has a VOA method blank been analyzed at least once every twelve hours for each matrix/concentration and GC/MS system used?	[/]	___	___
5.4	Was a VOA instrument blank analyzed after each sample/dilution which contained a target compound that exceeded the initial calibration range?	[ ]	___	[/]
5.5	Was a VOA storage blank analyzed at the end of all samples for each SDG in a case?	[/]	___	___

ACTION: If any method/instrument blank data are missing, contact the TOPO to obtain any missing deliverables from the laboratory. If method blank data are not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank or trip blank data for missing method blank data.

If the instrument blank was not analyzed **after a sample with high concentration of reported values**, inspect the chromatogram of the sample analyzed immediately after this analysis for possible carryover. Use professional judgement to determine if any contamination occurred and qualify analyte(s) accordingly.

If storage blank data is missing, contact the TOPO to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

Note: A storage blank shall be analyzed and reported as a water sample unless the SDG contains only soil samples. Then, the storage blank may be analyzed and reported as a soil sample. (p. D-49/VOA sec. 12.1.3.5)

YES NO N/A

5.6 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-30, section 3.3.7.3 of the SOW for further information.

Was the correct identification scheme used for all VOA blanks? ✓ ___ ___

ACTION: Contact the TOPO to obtain missing deliverables from the lab, or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-compliance if corrections were made by the validator.

5.7 Chromatography: review the blank raw data-chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) for each instrument acceptable for VOA's? ✓ ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.8 Are all detected hits for target compounds in method, instrument and storage blanks less than the CRQL for that analyte? ✓ ___ ___

Exception: Acetone and 2-butanone must be less than 5 times the CRQL, and methylene chloride **and Cyclohexane** must be less than 2.5 times its CRQL. **(p. D-50/VOA sec. 12.1.4.6)**

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

Contamination

NOTE: "Water blanks", "drill blanks", and "distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not

	YES	NO	N/A

confuse them with the other QC blanks discussed below.

6.1 Do any method/instrument/reagent/storage blanks have positive results (TCL and/or TIC) for VOA's? / [ ] ___

NOTE: When applied as directed in the table below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for %moisture when necessary.

NOTE: A contaminated instrument blank is not allowable under this SOW. **The instrument blank must meet the technical acceptance criteria for blank analyses(sec. 12.1.4).** See page D-48/VOA, section 12.1.2.4 for additional information. Document in the Data Assessment under Contract Problems/Non-Compliance if contaminated instrument blank was submitted.

6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)? ___ [/] ___

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped and are not required for non-aqueous matrices. Blanks may not be qualified because of contamination in another blank. Field Blanks & Trip Blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration, **and Internal standard** QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated data should be

YES NO N/A

qualified as unusable "R".

NOTE: Analytes qualified "U" for blank contamination are till considered as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R".

or:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
TL COMPOUNDS			
ethylene loride etone luene Butanone clohexane	Sample conc. is > CRQL, but ≤ 10× blank value.	Sample conc. is < CRQL and ≤ 10× blank value.	Sample conc. is > CRQL and > 10× blank value.
ner ita- ants	Sample conc. is > CRQL, but ≤ 5× blank value.	Sample conc. is < CRQL and ≤ 5× blank value.	Sample conc. is > CRQL and > 5× blank value.

6.3 Are there field/rinse/equipment blanks associated with every sample? [1] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For samples with high concentrations of suspected blank contaminants, use professional judgement to qualify these values and make a note in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

GC/MS Instrument Performance Check (Form V)

	YES	NO	N/A
7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)?	[/]		
7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift?	[/]		
7.3 **Is the mass spectrum of BFB acquired according to sec. 9.2.4.1 D-23/VOA?**	[/]		

Note: Sec. 9.2.4.1 states that "the mass spectrum of BFB MUST be acquired in the following manner. Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and MUST be accomplished using a single scan no more than 20 scans prior to the elution of BFB. DO NOT background subtract part of the BFB peak." See Attachment 2 for BFB criteria.

Action: If not, reject "R" all samples associated with that particular BFB.

7.4 Has an instrument performance check been analyzed for every analytical sequence on each instrument?	[/]		

ACTION: List date, time, instrument ID, and sample numbers for which associated GC/MS tuning data are unavailable.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS
_____	_____	_____	_____
_____	_____	_____	_____

ACTION: Notify the TOPO to obtain missing data, if possible. If the lab cannot provide the missing data, reject, "R", all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.5 Have the ion abundances been normalized to m/z 95 as specified in Exhibit D, page D-56/VOA?	[/]		

NOTE: All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

ACTION: If mass assignment is in error, qualify all associated data as unusable "R".

7.6 Have the ion abundance criteria been met for each instrument used?	[/]		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

7.7 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)		[/]	
7.8 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[/]		

ACTION: If large errors exist, take action as specified in section 3.5 above.

7.9 Are the spectra of the mass calibration compound acceptable?	[/]		

ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.

Target Compound List (TCL) Analytes (FORM I VOA)

8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:

	YES	NO	N/A
a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates?	[/]	___	___
c. Blanks?	[/]	___	___

8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:

a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[/]	___	___
c. Blanks?	[/]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

8.3 Is chromatographic performance acceptable with respect to:

a. Baseline stability?	[/]	___	___
b. Resolution?	[/]	___	___
c. Peak shape?	[/]	___	___
d. Full-scale graph (attenuation)?	[/]	___	___
e. Other: _____?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.4 Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample? [/] ___ ___

ACTION: If any mass spectra are missing, take action as specified in 3.2 above. If the lab does not

	YES	NO	N/A

generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment.

8.5 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration? [/] ___ ___

8.6 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum? [/] ___ ___

8.7 Do sample and standard relative ion intensities agree within ±20%? [/] ___ ___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.5, 8.6, and 8.7.

ACTION: When sample carry-over is suspected, use professional judgement determine if instrument cross-contamination has affected positive compound identifications.

Tentatively Identified Compounds (TIC)

9.1 Are all Tentatively Identified Compound Forms (Form I Part B) present; and do listed TIC's include scan number or retention time, estimated concentration and "JN" qualifier? [/] ___ ___

9.2 Are the mass spectra for the TIC's and associated "best match" spectra included in the sample package for each of the following:

a. Samples and/or fractions as appropriate? [/] ___ ___

b. Blanks? [/] ___ ___

	YES	NO	N/A
c. Are Alkanes listed in/or part of the Case Narrative?	[/]		

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier to all chemically named TIC's, if missing.

9.3 Are any TCL compounds (from any fraction **including all PCB congeners**) listed as TIC compounds? (Example: 1,2- dimethylbenzene is xylene, a VOA TCL analyte, and should not be reported as a TIC.)		[/]	

ACTION: Flag with "R" any TCL compound listed as a TIC.

9.4 Are any TIC's reported earlier than 30 sec before the first purgeable compound, or three (3) min. after the last purgeable compound listed in Exhibit C (Volatiles)?		[/]	

ACTION: Flag with "R" any TIC compound reported. (p. D38-VOA, sec. 11.1.2.2)

9.5 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[/]		
9.6 Do TIC and "best match" standard relative ion intensities agree within ±20%?	[/]		

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined an incorrect identification was made, change the identification to "unknown," or to some less specific identification as appropriate. (Example: "C3 substituted benzene.")

Also, when a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as

	YES	NO	N/A

unusable "R". (E.g., Common Lab Contaminants: CO_2 (M/E 44), Siloxanes (M/E 73) hexane, aldol condensation products, solvent preservatives, and related by-products.

9.7 Are TIC's with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported? ___ [/] ___

ACTION: If yes, cross out questionable TIC's.

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRF were used to calculate Form I results.)

10.2 Are the CRQL's adjusted to reflect sample dilutions and, for soils, sample moisture? ___ [/] ___

ACTION: If errors are large, take action as specified in section 3.2 above. [/] ___ ___

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQL's are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample). Replace concentrations that exceeded the calibration range in the original analysis by crossing out the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is not to be used, including any in the data summary package.

Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [/] ___ ___

	YES	NO	N/A

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete at concentrations of 10, 20, 50, 100, 200ng for separate calibrations of low water/med soils (unheated purge) and low soils (heated purge)? [1] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Were all low level soil standards, blanks and samples analyzed by heated purge? [1] ___ ___

ACTION: If low level soil samples were not heated during purge, qualify positive hits "J" (estimated) and non-detects "R".

12.3 Are the % relative standard deviation (%RSD) values for VOA's ≤ 30% over the concentration range of the calibration? [1] ___ ___

NOTE: Although 27 VOA compounds and 1SMC have a contractual minimum RRF and no maximum %RSD, the technical acceptance criteria are the same for all analytes.

ACTION: Circle all outliers with red pencil.

ACTION: If %RSD is > 30.0%, qualify associated positive results for that analyte "J" (estimated). **Do not qualify non-detects.** When %RSD is > 90%, flag all non-detects for that analyte "R" (unusable) and positive hits "J" .

NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.

12.4 Are any average RRFs < 0.05? ___ [1] ___

YES NO N/A

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05, then qualify associated non-detects with an "R" and flag associated positive data as estimated "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %RSD or RRF criteria, provided the %RSD is ≤ 40% and RRF is ≥ 0.010. (See Table 5, page D-61/VOA and analytes marked with a "*" on Form VI for required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than two analytes failed %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance.

12.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %RSD? (Check at least 2 values, but if errors are found, check more.) ___ [/] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, contact the TOPO to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for separate calibration of low water/med soil and low soil samples? [/] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [/] ___ ___

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact

YES NO N/A

the TOPO to request an explanation/resubmittal from the lab. If continuing calibration data are not available, flag all associated sample data as unusable "R".

ACTION: List below all sample(s) that were not analyzed within twelve hours of the previous continuing calibration.

_____

_____

_____

13.3 Do any volatile compounds have a percent difference (%D) between the initial and continuing RRF which exceeds the ±25% criteria? / [ ] ___

NOTE: Although 23 VOA compounds have a contractual minimum RRF and no maximum %D, the technical acceptance criteria are the same for all analytes.

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated. When %D is > 90%, qualify all non-detects for that analyte unusable (R) and positive results estimated (J) .

13.4 Are any continuing calibration RRFs < 0.05? / [ ] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify the associated non-detects as unusable "R" and the associated positive values "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 pg. D-61/VOA or

YES NO N/A

analytes marked with a "*" on Form VI for required analytes.) Technical criteria, however, are the same for all analytes.

ACTION: If more than two analytes failed %D and RRF, criteria document in the Data Assessment under contract Problems/Non-Compliance.

13.5 Are there any transcription/calculation errors in the reporting of RRF or %D between initial and continuing RRFs? (Check at least two values, but if errors are found, check more.) ___ [/] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, contact the **TOPO** to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance.

.0 Internal Standard (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [/] ___ ___

If no, was the sample re-analyzed? [ ] ___ ___

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

Sample #	Internal Std.	Area	Lower/Upper Limit
			/
			/
			/

(Attach additional sheets if necessary, or attach copies of Form VIIIs.)

YES NO N/A

ACTION: If any sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

ACTION: 1. If the internal standard area count is outside the upper or lower limit, flag with "J" all positive results quantitated with this internal standard.

2. Do not qualify non-detects when associated IS area counts are > 100%.

3. If the IS area in the sample is below the "lower limit," < 50%, qualify all analytes associated with that IS estimated, "J". If the area counts are extremely low, < 25% of the area in the 12 hour standard, or if performance exhibits a major abrupt drop- off, flag all associated non-detects as unusable, "R", and positive hits estimated, "J".

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? I/1 ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

5.0 Field Duplicates

15.1 Were any field duplicates submitted for VOA analysis? I/1 ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

YES NO N/A

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

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PART B: BNA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody records or laboratory SDG Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ___ N ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be flagged as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, qualify positive hits "J" and non-detects "R".

ACTION: If samples were not iced or if the ice was melted upon arrival at the laboratory and the temperature of the cooler was elevated (> 10° C), flag all positive results "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any BNA technical holding times, determined from date of collection to date of extraction, been exceeded? ___ N ___

NOTE: Technical Holding Time: Continuous extraction of water samples for BNA analysis must be started within seven days of the date of collection. Soil/sediment samples must be extracted within 7 days of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

YES NO N/A

ACTION: If technical holding times were exceeded, flag all positive results as estimated (J) and sample quantitation limits as estimated (UJ), and document in the Data Assessment that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times were exceeded by more than 28 days, all non-detect data must be qualified "R", unusable.

NOTE: Contractual Holding Times: Extraction of water samples must be started within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Water and soil/sediment extracts must be analyzed within 40 days following extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

.0 Surrogate Recovery (Form II)

3.1 Are BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [ ] ___ ✓

b. Low Soil? [ ] ___ ___

	YES	NO	N/A
c. Med Soil?	[ ]	___	/
3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:			
a. Low Water?	[ ]	___	/
b. Low Soil?	[/]	___	___
c. Med Soil?	[ ]	___	/

ACTION: Contact the TOPO to request an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[/]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[/]	___
If yes, were samples reanalysed?	[ ]	___	___
Were method blanks reanalysed?	[ ]	___	___

ACTION: If all BNA surrogate recoveries are ≥ 10%, but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. acid or base-neutral compounds):

1. Flag all positive results as estimated (J).

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. Do not qualify non-detects if recoveries are greater than the upper acceptance limit.

YES NO N/A

ACTION: If any base-neutral or acid surrogate has a recovery of < 10%:

1. Qualify positive results for that fraction as estimated (J).

2. Qualify non-detects for that fraction as unusable (R).

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Also check the internal standard areas.

NOTE: Contractual requirements state that if two surrogate fails acceptance criteria, **within the same fraction, i.e. Acid or BN,** the sample must be re-analyzed. If sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: The laboratory must submit the following data:

1. If surrogate recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If surrogate recoveries and/or internal standard responses fail to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [6] ___

ACTION: If large errors exist, contact the TOPO to request an explanation or resubmittal of corrected deliverables from the laboratory. Make necessary corrections and note errors in the Data Assessment.

	YES	NO	N/A

4.0 Matrix Spikes (Form III)

4.1	Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present?	[1]	___	___
4.2	Were matrix spikes analyzed at the required frequency for each of the following matrices:	3/9 1/18		
	a. Low Water?	[ ]	___	✓
	b. Low Soil?	[1]	___	___
	c. Med Soil?	[ ]	___	✓

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

ACTION: Circle all outliers with red pencil.

5.0 Blanks (Form IV)

5.1	Is the Method Blank Summary (Form IV) present?	[1]	___	___
5.2	Frequency of Analysis: Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each time samples are extracted?	[1]	___	___
5.3	Has a BNA method blank been analyzed for each GC/MS system used? (See SOW pg. D-55/SVOA, Section 12.1.2.)	[1]	___	___

ACTION: If any method blank data are missing, contact the TOPO to obtain an explanation/resubmittal from the lab. If resubmittals are unavailable, use professional judgement to determine if the

YES NO N/A

associated sample data should be qualified.

5.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-30, sec. 3.3.7.3 of the SOW for further information.

Was the correct identification scheme used for all BNA blanks? [/] ___ ___

ACTION: Contact the TOPO to obtain resubmittals from the lab or make the required corrections on the forms. Document all corrections made by the validator in the Data Assessment under Contract Problems/Non-Compliance.

5.5 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) acceptable for each instrument? [/] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

5.6 Are all detected hits for target compounds less than the CRQL for that analyte in all method blanks? [/] ___ ___

Exception: Phthalate esters must be less than five times (5x) the CRQL.

.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent blanks have positive results (TCL and/or TIC)? ___/ [ ] ___

NOTE: Water: When applied as directed in the table below (page 33), the contaminant concentration in method/

YES NO N/A

instrument/reagent blanks is multiplied by the sample dilution factor, where necessary.

Soil: If the lab has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate (1 gram for medium level soils) are used to prepare the soil reagent/method blank as instructed on page D-54/SVOA, section 12.1.3. Contact the TOPO to obtain resubmittals if the soil blanks are not reported in soil units (µg/kg).

6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)? ___ 1/1 ___

ACTION: Prepare a list of samples associated with each contaminated blank. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be used to qualify sample data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, spectral, instrument performance, calibration and Internal standard QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable "R".

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Common Phthalate-Esters	Sample conc. is > CRQL, but ≤ 10x blank value.	Sample conc. is < CRQL and ≤ 10x blank value.	Sample conc. is > CRQL and > 10x blank value.

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Other Contaminants	Sample conc. is > CRQL, but ≤ 5x blank value.	Sample conc. is < CRQL and ≤ 5x blank value.	Sample conc. is > CRQL and > 5x blank value.

NOTE: Analytes qualified "U" for blank contamination are still treated as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

		YES	NO	N/A
6.3	Are there field/rinse/equipment blanks associated with every sample?	[/]	___	___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentration, use professional judgement on qualification of these values and make a note in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

.0 GC/MS Instrument Performance Check

7.1	Are the GC/MS Instrument Performance Check Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)?	[/]	___	___
7.2	Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift?	[/]	___	___
7.3	Has an instrument performance check solution been analyzed for every twelve hours of sample			

	YES	NO	N/A
analysis per instrument?	[/]		

ACTION: List date, time, instrument ID, and sample number for which no associated GC/MS tuning data are valid.

SAMPLE NUMBERS	DATE	TIME	INSTRUMENT ID

ACTION: If the TOPO cannot obtain missing data from the lab, reject "R" all data generated outside an acceptable twelve hour calibration interval.

7.4	Have the ion abundances been normalized to m/z 198 (see SOW, page D-62/SVOA)?	[/]		

NOTE: All ion abundance ratios must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may up to 110% that of m/z 198.

ACTION: If mass assignment is in error, flag all associated sample data as unusable "R".

7.5	Have the ion abundance criteria been met for each instrument used?	[/]		

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.

7.6	Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)		[/]	

	YES	NO	N/A
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[/]	___	___
ACTION: If large errors exist, take action as specified in section 3.5 above.			
7.8 **Is the mass spectrum of DFTPP acquired according to sec. 9.2.4.2 p. D-20/SVOA ?**	[/]	___	___
NOTE: **Sec. 9.2.4.2 states that "the mass spectrum of DFTPP MUST be acquired in the following manner: Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and MUST be accomplished using a single scan acquired no more than 20 scans prior to the elution of DFTPP. Do NOT subtract part of the DFTPP peak." See Attachment 3 for DFTPP criteria.**			
ACTION: **If not, then reject "R" all data analyzed under that particular tune.**			
7.9 Are the spectra of the mass calibration compound acceptable?	[/]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

.0 Target Compound List (TCL) Analytes (FORM I SV)

8.1 Are the Organic Analysis Data Sheets (Form I SV) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates?	[/]	___	___
c. Blanks?	[/]	___	___
8.2 Has GPC cleanup been performed on all soil/			

	YES	NO	N/A
sediment sample extracts?	[/]	___	___
Has the Laboratory provided the TWO most recent UV traces of the calibration solution? GPC calibration and GPC CCV? (D-39/SVOA, sec.10.3.4.4)	[/]	___	___

ACTION: If data suggests that GPC was not performed, use professional judgement. Make note in Contract Problems/Non-Compliance section of the Data Assessment.

8.3 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:

a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[/]	___	___
c. Blanks?	[/]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

8.4 Is chromatographic performance acceptable with respect to:

Baseline stability?	[/]	___	___
Resolution?	[/]	___	___
Peak shape?	[/]	___	___
Full-scale graph (attenuation)?	[/]	___	___
Other:_____?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

8.5 Are lab-generated standard mass spectra of

	YES	NO	N/A
identified BNA compounds present for each sample?	[/]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. Note under Contract Non-compliance if lab does not generate their own standard spectra. If spectra are missing, reject all positive data.

8.6	Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[/]	___	___
8.7	Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[/]	___	___
8.8	Do sample and standard relative ion intensities agree within ±20%?	[/]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.6, 8.7, and 8.8.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

NOTE : **The maximum dilution factor permitted for low level soils is 30. If a low level soil sample requires a dilution greater than 30, then the medium level method shall be utilized.(p. D-43) SVOA, sec. 10.6.5.4 . Document in the Data Assessment under Contract Problems/Non compliance if any low level soil was analyzed at a dilution factor greater than 30.**

	YES	NO	N/A

9.0 Tentatively Identified Compounds (TIC)

		YES	NO	N/A
9.1	Are all Tentatively Identified Compound Forms (Form I, Part B) present? and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[/]	___	___
9.2	Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
	a. Samples and/or fractions as appropriate?	[/]	___	___
	b. Blanks?	[/]	___	___
	c. Are Alkanes listed in/or part of the Case Narrative?	[/]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "N" qualifier to all chemically named TIC's, if missing.

		YES	NO	N/A
9.3	Are any TCL compounds (from any fraction) listed as TIC compounds? (Example: 1,2-dimethylbenzene is xylene - a VOA TCL - and should not be reported as a TIC.)	[ ]	[/]	___

ACTION: Flag with "R" any TCL compound listed as a TIC.

		YES	NO	N/A
9.4	**Are any TICS reported earlier than 30 sec. before the first semivolatile compound, or three (3) minutes after the last semivolatile compound listed in Exhibit C SVOA? (p.D-45/SVOA,11.1.2.2)**	___	[/]	___

ACTION: Flag with "R" any TIC compound reported.

		YES	NO	N/A
9.5	Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[/]	___	___
9.6	Do TIC and "best match" standard relative ion			

	YES	NO	N/A
intensities agree within ±20%?	[/]		

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown," or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R".

9.7 Are any TICs with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported?		[/]	

ACTION: If yes, cross out questionable TIC(s).

0.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result.)		[/]	
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[/]		

ACTION: If errors are large, take action as specified in section 3.5 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is

YES NO N/A

that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for initial and continuing calibration? [1] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [1] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are the % relative standard deviation (%RSD) values for BNAs ≤ 30% over the concentration range of the calibration? [1] ___ ___

ACTION: Circle all outliers with red pencil.

NOTE: Although **41** BNA compounds **and 7 SMC** have a contractual minimum RRF and no maximum %RSD, the technical criteria are the same for all analytes.

NOTE: Eight BNA compounds do not require a 20ng standard. **They are 2,4-Dinitrophenol, 2,4,5-Trichlorophenol, 2-Nitroaniline, 3-Nitroaniline, 4-Nitroaniline, 4-Nitrophenol, 4,6-Dinitro-2-methylphenol, and Pentachlorophenol.**

ACTION: If the %RSD is > 30.0%, qualify **only positive** results for that analyte "J" and **do not qualify** non-detects. When %RSD is > 90%, flag all non-detect results for that analyte "R" (unusable) and all **positive** results "J" (estimated) **for ALL samples analyzed under that particular Initial Calibration.**

YES NO N/A

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

12.3 Are any average RRFs < 0.05? ___ [/] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05 then:

1. "R" all non-detects for ALL samples analyzed under that particular Initial Calibration.

2. "J" all positive results for ALL samples analyzed under that particular Initial Calibration.

12.4 Are there any transcription/calculation errors in the reporting of RRFs and/or %RSDs? (Check at least two values; if errors are found check more.) ___ [/] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %RSD or RRF criteria provided the %RSD is ≤ 40% or RRF is ≥ 0.010. (See Table 5, page D-67/SVOA and analytes marked with a "*" on Form VI for a list of required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes fail %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance.

.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction? [/] ___ ___

	YES	NO	N/A
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[/]		

ACTION: List below all sample analyses that were not analyzed within twelve hours of a continuing calibration standard for each instrument used.

_____

_____

_____

ACTION: If any forms are missing, or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact the TOPO to obtain an explanation/resubmittal from the lab. If continuing calibration data are unavailable, flag all associated sample data as unusable "R".

13.3 Does any BNA compound have a percent difference (%D) between the initial and continuing calibration RRFs which exceeds the ±25.0% criteria?	/	[ ]	

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated "J". When %D is > 90%, reject all non-detects for that analyte, "R", and qualify positive results "J" (estimated) **for ALL samples analyzed under that particular Continuing Calibration.**

13.4 Are any continuing RRFs < 0.05?		[/]	

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify as unusable (R) associated non-detects and "J" associated positive values **for ALL samples analyzed under that particular Continuing Calibration.**

YES NO N/A

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 page D-67/SVOA or analytes marked with a "*" on Form VI for a list of the required analytes.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes failed %D and RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance.

13.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %difference (%D) between initial and continuing RRFs? (Check at least two values, but if errors are found, check more.) ___ [/] ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

4.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? [/] ___ ___

If no, was sample re-analyzed? [ ] ___ ___

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

ACTION: If sample was not reanalysed, document in Data Assessment in Contract Problems/Non-Compliance.

Sample #	Internal Std.	Area	Lower/Upper Limit
			/
			/

YES NO N/A

(Attach additional sheets if necessary.)
(or attach copies of Form VIIIs)

ACTION: 1. If the internal standard area count is outside the "upper" or "lower" limit, flag with "J" all positive results and non-detects quantitated with this internal standard **with the following exceptions:**

A. Do not qualify non-detects associated with IS area > 100%.

B. If the IS area in the sample is < 50%, qualify all analytes associated with that IS estimated (J). If area counts are extremely low (< 25% of the area in the 12 hour standard), or if performance exhibits a major abrupt drop-off, flag all associated non-detects as unusable (R) and positive hits estimated (J).

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [ ]

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for BNA analysis? [ ]

YES NO N/A

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/A

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PART C: PESTICIDE/PCB ANALYSIS

..0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records or SDG Narrative indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data? ___ [/] ___

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be qualified as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, **qualify positive results "J" and non-detects "R".**

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory, and the temperature of the cooler was elevated > 10^{0} C, flag all positive results "J" and all non-detects "UJ".

ACTION: Check aqueous extraction log for sample pH, if adjustment was needed, it should have been noted in the SDG Narrative. If more information is needed, notify the **TOPO** to contact the lab.

.0 Holding Times

2.1 Have any PEST/PCB technical holding times, determined from date of collection to date of extraction, been exceeded? / [ ]

NOTE: Technical Holding Times: Water and soil samples for PEST/PCB analysis must be extracted within 7 days of the date of collection. Extracts must be analyzed within 40 days of the date extraction.

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits "UJ" and document in the

YES NO N/A

narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all the data should at least be qualified "J", but the reviewer may determine that non-detects are unusable "R".

Table of Holding Time Violations
(See Chain-of-Custody Records)

ample nalyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
	See data assessment				

NOTE: Contractual Holding Times: Extraction of water samples must be completed within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Extracts of water and soil/sediment samples must be analyzed within 40 days following start of extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

Surrogate Recovery (Form II)

3.1 Are the PEST/PCB Surrogate Recovery Summaries

	YES	NO	N/A
(Form II) present for each of the following matrices:			
a. Low Water?	[ ]	___	/
b. Soil?	[/]	___	___
3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summary for each of the following matrices:			
a. Low Water?	[ ]	___	/
b. Soil?	[/]	___	___

ACTION: Contact the TOPO to obtain an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

3.3 Were outliers marked correctly with an asterisk?	[/]	___	___

ACTION: Circle all outliers with red pencil.

3.4 Were surrogate recoveries of TCX or DCB outside of the contract specification for any sample, method blank or sulfur clean-up blank (30-150%)?	/	[ ]	___

ACTION: In the absence of matrix interference, qualification of the data is not required in the following three situations:

1. When surrogates on both columns are diluted out.

2. When one surrogate on one column was outside (either above or below) the contract limits but above 10%.

3. When the same surrogate on both columns is above the contract limit.

ACTION: If the same surrogate on both columns is below the contract limit but above 10%, check

YES NO N/A

chromatograms for interference. The reviewer may use professional judgement, and qualify only those analytes which elute in the region of the GC chromatogram where interference was observed.

ACTION: If the same surrogate on both columns is below the contract limit but above 10% (with no interference), qualify non-detects and positive hits "J" (estimated).

ACTION: If recoveries for both surrogates on both columns are below the contract limit but above 10%, flag positive results and non-detects for that sample "J".

ACTION: If recoveries are above the contract limit for both surrogates on both columns, then qualify positive values "J".

ACTION: If both surrogates on one column are below the contract limit but above 10%, then use the data from the other column, providing both surrogates on that column are within contract limits. The validator must check from which column the concentration is reported for each analyte. If the value is reported from the failed column, then cross it out and use the value from the other column. Document this change in the Data Assessment.

ACTION: If recovery is below 10% for either surrogate on any column, qualify positive results "J" and flag non-detects "R".

3.5 Were surrogate retention times (RT) within the windows established during the initial 3-point analysis of Individual Standard Mixture A (see Form VI Pest-1)? [/] ___ ___

ACTION: If the RT limits are not met, positive results and non-detects for that sample may be qualified unusable, "R", based on professional judgement.

	YES	NO	N/A
3.6 Are there any transcription/calculation errors between raw data and Form II?		[1]	

ACTION: If large errors exist, contact the TOPO to obtain an explanation or resubmittal of corrected deliverables from the laboratory. Make any necessary corrections and document the effect in the Data Assessment.

.0 Matrix Spikes (Form III)

	YES	NO	N/A
4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present?	[1]		
4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices (one MS/MSD must be performed for every 20 samples of similar matrix or concentration level):			
a. Low Water?	[ ]		[1]
b. Soil?	[1]		

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above. 6/6

ACTION: Circle all outliers with red pencil. 11/12

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

.0 Blanks (Form IV)

	YES	NO	N/A
5.1 Is the Method Blank Summary (Form IV) present?	[1]		
5.2 Frequency of Analysis: Has a reagent/method blank been analyzed for each SDG, every 20 samples of similar matrix and concentration level or each extraction batch, whichever is more frequent?			

	YES	NO	N/A

ACTION: If any blank data are missing, take action as specified above in section 3.2. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required? [ ] ___ /

ACTION: If sulfur clean-up blank data and Form IV are missing, take action as specified in 3.2 above.

5.4 Has a PEST/PCB instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)? [/] ___ ___

ACTION: If any blank data are missing, take action as specified in section 3.2 above.

5.5 Was the correct identification scheme used for all Pest/PCB blanks? (See page B-30, sec. 3.3.7.3 of the SOW for further information.) [/] ___ ___

ACTION: Contact the TOPO to obtain resubmittals or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.

5.6 Chromatography: review the blank raw data - chromatograms, quant. reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable? [/] ___ ___

ACTION: Use professional judgement to determine the

YES NO N/A

effect on the data.

5.0 Contamination

NOTE: "Water blanks", "distilled water blanks" and "drilling water blanks" are validated like any other sample and are not used to qualify the data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent, instrument, or cleanup blanks show positive hits for pest/PCBs? / [ ] ___

6.2 If any method blanks and/or sulfur clean-up blanks contain "hits" for target compounds, are these hits greater than the CRQL for that analyte? / [ ] ___

6.3 In any instrument blanks, is the concentration of any target hit > 0.5 times CRQL for that analyte (see SOW, section 12.1.4.3.3, page D-73/PEST)? ___ [/] ___

NOTE: Most labs will report 0.5 times CRQLs on the instrument blank Form I instead of the actual method CRQLs. If the lab reported the actual CRQLs, then check if any detected hits are above 0.5 times the CRQLs reported on the Form I.

ACTION: If yes to any of the above questions: note in the Data Assessment under Contract Problems/Non-Compliance if any method or clean-up blanks contain hits > the CRQL, or of instrument blank contained hits > 0.5 times CRQL for that analyte.

6.4 Do any field/rinse blanks have positive pest/PCB results? / [ ] ___

BQ98-41 WDT
BQ99RE-8.1

ACTION: Prepare a list of the samples associated with each contaminated blank. (Attach a separate sheet)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Do not convert

YES NO N/A

field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, and/or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

NOTE: When applied as directed in the table below, the contaminant concentration in method/instrument/reagent/cleanup blanks is multiplied by the sample dilution factor, where necessary.

If the laboratory has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate are used to prepare each soil reagent/method blank as instructed on page D-69/PEST, section 12.1.2.3.1. Ask the **TOPO** to contact the laboratory if the soil blanks are not reported in soil units (µg/kg).

Flag sample result with a "U":	**Report CRQL & qualify "U":**	**No qualification is needed:**
Sample conc. > CRQL, but ≤ 5× blank.	Sample conc. < CRQL & is ≤ 5× blank value.	Sample conc. > CRQL & > 5× blank value.

NOTE: If gross blank contamination exists, all data in the associated samples should be qualified as "R", unusable.

6.5 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentrations, use professional judgement

	YES	NO	N/A

to qualify these values and document in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data Systems Printouts for both columns present for all samples, blanks and MS/MSD:

a. Peak resolution check?	[/]	___	___
b. Performance evaluation mixtures?	[/]	___	___
c. Aroclor 1016/1260?	[/]	___	___
d. Aroclors 1221, 1232, 1242, 1248, 1254?	[/]	___	___
e. Toxaphene?	[/]	___	___
f. Low points individual mixtures A & B?	[/]	___	___
g. Med points individual mixtures A & B?	[/]	___	___
h. High points individual mixtures A & B?	[/]	___	___
I. Instrument blanks?	[/]	___	___
j. Were the appropriate GC columns used as specified on pg. D-10/PEST, sections 6.23.3 to 6.23.3.7, in the SOW?	[/]	___	___

7.2 Do the chromatograms for all Individual Standard Mixtures and PEM analyses display single component analytes at > 10% but < 100% of full scale (see sections 9.3.5.8.1 thru 9.3.5.8.4, pages D-30 & 31/PEST)? [/] ___ ___

Have chromatograms for Individual Standard Mixtures and PEM analyses been replotted, showing scaling factor(s), to meet the above requirements when necessary? [/] ___ ___

	YES	NO	N/A

NOTE: All standard chromatograms must clearly display all peaks at > 10% but < 100% of full scale, and replotted if necessary to accommodate peaks not properly scaled in the initial chromatogram(s). Both the initial and replotted chromatograms must be submitted with the data package.

ACTION: If all single component peaks are not clearly displayed on chromatograms for all Individual Standard Mixtures and PEM analyses, notify the TOPO to obtain resubmittal of the necessary data.

7.3 Are Forms VI PEST 1-7 present and complete for each column and each analytical sequence?	[/]	___	___

ACTION: If no, take action as specified in 3.2 above.

7.4 Are there any transcription/ calculation errors between raw data and Forms VI?	___	[/]	___

ACTION: If large errors exist, take action as specified in section 3.2 above.

7.5 Do all standard retention times, including each pesticide in each level of Individual Mixtures A & B, fall within the windows established during the Initial Calibration (see Form VI PEST-1)?	[/]	___	___

ACTION: If no, all samples in the entire analytical sequence are potentially affected. Check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results "JN" and non-detects as unusable (R). For Aroclors, the RT may be outside the window, but the Aroclor may still be identified from its distinctive pattern.

7.6 Are the linearity criteria for the initial

	YES	NO	N/A
analyses of Individual Standards A & B within limits for both columns? (%RSD must be ≤ 25.0 for alpha and delta BHC, ≤ 30.0 for the two surrogates and ≤ 20% for all other analytes.)	[/]		

NOTE: Contractual requirements allow up to two single component TCL compounds, but not surrogates, on each column to exceed the criteria provided the %RSD is ≤ 30%. (See page D-26/Pest, sec. 9.2.5.7 in the SOW.) Technical criteria, however, are the same for all analytes.

ACTION: If technical criteria were not met, qualify all associated positive results generated during the entire analytical sequence "J" and all non-detects "UJ". When %RSD > 90%, flag all non-detect results for that analyte "R" (unusable), **and positive results as "J" estimated.**

ACTION: If more than two analytes failed %RSD, document in the Data Assessment Contract Problems/Non-Compliance section.

7.7 Is the resolution between each pair of adjacent peaks in the Resolution Check Mixture ≥ 60.0% for both columns? (See Form VI PEST-4.) **(D-25/Pest)**	[/]		

ACTION: If no, qualify positive results for compounds that were not adequately resolved "J". Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable (R).

7.8 Is Form VI PEST-5 present and complete for each Performance Evaluation Mixture (PEM) standard used for both initial and continuing calibrations (see SOW section 3.12.4.4, page B-48)?	[/]		

ACTION: If no, take action as specified in section 3.2 above.

7.9 For each PEM standard, was the resolution between

	YES	NO	N/A
each pair of adjacent peaks ≥ 90.0% on both columns?	[/]	___	___

ACTION: Qualify positive results for compounds not adequately resolved estimated (J). Qualify non-detects based on professional judgement.

7.10 Have Forms VI PEST-6 & PEST-7 been completed for all midpoint Individual Standards A and B used for initial calibration?	[/]	___	___
For each standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[/]	___	___

ACTION: If no, qualify positive results for compounds that were not adequately resolved estimated (J). Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable "R".

7.11 Is Form VII Pest-1 present and complete for each PEM standard analyzed during the analytical sequence for both columns?	[/]	___	___

NOTE: If a PEM or Individual std mixture does not meet technical criteria listed on sec. 9.3.5.8.1 through 9.3.5.8.4, it MUST be reinjected immediately. If the second injection meets the criteria, sample analysis may continue. Otherwise, ALL data collection MUST BE STOPPED. Document it in the Data Assessment under Contract Problems/Non compliance.(p. D-31/Pest, sec. 9.3.6.4).

Was the %Breakdown of DDT and Endrin calculated using the equations given on page D-24/PEST, sec. 9.2.4.8 in the SOW?	[/]	___	___
Were all pesticides and surrogates in each PEM standard within the RT windows established during the Initial Calibration?	[/]	___	___

YES NO N/A

ACTION: If no, take action as specified in 3.2 above.

7.12 Has the individual percent breakdown for DDT/Endrin exceeded 20.0% in any PEM on either column? (See Form VII PEST-1.)

- for 4,4'-DDT? ___ [ ] ___

- for Endrin? ___ [ ] ___

Has the combined percent breakdown for DDT/Endrin exceeded 30.0% in any PEM on either column (required for all PEM analyses)? ___ [ ] ___

ACTION: 1. If any percent breakdown has failed the QC criteria in either PEM in steps 2 and 17 in the initial calibration sequence (page D-21/Pest, sec. 9.2.3.4 in the SOW), qualify all samples in the entire analytical sequence as described in sections 2.a, b and c below.

2. If any percent breakdown failed the QC criteria in a PEM calibration verification analysis, review data beginning with the samples which followed the last in-control standard until the next acceptable PEM and qualify the data as described below.

a. 4,4'-DDT Breakdown: If DDT breakdown was > 20.0%:

I. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT unusable, "R".

ii. Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

b. Endrin Breakdown: If endrin breakdown was > 20.0%:

I. Qualify all positive results for endrin

YES NO N/A

with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN".

c. Combined Breakdown: If the combined 4,4'-DDT and endrin breakdown is greater than 30.0%:

I. Qualify all positive results for DDT and Endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for endrin as unusable "R". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN". Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

7.13 Are all percent difference (%D) values for PEM analytes and surrogates on both columns ≥ -25% and ≤ +25.0%? (See Form VII PEST-1.) [ ] ___ ___

ACTION: If no, qualify all associated positive results generated during the analytical sequence "J" and sample quantitation limits "UJ".

NOTE: If the failing PEM is part of the initial calibration, all samples are potentially affected. If the offending standard is a calibration verification, the associated samples are those which followed the last in-control standard until the next passing standard.

7.14 Is Form VII Pest-2 present and complete for each

	YES	NO	N/A
INDA and INDB calibration verification analyzed?	[1]	___	___

ACTION: If no, take action specified in 3.2 above.

7.15 Are there any transcription/calculation errors between raw data and Form VII Pest-2?	___	[1]	___

ACTION: If large errors exists, take action as specified in section 3.6 above.

7.16 Do all standard retention times for each INDA and INDB calibration verification fall within the RT windows established during the initial calibration sequence? (See Form VII PEST-2.)	[1]	___	___

ACTION: If no, beginning with the samples which followed the last in-control standard, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results and non-detects as unusable (R).

7.17 Are all %D values for INDA and INDB calibration verification compounds ≥ -25.0% and ≤ +25.0%?	[1]	___	___

ACTION: If the %D is outside the ±25.0% range for any compound(s), qualify associated positive results for that compound "J" and non-detects "UJ". The "associated samples" are those which followed the last in-control standard up to the next passing standard containing the analyte(s) in question. If the %D is > 90%, flag all non-detects for that analyte "R" (unusable).

0 Analytical Sequence Check (Form VIII-PEST)

8.1 Is Form VIII present and complete for each column and each period of analyses?	[1]	___	___

ACTION: If no, take action specified in 3.2 above.

	YES	NO	N/A
8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/ECD instrument used.? (See SOW pages D-21 & D-55/PEST.)	[1]	___	___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Were all samples analyzed within a 12 hour time period beginning with the injection of an instrument blank and bracketed by acceptable analyses of the proper standards?	[1]	___	___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Document in the Data Assessment under Contract Problems/Non-Compliance.

8.4 If a multi-component analyte was detected in a sample, was a matching multi-component standard analyzed within 72 hours of the injection of the sample and within a valid 12 hour sequence?	[1]	___	___

NOTE: This additional standard is for identification purposes only. Positive results for Aroclors and Toxaphene are quantitated from the initial calibration.

ACTION: If no, document in the Data Assessment under Contract Problems/Non-Compliance.

Cleanup Efficiency Verification (Form IX)

9.1 Is Form IX PEST-1 present and complete for each lot of Florisil Cartridges used? (Florisil Cleanup is required for all Pest/PCB extracts.)	[1]	___	___

Are all samples listed on the Pesticide Florisil

	YES	NO	N/A
Cartridge Check Form?	[/]		

ACTION: If no, take action specified in 3.2 above. If data suggests florisil clean-up was not performed, document in the Data Assessment under the Contract Non-compliance section.

9.2 Are percent recoveries (%REC) of the pesticide and surrogate compounds used to check the efficiency of the florisil clean-up procedure within QC limits of 80 - 120%?	[/]		

ACTION: Qualify only the analyte(s) which failed the recovery criteria as follows:

If %REC is < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 120%.

NOTE: Sample data should be evaluated for potential interferences if recovery of 2,4,5-trichlorophenol was > 5% in the Florisil Cartridge Performance Check analysis. Document any problems found in the Data Assessment under the Contract Problems/Non-Compliance section.

9.3 If GPC Cleanup was performed (mandatory for all soil sample extracts), is Form IX Pest-2 present?	[/]		
Are all soil samples listed on Form IX Pest-2?	[/]		

ACTION: If no, take action specified in 3.2 above. If data suggests GPC clean-up was not performed when required, document in the Data Assessment under the Contract Problems/Non-Compliance section.

Are the %REC values for all pesticides in the GPC

	YES	NO	N/A
calibration solution between 80 - 110%?	Y		

ACTION: Qualify only those analytes which failed the recovery criteria as follows:

If %REC are < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 110%.

NOTE: An Aroclor mixture containing Aroclors 1016 and 1260 is also analyzed during GPC calibration; however, Aroclor data is not listed on Form IX PEST-2. The raw GPC data for Aroclors 1016/1260 must be evaluated for pattern similarity with previously analyzed Aroclor standards.

9.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-30, sec. 3.3.7.2 and 3.3.7.9 of the SOW for further information.

Was the correct identification scheme used for GPC and Florisil blanks?	Y		

0 Pesticide/PCB Identification

10.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	Y		

ACTION: If no, take action specified in 3.2 above.

10.2 Are all sample chromatograms properly scaled, attenuated, etc. as required for proper identification of single and multi-component analytes? (Refer to SOW sections 11.3.7.1 thru 11.3.7.8, page D-67/Pest for specific details.)	Y		

NOTE: Proper verification of Pest/PCB results depends

	YES	NO	N/A

on clear, legible presentation of the raw data. Single component pesticides and all peaks chosen for quantitation of multi-component analytes must appear at less than full scale. Toxaphene and PCB patterns must be clearly visible to enable comparison with standard chromatograms.

ACTION: If retention times or apex of peaks cannot be verified, or if multi-component peak patterns cannot be discerned, contact the WAM to obtain rescaled chromatograms from the lab.

10.3 Are there any transcription/calculation errors between raw data and Forms 10A and 10B? [ ] /

ACTION: If large errors exist, take action as specified in section 3.2 above.

10.4 Are RTs of sample compounds within the established RT windows for analyses on both columns? [/]

Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/mℓ in the final extract)? [ ]

ACTION: Use professional judgement to qualify positive results which were not confirmed by GC/MS analysis. Qualify as unusable (R) all positive results which were not confirmed on a second GC column. Also qualify as unusable (R) all positive results which do not meet RT window criteria, unless associated standard compounds are similarly biased. Use professional judgement to assign an appropriate quantitation limit.

10.5 Is the percent difference (%D) calculated for the positive sample results on both columns > 25.0%? / [ ]

ACTION: If the reviewer finds neither column shows interference for the positive hits, the **Pesticide** data should be flagged as follows:

YES NO N/A

% Difference	Qualifier
0 - 25%	None
26 - 70%	"J"
71 - 100%	"JN"
100 - 200% (No Interference)	"R"
100 - 200% (Interference detected)*	"JN"
> 50% (Pesticide value is < CRQL)**	"U"
> 200%	"R"

* When the reported %D is 100- 200%, but interference is detected on either column, qualify the data with "JN".

** When the reported pesticide value is lower than the CRQL, and the %D is > 50%, raise the value to the CRQL and qualify "U", undetected.

NOTE: For Aroclors, if the %D is > 50%, but the pattern of GC peaks on both columns indicates a specific Aroclor is present, qualify that Aroclor "J".

NOTE: The lower of the two values is reported on Form I. If using professional judgement, the reviewer determines that the higher result was more acceptable, the reviewer should replace the value and indicate the reason for the change in the Data Assessment.

10.6 Check chromatograms for false negatives, especially the multiple-peak compounds (Toxaphene and the PCBs). Were there any false negatives? ___ [1] ___

ACTION: Use professional judgement to decide if the compound should be reported. If the appropriate PCB standards were not analyzed within 72 hrs. of the sample(s) in question, qualify the data unusable "R".

Also note in Data Assessment under Contract Problems/Non-Compliance if the lab failed to analyze Aroclor standards when required.

Target Compound List (TCL) Analytes

11.1 Are the Organic Analysis Data Sheets (Form I

	YES	NO	N/A
Pest) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates?	[/]	___	___
c. Blanks?	[/]	___	___
d. Instrument Blanks (per column & analysis)?	[/]	___	___
11.2 Are the Pest chromatograms and quant. reports included in the sample data package for each of the following:			
a. Samples and/or fractions as appropriate?	[/]	___	___
b. Matrix spikes and matrix spike duplicates?	[/]	___	___
c. Blanks?	[/]	___	___
d. Instrument Blanks (per column & analysis)?	[/]	___	___
ACTION: If any data are missing, take action specified in 3.2 above.			
11.3 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[/]	___	___
b. Resolution?	[/]	___	___
c. Peak shape?	[/]	___	___
d. Full-scale graph attenuation?	[/]	___	___
e. Other: _____?	[ ]	___	___
11.4 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[/]	___
ACTION: Use professional judgement to determine the acceptability of the data. Address comments			

YES NO N/A

under System Performance section of the Data Assessment.

.0 Compound Quantitation and Reported Detection Limits

12.1 Are there any transcription/calculation errors in Form I results? Check at least two positive results. Were any errors found? ___ [/] ___

NOTE: Single-peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. Use professional judgement to decide whether a large discrepancy indicates the presence of an interfering compound. If an interfering compound is visible on the chromatogram, the lower of the two values should be reported and qualified as presumptively present at an approximated quantity "JN". This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has interfered with the evaluation of the second column confirmation.

12.2 Are the CRQLs adjusted to reflect sample dilutions? [/] ___ ___

ACTION: If large errors exist, take action as specified in section 3.2 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs from the diluted sample). Replace concentrations which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

ACTION: Quantitation limits affected by large, off-scale

YES NO N/A

peaks should be qualified as unusable (R). If the interference is on-scale, the reviewer may offer an approximated quantitation limit (UJ) for each affected compound.

NOTE: If a sample required greater than a 10 times dilution, then a 10 times more concentrated analysis must also be performed and submitted (see SOW, page D-57/PEST, section 10.2.3.5).

ACTION: If a more concentrated analysis is unavailable, document in the Contract Problems/Non-Compliance section of the Data Assessment. Use professional judgement to qualify non-detects and positive hits below the CRQL.

.3.0 Field Duplicates

13.1 Were any field duplicates submitted? [/] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

ATTACHMENT 1

CLP Data Assessment

RECEIVED
JUN 16 2004
HAZ. WASTE SUPPORT SEC.

SDG Narrative

The enclosed data package is in response to USEPA, Region II, Case No. 32903, and SDG No. BQQ91, Contract No. 68-W-03-018. Under this SDG there are 11 VOA, 11 SVOA and 10 PEST/PCB samples received at Ceimic Corporation on May 18, 2004.

EPA ID:	CEIMIC ID:	Analysis
BQQ91	040415-01	VOA, SVOA, PEST/PCB
BQQ92	040415-02	VOA, SVOA, PEST/PCB
BQQ93	040415-03	VOA, SVOA, PEST/PCB
BQQ94	040415-04	VOA, SVOA, PEST/PCB
BQQ95	040415-05	VOA, SVOA, PEST/PCB
BQQ95MS	040415-05MS	PEST/PCB
BQQ95MSD	040415-05MSD	PEST/PCB
BQQ96	040415-06	VOA, SVOA, PEST/PCB
BQQ97	040415-07	VOA, SVOA, PEST/PCB
BQQ98	040415-08	VOA, SVOA
BQQ98MS	040415-08MS	VOA, SVOA
BQQ98MSD	040415-08MSD	VOA, SVOA
BQQ99	040415-09	VOA, SVOA, PEST/PCB

(1) Sample Receipt

Cooler Temperatures upon receipt were 2°C.

(2) Instrumentation and Column Identification

The following instruments were used for the analyses:

GC/ECD Analysis

A. VOA

MS15 HP5972 GC/MS, 30m, 0.25mm ID, 1.4 um, DB-624 capillary column. OI trap #10 (8cm Tenax, 8cm silica gel, 8cm carbon molecular sieve)

B. SVOA

MS4 HP5890SeriesII GC, HP5970BMS,30 m,0.25 mm ID, ZB-5 fused silica capillary column

C. PEST/PCB

AD6: HP5890II (GC8) using 30m x 0.53mm ID, DB5 megabore column

AD7: HP5890II (GC8) using 30m x 0.53mm ID, DB35 megabore column

(3) Sample Information

An "x" qualifier is flagged by Target Thru-put software whenever the data is manually edited. The letter "M" for GC/MS and for GC is used on the raw data of the quantitation report whenever a manual integration is performed. Manual integrations are performed on GC/MS and GC standards and samples when computer generated integration picks up only a portion of the chromatographic peak, due to software limitations. When manual integrations are required, these integrations are performed using sound defensible professional judgment, in order to report accurate data. Each manual integration is signed and dated, and reviewed by both the lab supervisor and the GC/MS Interpretation Specialist for GC/MS or the Organic Lab Manager for Pest/PCB.

A. VOA Fraction (Method CLP SOW OLM04.3)

The %moistures of the soil samples were:

Client ID:	Ceimic ID:	%M:
BQQ91	040415-01	22
BQQ92	040415-02	20
BQQ93	040415-03	20
BQQ94	040415-04	19
BQQ95	040415-05	29
BQQ96	040415-06	22
BQQ97	040415-07	25
BQQ98	040415-08	20
BQQ99	040415-09	16

The Relative Percent Differences (RPD) of toluene and chlorobenzene were flagged as outliers in the comparison of the duplicate matrix spikes.

B. SVOA Fraction (Method CLP SOW OLM04.3)

The pH and %moisture of the soil samples were:

Client ID:	Ceimic ID:	pH	%M
BQQ91	040415-01	7.7	19
BQQ92	040415-02	8.3	28
BQQ93	040415-03	7.4	64
BQQ94	040415-04	7.0	12
BQQ95	040415-05	6.7	28
BQQ96	040415-06	7.9	36
BQQ97	040415-07	6.8	10
BQQ98	040415-08	6.5	46
BQQ99	040415-09	7.2	13

Manual quantitations were performed on one or more of the process files associated with this SDG, including sample BQQ96. The recovery of the spike compound N-nitroso-di-n-propylamine was flagged as an outlier in the matrix spike. The Relative Percent Differences (RPD) of phenol, N-nitroso-di-n-propylamine, and acenaphthene were flagged as outliers in the comparison of the duplicate matrix spikes.

C. PEST/PCB Fraction (Method CLP SOW OLM04.3)

All original sample extractions were performed and the extracts analyzed within their respective holding times.

As described in e-mail correspondence with Mr. Steve Remaley since 06/01/04, the laboratory received EPA Region III cases 32833 and 32925 with a large number of samples containing 4,4'-DDT at hazardous waste levels (up to 0.24% of dry weight). Following identification of the various contaminated equipment, decontamination thereof, and bringing the laboratory back to normal production, we are now confident that there is no further 4,4'-DDT contamination in our lab. Although this contamination has been eliminated and recently extracted EPA samples show no 4,4'-DDT, some of the samples reported in this SDG were affected:

Method blank PBLK01, associated with all original extractions in this SDG, showed a positive detect for 4,4'-DDT at a concentration of 7.8 ppb. Therefore, all samples (except for sample BQQ98, of which no sample material remained after the original extraction) were re-extracted 11 days after receipt (1 day out of hold time), for which a waiver was granted. The method blank associated with the re-extraction showed no 4,4'-DDT above the CRQL. The re-extracted samples showed positive detects very similar to the original analyses, which suggests that the DDT contamination may have been limited to the method blank.

5/13 → 6 ~ 20 days

The following samples contained target analytes at concentrations above the linearity range of the initial calibration. They were diluted and re-analyzed:

Sample	Dilution Factor
BQQ93	10
BQQ93RE	10
BQQ94	10
BQQ94RE	10
BQQ95	10
BQQ95RE	10
BQQ96	10
BQQ96RE	10

The following Surrogate recoveries were outside the QC limits, mostly due to the apparent presence of DCB in the samples:

Sample	% TCX 1	% TCX 2	% DCB 1	% DCB 2
BQQ91				231
BQQ94			553	513
BQQ93			432	405
BQQ97			200	207
BQQ96			195	286
BQQ95			400	405
BQQ91RE				169
BQQ95MS			322	317
BQQ93RE			378	351
BQQ94RE			500	467
BQQ95RE			556	667
BQQ95MSD			344	344
BQQ97RE		29	193	207
BQQ96RE			233	281

The following recoveries were outside the QC limits in BQQ95MS/MSD:

Analyte	% MS	% MSD	%RPD
Gamma-BHC	25	25	
Heptachlor	25	27	
Aldrin	23	24	
Dieldrin	13	15	
Endrin	28	26	
4,4'-DDT		154	

No other non-compliances were noted.

Deviations from the SOW

None other than specified above.

End of SDG Narrative

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the laboratory manager or his/her designee, as verified by the following signature.

Ines Bauer, Ph. D
Laboratory Manager

06/15/04
Date

RECEIVED
JUN 16 2004
HAZ. WASTE SUPPORT SEC.

SAMPLE DELIVERY GROUP (SDG)
TRAFFIC REPORT (TR) COVERSHEET

Lab Name: Ceimic Corporation **Lab Code:** CEIMIC

Case No.: 32903 **Bid Lot:** D

Contract No: 68W03018 **Full Sample Analysis Price:** $266.00

First Sample in SDG: BQQ91 **Sample Receipt Date:** 5/18/2004

(Lowest EPA Sample Number in the first shipment of samples received under SDG.)

Last Sample in SDG: BQQ99 **Sample Receipt Date:** 5/18/2004

(Highest EPA Sample Number in the last shipment of samples received under SDG.)

EPA Sample Numbers in the SDG (listed in alphanumeric order by date received)

1. BQQ91
2. BQQ92
3. BQQ93
4. BQQ94
5. BQQ95
6. BQQ96
7. BQQ97
8. BQQ98
9. BQQ99

Note: There are a maximum of 20 field samples in an SDG.

Attach Traffic Reports to this form in alphanumeric order by date received.
(i.e. The order listed on this form)

Jessica Muldoon
Signature

06/07/04
Date

177

Ryan Montalbano

From: Bauer, Heather [Heather.Bauer@dyncorp.com]
Sent: Tuesday, June 08, 2004 1:23 PM
To: Jessica Muldoon (E-mail); Kristen Riley; Liz Asting (E-mail); Ryan Montalbano
Cc: Jennifer Feranda (E-mail); Adly Michael (E-mail); Robert Toth (E-mail); Hanif Sheikh (E-mail)
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems | FINAL

Ryan,
Following is the resolution from Region 2. Per the Region, the lab should proceed with the analysis of all samples (except sample BQQ98 that has no material left) after the laboratory decontamination and fourth extraction. Please note the issues in the SDG Narrative and proceed with the analysis of the samples. Please let me know if you have any additional questions or problems.

Thanks,
Heather

Heather Bauer
CSC
Environmental Coordinator
Regions 1 and 2
(703) 818-4220
heather.bauer@dyncorp.com

-----Original Message-----
From: Sheikh.Muhammad@epamail.epa.gov
Sent: Tuesday, June 08, 2004 1:18 PM
To: Bauer, Heather
Cc: Adly Michael (E-mail); Jennifer Feranda (E-mail); Robert Toth (E-mail)
Subject: Re: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Heather,
Yes, the lab should proceed with the analysis of all samples (except sample BQQ98 that has no material left) after the laboratory decontamination and fourth extraction.

Thanks,

Hanif Sheikh
Alt. CLP PO
EPA REgion 2
Tel. 732-906-6169

"Bauer, Heather"
To: Muhammad Sheikh, Robert Toth, Jennifer Feranda, Adly Michael
06/08/2004 11:57 AM
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Hanif,
Following is the response from CEIMIC regarding the clean method detection blank. The lab is reporting that the fourth extraction was only begun yesterday, after laboratory decontamination was confirmed. Results on the method blank associated with this fourth extraction will not be available until at least Thursday. Please advise if the lab should proceed with the resolution provided previously.

Thanks,
Heather

Heather Bauer
CSC
Environmental Coordinator
Regions 1 and 2
(703) 818-4220
heather.bauer@dyncorp.com

1225

-----Original Message-----
From: Ryan Montalbano
Sent: Tuesday, June 08, 2004 12:00 PM
To: 'Bauer, Heather'
Subject: RE: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Hi Heather.
The fourth extraction was only begun yesterday, after laboratory decontamination was confirmed. Results on the method blank associated with this fourth extraction will not be available until at least Thursday.

-Ryan

Ryan Montalbano
Supervisor, Inorganic Chemistry Laboratories
Ceimic Corporation
10 Dean Knauss Drive
Narragansett, RI 02882
(401)782-8900
Fax (401)782-8905
rmontalbano@ceimic.com

-----Original Message-----
From: Bauer, Heather
Sent: Tuesday, June 08, 2004 11:38 AM
To: Jessica Muldoon (E-mail); Kristen Riley; Liz Asting (E-mail); Ryan Montalbano
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Ryan,
Region 2 would like to know if the method blank used for the fourth extraction was clean. Please let me know as soon as possible.

Thanks,
Heather

Heather Bauer
CSC
Environmental Coordinator
Regions 1 and 2
(703) 818-4220
heather.bauer@dyncorp.com

-----Original Message-----
From: Sheikh.Muhammad@epamail.epa.gov
Sent: Tuesday, June 08, 2004 11:33 AM
To: Bauer, Heather
Cc: Adly Michael (E-mail); Jennifer Feranda (E-mail); Robert Toth (E-mail); Karras.George@epamail.epa.gov
Subject: Re: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Hi Heather,
Please advise the lab to proceed with the analysis of all other samples in the case. Since there is no material of sample BQQ98 left for extraction, it cannot be analyzed. Here is a question for the lab: Was the method blank for samples that required fourth extraction clean?

Hanif Sheikh
Alt. CLP PO
EPA REgion 2
Tel. 732-906-6169

"Bauer, Heather"
To: Jennifer Feranda, Adly Michael, Robert Toth, Muhammad Sheikh
06/08/2004 08:35
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Hanif,
CEIMIC is still waiting for a resolution to the other issue for Case 32903. This issue is that they do not have any material remaining for sample BQQ98 to perform any type of Pest/PCB extraction. All previous extractions are associated with method blanks that have high levels of DDT. Please advise on how the lab should proceed.

Thanks,
Heather

Heather Bauer
CSC
Environmental Coordinator
Regions 1 and 2
(703) 818-4220
heather.bauer@dyncorp.com

-----Original Message-----
From: Ryan Montalbano
Sent: Monday, June 07, 2004 5:03 PM
To: 'Bauer, Heather'
Cc: Tara Dameron (E-mail)
Subject: RE: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems | FINAL
Importance: High

Heather/Tara,
Please advise on the other issue: namely that there is no material remaining of sample BQQ98 to perform any type of Pest/PCB extraction whatsoever. All previous extractions are associated with method blanks that have high levels of DDT.

Thanks! -Ryan

Ryan Montalbano
Supervisor, Inorganic Chemistry Laboratories
Ceimic Corporation
10 Dean Knauss Drive
Narragansett, RI 02882
(401)782-8900
Fax (401)782-8905
rmontalbano@ceimic.com

-----Original Message-----
From: Bauer, Heather
Sent: Monday, June 07, 2004 4:44 PM
To: Jessica Muldoon (E-mail); Kristen Riley; Liz Asting (E-mail); Ryan Montalbano
Cc: Adly Michael (E-mail); Jennifer Feranda (E-mail); Robert Toth (E-mail); Sheikh.Muhammad@epamail.epa.gov
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems | FINAL

This is Tara Dameron. Heather has left for the day.

Per Region 2, the lab should proceed with using Sample BQQ95 as the PEST MS/MSD. Let me know if you have any questions or problems.

Thanks,
Tara

Heather Bauer
CSC
Environmental Coordinator
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(703) 818-4220
heather.bauer@dyncorp.com

-----Original Message-----
From: Sheikh.Muhammad@epamail.epa.gov
Sent: Monday, June 07, 2004 4:23 PM
To: Bauer, Heather

Cc: Adly Michael (E-mail); Jennifer Feranda (E-mail); Robert Toth (E-mail)
Subject: Re: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Hi Heather,
Yes, the lab can use sample BQQ95 as the Pest/PCB MS/MSD.

Hanif sheikh
Alt. CLP PO
Region 2
Tel (732)906-6169

"Bauer, Heather"
To: Jennifer Feranda, Adly Michael, Robert Toth, Muhammad Sheikh
06/07/2004 02:58 PM
Subject: Region 02 | Case 32903 | Lab CEIMIC | Issue Laboratory problems

Following is an email from CEIMIC regarding Case 32903. The lab is reporting that several of the samples require a fourth extraction for Pest/PCB due to a contamination of all samples and blanks with 4,4'-DDT. The source of the contamination was determined to be a series of samples from an unrelated CLP Case from Region 3, which required 100x - 1,000,000x dilutions for DDT. Sample BQQ98 was listed on the TR/COC as the MS/MSD sample, does not have any material left with which to perform the fourth set of extractions. It has been completely consumed by the BNA extraction and the first three Pest/PCB extractions. The lab would like to use sample BQQ95 as the Pest/PCB MS/MSD instead. Please advise on how the lab should proceed.

Thanks,
Heather

Heather Bauer
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-----Original Message-----
From: Ryan Montalbano
Sent: Monday, June 07, 2004 3:00 PM
To: Heather Bauer (E-mail)
Subject: RE: Case 32903 samples to be reextracted, no mass remaining for one

Hi Heather.
Several samples in Case 32903 require a fourth extraction for Pest/PCB. The reason for the three re-extractions is contamination of all samples and
blanks with 4,4'-DDT. The source of the contamination was determined to be a series of samples from an unrelated CLP Case from Region 3, which required 100x - 1,000,000x dilutions for DDT. Sample BQQ98 in Case 32903, being an assigned MS/MSD sample, does not have any material left with which to perform the fourth set of extractions. It has been completely consumed by the BNA extraction and the first three Pest/PCB extractions. Please advise. A Pest/PCB MS/MSD will be extracted on sample BQQ95 instead.

Thanks! -Ryan

Ryan Montalbano
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