39911

RECORD OF DECISION

Barceloneta Landfill Site

Barceloneta, Puerto Rico

United States Environmental Protection Agency
Region II
New York, New York
July 1996

500001

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Barceloneta Landfill
Florida Afuera Ward
Barceloneta, Puerto Rico

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selection of the remedial action for the Barceloneta Landfill Site in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document summarizes the factual and legal basis for selecting the remedy for this Site.

The Puerto Rico Environmental Quality Board (EQB) concurs with the selected remedy (see Appendix IV).

An administrative record for the Site contains the documents that form the basis for EPA's selection of the remedial action, the index for which is attached as Appendix III.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The primary objective of this remedy is to control the source of contamination at the Site and to reduce and minimize the migration of contaminants into Site media thereby minimizing any health and environmental impacts.

The major components of the selected remedy include the following:

- Installing a low permeability cover system for the three landfill cells meeting the requirements of the Resource Conservation and Recovery Act Subtitle D and Puerto Rico's Regulations Governing Landfill Closure . This cover system or landfill cap(s) will further reduce infiltration of precipitation water into the landfill and reduce leachate generation thus mitigating impacts to ground water.

- Regrading the Site and installing storm water management improvements at the Site to reduce infiltration of storm water into the landfill and reduce leachate generation.

- Conducting long term ground water and surface water monitoring to evaluate the effectiveness of the cover system. It is anticipated that monitoring will be conducted on a quarterly basis for the first year, semi-annually for the next four years, and then annually. Monitoring will include the eight existing monitoring wells. Initially, the wells will be sampled for a broad parameter list. The list was developed based on constituents detected above Safe Drinking Water Act Maximum Contaminant Levels in the Remedial Investigation and on the requirements of the Resource Conservation and Recovery Act Subtitle D and Puerto Rico's Regulation Governing Landfill Closure (RMNHSW). After the first five years, the parameter list would be reviewed and those parameters not detected above standards would be omitted. The exact long term ground water monitoring program will be further defined during remedial design (RD).

- Conducting a landfill gas survey during predesign to determine the necessity of a landfill gas collection system. The appropriate type of system, if necessary, will be determined during RD.

- Implementing a long term operation and maintenance program for the cover system which will include inspection of the system and provision for repair.

- Recommending to appropriate authorities that institutional controls be emplaced. Institutional controls are recommended in order to protect the integrity of the landfill cover system and to reduce potential exposure to landfill contents. The institutional controls will include recommending that zoning restrictions be applied to the Site to limit future land use and recommending that a deed restriction be established to limit future land and ground-water use.

- Installing a perimeter fence with signs to restrict access.

- Reevaluating Site conditions at least once every five years to determine if a modification of the selected remedy is necessary.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable, given the scope of the action. However, because the contaminant source, the Site itself, could not be effectively excavated and treated as a result of the volume of waste and the absence of hot-spots representing major sources of contamination, the selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. Since this remedy will allow

hazardous substances, pollutants, or contaminants to remain on-site above health-based levels, a review of this remedy will be conducted at least once every five years after the initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

William J. Fox

Jeanne M. Fox
Regional Administrator

7/5/96
Date

RECORD OF DECISION FACT SHEET
EPA REGION II

Site:

Site name: Barceloneta Landfill

Site location: Barceloneta, Puerto Rico

HRS score: 62.5 dated August 3, 1982.

Listed on the NPL: September 1st, 1983.

Record of Decision:

Date signed:

Selected remedy: Containment

Estimated Construction Completion: two years

Capital Cost: $5,453,200

O & M Cost: $236,207/yr

Present-worth O&M Cost (5% discount rate for 30 years): $4,836,800

Total Cost: $10,290,000

Lead:

U.S. Environmental Protection Agency (enforcement lead)

Primary Contact: Luis E. Santos (787) 729-6951

Secondary Contact: Melvin Hauptman (212)637-3952

Main PRPs:
Abbot Laboratories,
American Cyanamid Company,
Browning-Ferris Industries of Puerto Rico, Inc,
E.I. Du Pont de Nemours & Company,
Merck & Company, Inc.,
Roche Products, Inc.,
Schering Pharmaceuticals Corp.,
Sterling Pharmaceuticals Inc.,
Town of Barceloneta,
Union Carbide Corporation &
Upjohn Manufacturing Co.

Waste:

Waste type: municipal solid waste with metals and volatile organics

Waste origin: households and industries

Estimated waste quantity: 500,000 yd^3

Contaminated medium: ground water

RECORD OF DECISION
DECISION SUMMARY

Barceloneta Landfill

Barceloneta, Puerto Rico

United States Environmental Protection Agency
Region II
New York, New York

TABLE OF CONTENTS

ATTACHMENTS

SITE NAME, LOCATION AND DESCRIPTION

The Barceloneta Landfill, an active non-hazardous domestic and industrial waste facility, is located in Barceloneta, Puerto Rico on the north coast of the island, approximately 20 miles due west of San Juan. The Landfill is about 4.5 kilometers south of the town of Barceloneta in Florida Afuera Ward. The entire property which comprises the Barceloneta Landfill is approximately 32.6 hectares (80.6 acres) in size and is owned by the Municipality of Barceloneta. The Landfill is surrounded by a tropical forest. The Quebrada Cimarrona, a tributary of the Rio Grande de Manatí, is located 0.8 kilometers north of the landfill. A small residential area of approximately 150 residences in Barrio Bajura Adentro is located approximately one kilometer east of the Site. Approximately two kilometers north of the Site, in an area with more gentle topographic relief, there are a series of manufacturing facilities. The nearest village is Cruce Magueyes, located approximately two kilometers to west-north-west of the Site. The residences in the area of the landfill are served by a public supply system that uses ground water as a source.

The Site comprises three separate waste disposal areas (the northern, southern, and southeastern), a borrow area, and a dirt access road. The northern disposal area (NDA) is separated into two sections by the access road, the southern disposal area is also known as the Superfund disposal area (SFDA) or "El Superfondo". Both the northern and southern disposal areas are filled and inactive. The southeastern disposal area (SDA) is still active, and is expected to reach capacity in another 2 years, depending on final grading plans. Although the southern disposal area is known as the SFDA, all three areas are considered to be part of the Superfund National Priorities List (NPL) site. The three waste disposal areas comprise approximately six hectares (15 acres). Each disposal area is located in a depression referred to as a "sumidero" (sinkhole) that is surrounded by conical limestone hills referred to as "mogotes". See Figure 1.

The Landfill is located in a belt of rugged karst topography that extends along the north coast from 30 kilometers (19 miles) east of San Juan to the west of the island. In the vicinity of the Site, this belt is located from about one kilometer south of the coast to about 20 kilometers (12 miles) inland. North (seaward) of this rugged karst region is a belt of relatively flat coastal plain sediments. South (landward), the rugged karst terrain transitions into the central mountainous core of the island. Features of this karst landscape include numerous sumideros, steep scarp cliffs on the mogotes and adjoining ridges which surround the sumideros, and a lack of surface streams or drainage features associated with individual sumideros.

The Site is underlain by the northern limestone province of Puerto Rico which consists of blanket deposits, the Aymamon Limestone, the Aguada Limestone, the Cibao Formation, and the Lares Formation. Groundwater exists under unconfined conditions in the Aymamon and Aguada Limestones and under confined conditions in the Cibao and Lares Formations. Groundwater flow is to the north.

Groundwater in this area of the northern province discharges to the Rio Grande de Manati (river) and the Cano Tiburones (wetlands) which are 2.7 kilometers (1.7 miles) north of the

Site. Groundwater also feeds the Ojo de Guillo spring located 1 kilometer (0.6 miles) northeast of the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The 32.6-hectare (80.6 acres) area where the Barceloneta Landfill is located was purchased by the municipality of Barceloneta as three separate parcels during the early 1970s. Preparation of the Site for landfill use began in April 1972, and the landfill operations commenced in August 1973. During operation of the landfill from 1973 to date, three depressions have been used for waste disposal. Reportedly, the landfill was initially approved to receive both municipal and industrial waste. (Ebasco Services, Inc. June 1990). Beginning in 1975, disposal in the Landfill was restricted to municipal waste only. However, disposal of industrial wastes reportedly continued. Specific dates of active filling in each of the three disposal areas are difficult to determine given the lack of record keeping at the Site. The EQB has information which indicates that the entire Landfill was used in the late 1970's (prior to the passage of the Resource Conservation and Recovery Act) for disposal of wastes which contained hazardous substances.

Personnel from EQB and the Department of Health conducted numerous inspections of the Site and listed various violations. These violations included insufficient cover material; allowing refuse to burn; the presence of flies, rats and mosquitoes; allowing unlimited access to the landfill, and allowing people to inhabit structures in the landfill.

The Site was proposed for inclusion on the NPL in December 1982, and was subsequently approved and listed as an NPL site in September 1983. In 1984, a Remedial Action Master Plan (RAMP) was prepared by an EPA contractor for the Site (NUS, 1984). Based on the RAMP, a Remedial Investigation and Feasibility Study (RI/FS) Work Plan was developed (Ebasco Services, Inc., June 1990). In September 1990, the Consent Order was signed in which the potentially responsible parties (PRPs) agreed to perform the RI/FS for the Site. Pursuant to the Work Plan, sampling of subsurface soils, ground water and surface water was completed. The first phase of the RI was completed in 1992 and the second phase of the RI field work was completed in January 1994. A final RI report was received by EPA in March 1995 and the streamlined Risk Assessment (Abbreviated Risk Assessment) was completed in May 1995. An abbreviated Final FS was conducted in accordance with EPA's Presumptive Remedy approach (this is discussed in further detail in the "Scope and Role of Response Action" section). The FS was received by EPA in September 1995.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI report, FS report, Abbreviated Risk Assessment and the Proposed Plan for the Site were released to the public for comment on December 27, 1995. These documents were made available to the public in the administrative record file at four information repositories maintained at the Sixto Escobar Municipal Library, Barceloneta, P.R.; U.S. Environmental Protection Agency, Caribbean Field Office, Centro Europa Building; U.S. Environmental

Protection Agency, Region II Office Superfund Record Center in New York City; and Puerto Rico Environmental Quality Board. The notice of availability for the above-referenced documents was published in the San Juan Star, El Nuevo Día on December 27, 1995 and El Periódico El Norte on December 28, 1995. The public comment period on these documents was held from December 27, 1995 to January 26, 1996. In addition, over the last four years EPA has conducted numerous public meetings and maintained contact with local concerned groups as well as the community at large.

On January 18, 1996, EPA conducted a public meeting at the Tosas Ward's Christian Pentecostal Church, to inform local officials and interested citizens about the Superfund process, to present the Proposed Plan for the Site including the preferred alternative for remediation of the Site, and to respond to any questions from area residents and other attendees. The comments received at the public meeting generally focused on drinking water contamination, implementation schedule, and Site-related risks. Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF RESPONSE ACTION

The primary objectives of the selected action are to control the source of contamination at the Site, and reduce and minimize the migration of contaminants into Site media thereby minimizing any health and ecological impacts.

EPA is considering containment as the appropriate technology to address conditions at the Site based on the findings of the RI study. The Abbreviated Risk Assessment showed levels of contaminants found at the Site pose a relatively low long-term threat to public health and the environment. A municipal landfill, such as the Barceloneta Landfill, is a type of site where removal of waste is not practical because of the large volumes of waste and the diverse mixture of waste, e.g., municipal waste with industrial waste. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which prescribes the rules for implementing the Superfund Law, provides for the use of engineering controls, such as containment at sites where the waste poses a relatively low long-term threat or where treatment is not practical.

Under ordinary circumstances, EPA would have conducted an FS as the next step in the Superfund process to evaluate alternative cleanup methods (remediation) for the Site. In the case of the Barceloneta Landfill, which is a municipal landfill and where treatment is not practical, an abbreviated FS was conducted in accordance with EPA's Presumptive Remedy approach. Presumptive remedies are preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation. For CERCLA municipal landfills, containment is the presumptive remedy. Containment under the Presumptive Remedy approach may include the following components: landfill cap, control of affected groundwater at the perimeter of the Landfill, leachate collection and treatment, and landfill

gas collection and treatment. A complete description of the Presumptive Remedy Guidance for municipal landfill sites can be found in EPA's Directive No. 9355.0-49FS, EPA 540-F-93-035, Presumptive Remedy for CERCLA Municipal Landfill Sites, dated September 1993.

SUMMARY OF SITE CHARACTERISTICS

The RI was conducted in two phases. Phase I of the RI was conducted from 1991 through 1992 by Paul C. Rizzo Associates (Rizzo), and is described in the Site Characterization Summary Report (SCSR) dated September 1992. Phase II of the RI was conducted during 1993 through 1994 and is described in the Revised SCSR dated May 1994. Phase II of the RI was initiated by Rizzo and was completed by Golder Associates.

The objectives of Phase I of the RI were to evaluate the nature and extent of potential impact from site waste materials and to characterize potential contaminant migration pathways. Therefore, the Phase I investigation focused on characterizing geologic and hydrogeologic site conditions, evaluating the characteristics and extent of waste materials, and collecting representative samples to characterize soils and groundwater conditions at the Site. Specific field investigation efforts conducted at the Site included the following activities:

- Waste delineation borings;
-Leachate sampling;
-Vadose zone soil sampling;
-Drilling and monitoring well installation;
-Water level measurements;
-Groundwater sampling and analysis;
-Spring survey;
-Public and private well survey; and
-Topographic mapping and site surveying.

After the results of Phase I were reviewed, EPA determined that additional investigations (Phase II) were necessary in order to provide enough information to complete the RI.

The additional activities performed during Phase II included:

-Redevelopment of monitoring wells;
-Additional measurement of groundwater elevations;
-Collection of two rounds of groundwater samples from eight on-site monitoring wells, the Ojo de Guillo spring and one off-Landfill well;
-Performance of slug tests on the eight monitoring wells to evaluate the hydraulic conductivity of the two water bearing units identified;
-Collection of 15 additional background soil samples for chemical analyses;
-Collection of 3 soil samples for geotechnical analyses; and
-Performance of further waste delineation in the Superfund Disposal Area.

This section summarizes the findings of the RI. A summary of the analytical data collected for the Site, listed by chemical and medium, can be found in Appendix II.

Waste Characterization

The SDA is locally called " El Superfondo". The disposal area encompasses approximately 0.9 hectares (2.2 acres) of surface area. During the Phase I Site Characterization Investigation (Rizzo, Sept. 1992), four soil borings (SS-11, SS-11A, SS-11B, and SS-12) were installed in this disposal area to delineate the extent of waste material. Soil boring SS-12, drilled in the southeastern portion of the depression, encountered waste to a depth of 15.3 meters (50 feet). No waste material was encountered in the other three soil borings, which were located in the northwestern portion of the depression. Apparently, waste fillingwas restricted to the deeper part of the asymmetric depression in the southeastern portion of the depression. To verify this, additional waste delineation activities were performed during the Phase II Site Characterization Investigation, including excavation of two trenches and installation of five shallow soil borings to define the northwestern extent of waste in the depression. The two trenches extended from near the northern and western mogote walls toward the center of the sumidero to the location where waste was encountered. Three of the soil borings (SB-1 to SB-3) encountered native soil with no waste material. The southern most soil boring (SB-4) encountered waste material. Soil boring SB-5 encountered non-waste fill material.

The waste material in the SDA was reported, based on visual observations of drilling materials and superficial wastes, to include glass vials, syringes, personal protective equipment, various types of wire and other metallic waste, and sludges (Rizzo, September 1992). Other waste materials encountered were wood, cardboard, cloth, and plastic. An estimated waste volume for this disposal area was calculated to be approximately 40,000 cubic meters (52,000 cubic yards), based on waste delineation activities conducted during the Phase I Site Characterization Investigation.

The NDA encompasses approximately 3.7 hectares (9.1 acres). The depth to the base of waste in two soil borings installed during the Phase I Site Characterization Investigation (i.e., SS-7 and SS-8) averaged 7.6 meters (25 feet). Much of the northern disposal area is revegetated, with intermittent waste materials located at the ground surface.

The waste material in the NDA was reported, based on visual observations, to include paper, plastic, metal, wood, glass, rubber tires, and cloth, with trace amounts of slag and sludge materials (Rizzo, September 1992). An estimated waste volume for this disposal area was calculated to be approximately 250,000 cubic meters (340,000 cubic yards) based on waste delineation activities conduct during the Phase I Site Characterization Investigation.

The SDA is currently being used for disposal of primarily municipal wastes. The disposal area encompasses approximately 1.5 hectares (3.6 acres). The depth to the base of the

waste based on two soil borings installed during the Phase I Site Characterization Investigation (SS-9 and SS-10) averaged 6.2 meters (20.5 feet). No data is available to determine the thickness of waste placement since the Phase I soil borings were conducted. Given the active status of the disposal area, very little vegetation is located within the depression.

The waste material in the SDA was reported, based on visual observations, to include plastic, cloth, paper, wood, metal, and glass, with trace amounts of leather and rubber (Rizzo, September 1992). An estimated waste volume for this area was calculated to be approximately 81,000 cubic meters (111,000 cubic yards), based on waste delineation activities conducted during the Phase I Site Characterization Investigation. No data is available to estimate the volume of waste placed since completion of the Phase I Site Characterization Investigation.

Soil and Leachate Sampling

To determine the chemical nature of the source areas, samples of sub-waste soil and leachate were collected. Sub-waste soil samples were collected during Phase I of the RI from five locations. Two sub-waste soil samples were collected in each of the northern and southeastern disposal areas, and one sample was collected from the Superfund disposal area. The analysis of soils indicate that sub-waste soils were marginally impacted by waste disposal activities at the Site. Few organic contaminants and no pesticides or polychlorinated biphenyls (PCBs) were detected in sub-waste soils.

During sampling of sub-waste soils, leachate was encountered in only one boring located in the northern disposal area. The analysis of this sample indicated a leachate with a moderately high inorganic loading, but with few Volatile Organic Compounds (VOCs). The VOCs which were reported in the leachate sample included benzene, chlorobenzene, ethylbenzene and xylene. The temperature of the leachate was also high (38°C), indicating probable microbial or thermal degradation occurring in the landfill mass. Analysis of the leachate sample was found to be typical of municipal solid waste leachate as referenced in literature and studies conducted by EPA.

Groundwater and Spring Sampling

Groundwater in the Barceloneta area primarily occurs in the following principal water bearing units that comprise much of the northern limestone province: the Aymamon Limestone, the Aguada Limestone, the Cibao Formation and the Lares Formation. Groundwater is typically found under unconfined (water table) aquifer conditions in the Aymamon and Aguada Limestones and under confined (artesian) conditions in parts of the Cibao and Lares Formations. A confining unit (aquitard) at the top of the Cibao Formation, consisting of calcareous marl, separates and confines groundwater in underlying units of the Cibao Formation from the unconfined units above. Perched and/or semi-confined

conditions may also occur locally within the Aymamon and Aguada Limestones, as a result of localized low permeability strata retarding groundwater flow.

At the Site, precipitation which falls on the blanket sands and eventually recharges the aquifer either flows overland directly to the more permeable limestone mogotes, or infiltrates into the waste and then flows laterally to the limestone mogotes. In the limestone, the infiltrated water drains downward through the porous media and solution features to the perched water table zone and/or the unconfined regional aquifer. Groundwater flow is toward the north in both the localized perched water table and the unconfined regional aquifer.

As part of Phase I of the RI, groundwater samples were collected from the eight monitoring wells installed around the three landfill disposal areas during two sampling events. An off-site water supply was also sampled. The results of the groundwater sample events demonstrated that groundwater has been locally impacted by the disposal areas. Chloride and Total Dissolved Solids (TDS), typical municipal landfill indicators, were detected below EPA's Secondary MCLs. However, 1,1-dichloroethane was detected in MW-3 located near the northern disposal area during the groundwater sampling events at concentrations ranging from 11 to 42 µg/l which exceeds the MCL of 7 µg/l. Chloroform and trichloroethane (TCE) were also detected in MW-6 at levels below the MCL.

Groundwater analytical results from Phase II of the RI indicated metal detections above MCL concentrations. In MW-3 manganese was detected at 92.9 µg/l which exceeds the SMCL of 50 µg/l. In MW-4 mercury was detected at concentrations ranging from 6.1 to 13.1 which exceeds the MCL of 2 µg/l. In MW-5 chromium was detected at 826 µg/l which exceeds the MCL of 100 µg/l. In MW-6 chromium was detected at 106 µg/l which slightly exceeds the MCL. In MW-7 nickel was detected at 101 µg/l which slightly exceeds EPA's health advisory level of 100 µg/l. In MW-8 nickel was also detected at concentrations ranging from 125 to 175 µg/l in filtered and unfiltered samples which exceeds EPA's health advisory level, and chromium was detected at 204 µg/l which exceeds the MCL.

An additional monitoring well, MW-9, was installed 2500 feet downgradient of the Landfill in early 1995, and analytical results from that monitoring well indicated no exceedances of MCLs. Therefore, although ground water is impacted on-site, the quality of groundwater off-site has not been found to be impacted.

During the RI, the Ojo de Guillo Spring was sampled on three occasions because it was a viable location to collect groundwater which could be impacted by the Site. The results of the sampling indicated that only iron was detected slightly above the Secondary Maximum Contaminant Level (MCL) in one sample.

SUMMARY OF SITE RISKS

Based upon the results of the RI, a baseline risk assessment was conducted to estimate the risks associated with current and future Site conditions. The baseline Risk Assessment estimates the human health and ecological risk which could result from the contamination at the Site, if no remedial action were taken.

Consistent with EPA's Presumptive Remedy approach, EPA conducted a streamlined baseline risk assessment by comparing the levels of contaminants in ground water to MCLs. These levels were exceeded, indicating that the Landfill is a source of contamination to the ground water and therefore remedial measures are necessary to protect human health and the environment. EPA's Abbreviated Risk Assessment evaluated any potential adverse effects to human health from exposure to chemical contamination present in the vicinity of the Site groundwater. The reasonable maximum human exposure was used. The results indicate that the levels of contaminants present in the ground water pose a relatively low long-term threat to human health. However, if no action is taken with respect to the Landfill, the continued release of contaminants into ground water could potentially result in a greater risk at some point in the future. Therefore, based on the results of the Abbreviated Risk Assessment, EPA has determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. The primary objectives of this remedy are to control the source of contamination at the Site and to reduce and minimize the migration of contaminants into Site media thereby minimizing any health and ecological impacts.

The following remedial action objectives were established for the Site:

- to prevent direct contact with waste material;
- to reduce or eliminate the potential for the Landfill disposal areas to release hazardous substances to ground water;
- to reduce or eliminate the potential for migration of hazardous substances to ground water downgradient of the Landfill;
- to prevent the migration of and control Landfill gas; and
- to minimize any potential future impacts of hazardous substances that may migrate into environmental media.

DESCRIPTION OF REMEDIAL ALTERNATIVES

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, mandates that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. It also establishes a preference for remedial actions which employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains applicable or

relevant and appropriate requirements (ARARs) under federal and state laws, unless a waiver can be justified.

The FS report evaluates in detail six remedial alternatives for addressing the contamination associated with the Site. The implementation time reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate with the responsible parties, procure contracts for design and construction, or conduct operation and maintenance ("O&M") at the Site.

In addition, in accordance with Section 121 of CERCLA, EPA must review any remedial action that leaves hazardous substance above health based levels at a site at least once every five years to assure that the remedy selected continues to be protective of human health and the environmental. All of the alternatives presented will require such a five year review. If justified by the review, remedial actions may be implemented to remove or treat the wastes, or to otherwise change the remedial action selected in this ROD.

Alternative 1: No Action

The Superfund program requires that the "No-Action"alternative be considered at every site to provide a baseline of comparison among alternatives. The No Action alternative means that no remedial actions would be conducted for any of the media of concern at the Site. This does not achieve all the remedial action objectives. While the existing soil and vegetative cover reduces potential exposure to on-site soil contaminants by direct contact, ingestion, and/or inhalation, it does not prevent such exposure. The potential migration of contaminants from on-site waste materials into the ground water from water infiltration through the waste materials or surface water runoff and erosion would not be prevented or minimized and the release of landfill gas would not be controlled. The potential for continued access to the Site would exist thereby allowing potential exposure to on-site waste materials and direct contact, ingestion, and/or inhalation. The potential for future airborne releases from exposed waste areas would not be prevented. The leachate generation and/or groundwater contamination from waste areas would also not be prevented.

In accordance with Section 121 of CERCLA, remedial actions that leaves hazardous substances at a Site are to be reviewed at least once every five years to assure that the remedial action is protective of human health and the environmental. There are no costs associated with the No Action alternative.

Capital Cost: $0
Operation and Maintenance Cost: $0
Present-Worth Cost: $0
Implementation Time: None

Alternative 2: Site -Wide Area Institutional Controls

This alternative provides that institutional controls be implemented on a site-wide basis. The institutional controls are to be used to minimize the potential for human exposure to the waste and to monitor leachate generation and groundwater contamination at the Site. The controls include:

1. Recommending that zoning restrictions be applied to the Site, limiting future land use;

2. Recommending that a deed restriction be applied to the Site, limiting future land and groundwater use; and

3. Groundwater monitoring after the Landfill ceases accepting wastes and installing perimeter fencing and sign posting to restrict access;

Access restrictions will be implemented in the form of fences and signs around the Site. The existing fence will require inspection and upgrading, as necessary, to ensure that the existing fence completely surrounds the Site. Signs indicating that the landfill is a Superfund site (with EPA's telephone number for information) would be posted on the fence or at other appropriate locations; language on the signs would be in both Spanish and English. On-going maintenance of the fence and signs would also be required.

Restrictions on future use of the Site include zoning and/or deed restrictions directed toward the prevention of the construction of new drinking water supply wells and prohibition of construction at the Site to prevent excavation. Restrictions will be placed on the property deed to assure the long-term maintenance of the Site.

This alternative also includes site-wide groundwater monitoring for the period after the landfill is closed (O & M period). The groundwater monitoring program will be developed during the Remedial Design (RD) phase. The groundwater monitoring system is anticipated to include the eight existing monitoring wells, and groundwater sampling is anticipated to be conducted quarterly for the first year, semi-annually for the next four years, followed by annual sampling for the remainder of the 30-year O&M period. Initially, the wells would be sampled for a broad parameter list. The list was developed based on constituents detected above MCLs in the RI and on the requirements of the Resource Conservation and Recovery Act (RCRA) Subtitle D and Puerto Rico's Regulation Governing Landfill Closure (RMNHSW). After the first five years, the parameter list will be reviewed and those parameters not above standards would be omitted. The initial parameter list includes:

* Site Volatile Organic Compounds of Concern (only 1,1-dichloroethane was detected above MCLs during the RI. However, to be more conservative, the complete EPA Method scan for volatile organic compounds will be analyzed in accordance with 40 CFR, Part. 258, Appendix. I & II).
* Site Metals of Concern (only mercury, chromium, and nickel were detected above MCLs during the RI. However, to be more conservative, the complete EPA method scan for metals compounds will be analyzed in accordance with 40 CFR, Part. 258, Appendix. I & II).
* Chloride
* Total Dissolved Solids
* Total Suspended Solids
* pH (field measurement)
* Specific Conductivity (field measurement).

This alternative by itself does not provide for the prevention of leachate generation and protection of the ground water.

Capital Cost: $779,00
Operation & Management Cost: $73,207/yr
Present Worth O&M Cost: $1,628,000
Total Cost: $2,407,000
Implementation Time: six months

Alternative 3A: SFDA Partial Soil Cover System

This alternative addresses the SFDA or southern disposal area, and includes a soil cover which would be placed or combined with portions of the existing cover (to be at least one-half meter thick) in the areas which have exposed debris or an inadequate existing cover system. The soil cover will be properly graded and vegetated to control surface water flow and erosion. The existing grades will generally be the final grades for the partial cover, changing only in the areas requiring partial cover.

For the purposes of the FS, the area requiring a partial cover is assumed to be approximately 25% of the total area, but the exact area will need to be further evaluated as part of the RD process. This alternative was evaluated because most of the SFDA is covered and the cover has substantial vegetation. However, there are some limited areas where debris, such as broken glass vials, are exposed on the surface. These areas are limited in size and the exposed waste appears to present only a physical hazard (not a chemical hazard). Also, the majority of the disposal area appears to have an adequate cover with substantial vegetation. Therefore, this option was considered because it would allow disturbance of only a portion of the disposal area and thereby limit the potential short-term exposures and/or releases. However, this alternative does not provide reasonable protection against leachate generation and groundwater contamination.

Capital Cost: $76,000
Operation & Management Cost: $5,500/yr
Present Worth O&M Cost: $168,500
Total Cost: $244,500
Implementation Time: one month

Alternative 3B: SFDA Subtitle D Cover System

This alternative includes placing a cover system consistent with Resource Conservation and Recovery Act (RCRA) Subtitle D and the Puerto Rico's Regulations Governing LandfillClosure (RMNHSW) over the entire Superfund Disposal Area. The Subtitle D cover system proposed for this disposal area under this alternative consists of an 18-inch-thick layer of clay, placed to have a maximum permeability of $1x10^{-5}$ cm/s, and a 6 inch vegetative layer to help control erosion. Existing vegetation in the area will initially be cut (less than 6 inches) and the area regraded so that minimum grades can be obtained. The regrading may include the re-distribution of some of the existing cover materials and/or waste materials. In particular, there is an area of waste disposal which is outside the property line. This waste will be relocated to the disposal area. Additionally, a layer of general fill material will be utilized, as needed, to obtain grades.

The general fill grades for this alternative will have surface water runoff directed generally from southwest to northeast and north into a low area where a retention pond will be

constructed. The grades are generally 5% across the Landfill, with a 3H:1V slope at the northern end for tying into the retention pond area. Therefore, adequate erosion control for the surface water system will need to include reinforcement of slopes and/or channels. The perimeter ditches will also be designed to divert surface water from off the Landfill to the retention pond area. These ditches are also anticipated to require reinforcement.

Consistent with the RMNHSW, a landfill gas survey will be required as part of a predesign investigation to determine if a gas collection system is necessary. The appropriate type of system and system design would require further evaluation as part of the RD process.

Capital Cost: $889,000
O & M Cost: $20,500/yr
Present Worth O&M Cost: $445,000
Total Cost: $1,334,000
Implementation Time: six months

Alternative 4: NDA Subtitle D Cover System

This alternative for the NDA includes a cover system consistent with RCRA Subtitle D and RMNHSW. The Subtitle D cover system proposed for the NDA under this alternative consists of an 18-inch-thick layer of clay, placed to have a maximum permeability of 1×10^{-5} cm/s, and a 6 inch vegetative layer which includes vegetation to help control erosion. The area will be regraded so that minimum grades can be obtained; this may include the redistribution of some of the existing cover materials and/or waste materials. A layer of general fill material will be utilized as needed, to obtain grades. The regrading and general fill placement will allow a uniform cover system to be placed, as described below, while maintaining the grades needed for control of surface water flow and erosion.

The grading for the NDA is anticipated to be generally from the west towards the east and from the south to the north. All surface water will be directed over the surface of the Landfill and/or to perimeter ditches towards the low area to the north where a retention pond will be constructed. The perimeter ditches are also anticipated to divert surface water from off the NDA to the retention pond area. This retention pond area is anticipated to be sufficient to control and infiltrate the water from a 25-year, 24-hour storm from the entire drainage area. Because the maximum grade on the NDA is 5%, adequate erosion control for the surface water system may include reinforcement of slopes and/or channels, particularly in the perimeter ditches.

Consistent with the RMNHSW, a landfill gas survey will be required as part of a predesign investigation to determine if a gas collection system is necessary. The need for the gas system and/or the appropriate type of system and system design would require further evaluation as part of the RD process.

Capital Cost: $2,878,000
O & M Cost: $78,000/yr
Present Worth O&M Cost: $1,507,000
Totla Cost: $4,385,000
Implementation Time: one year

Alternative 5: SDA Subtitle D Cover System

This alternative for the SDA includes a cover system consistent with RCRA Subtitle D and RMNHSW. The subtitle D cover system for the SDA under this alternative consists of an 18-inch-thick layer of clay, placed to have a maximum permeability of $1x10^{-5}$ cm/s, and a 6 inch vegetative layer which includes vegetation to help control erosion. The filling of this area is currently ongoing and will be tailored for the installation of the final cover. A general fill layer (assumed to be 2 feet in thickness) will be placed to obtain the final grades for surface water flow and erosion control.

The grading for the SDA is anticipated to generally be from west to east draining to a retention pond. The retention pond is expected to be sufficient to control and infiltrate the water from a 25-year, 24-hour storm event. The slope on the SDA is anticipated to be approximately 3%, therefore, erosion control will not likely require much reinforcement other than vegetation, although the perimeter ditches may require additional protection such as rip rap.

Consistent with the RMNHSW, a landfill gas survey will be required as part of a predesign investigation to determine if a gas collection system is necessary. The need for the system an/or the appropriate type of system and system design would require further evaluation as part of the RD process.

Capital Cost: $907,200
O & M Cost: $64,500/yr
Present Worth O&M Cost: $1,256,800
Total Cost: $2,164,000
Implementation Time: six months

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with the NCP a detailed analysis of each alternative is required. The detailed analysis consists of an assessment of the individual alternatives against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each alternative against those criteria.

The following "threshold" criteria must be satisfied by any alternative in order to be eligible for selection:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy would meet all of the applicable (legally enforceable), or relevant and appropriate (requirements that pertain to situations sufficiently similar to those encountered at a Superfund site such that their use is well suited to the Site) requirements of federal and state

environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume via treatment refers to a remedial technology's expected ability to reduce the toxicity, mobility, or volume of hazardous substances, pollutants or contaminants at the Site.

5. Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

6. Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital and operation and maintenance costs, and the present-worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI/FS report and the Proposed Plan, the Commonwealth supports, opposes, and/or has identified any reservations with the preferred alternative.

9. Community acceptance refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

A comparative analysis of the remedial alternatives based upon the evaluation criteria noted above follows.

- Overall Protection of Human Health and the Environment

All of the alternatives except Alternative 1 (No Action) and Alternative 2 (Institutional Controls) provide general protection of human health and the environment since they all provide for the landfill cover system. Alternative 1 does not meet the remedial action objectives. This alternative does not provide protection of the public health and the environmental because the potential risks associated with the Site are not mitigated. The existing source and exposure pathways remain. Alternative 2 minimizes the potential

exposure to waste and ground water with Site restrictions and a drilling ban. The existing exposure pathways inside the area would remain and no mitigation of risks associated with the Landfill would take place. This alternative by itself does not provide for the prevention of leachate generation and groundwater protection from leachate nor for landfill gas control. Alternative 3A is somewhat protective of human health by reducing the potential exposure to waste and leachate generation. It provides only limited protection of the ground water since it does not adequately prevent infiltration because of the poor impermeability of the cap soil. Alternatives 3B, 4 and 5 are protective by minimizing potential exposure to waste and providing for the protection of ground water by controlling leachate generation. They also prevent the accumulation and potential migration of landfill gas, reduce infiltration, minimize migration of contaminants into ground water, and provide vector control (insects and rodents).

- Compliance with ARARs

The principal action-specific ARARs for this Site include the Resource Conservation and Recovery Act (RCRA) Subtitle D and Puerto Rico's Regulation Governing Landfill Closure (RMNHSW) requirements, which require the installation of a cover system.

Alternative 1, No Action, does not meet federal or Commonwealth ARAR's established for the Site. It allows the Site to continue to be a source of contamination. Alternative 2 would meet the ARARs for groundwater monitoring but by itself does not comply with federal or Commonwealth RCRA Subtitle D closure ARAR's, allowing the landfill to remain without a cover system. Alternative 3A provides a cap with minimum requirements. This proposed cap does not comply with federal and Commonwealth ARAR's capping/closure requirements for the Site. Alternatives 3B, 4 and 5, provide for the closure of the landfill with a full RCRA Subtitle D cap at all units. This cap meets federal and Commonwealth ARAR's for capping/closure of the Site.

- Long-Term Effectiveness and Permanence

The No Action alternative provides no long-term effectiveness or permanence for the Site. The remedial action objectives would not be met and the potential risks established for the Site would not be mitigated. Alternative 2 which provides for institutional controls, groundwater monitoring and fencing would not by itself be effective in reducing the risks that the Site presents over the long term because leachate would continue to be generated thereby causing groundwater contamination. Alternative 3A does not provide long-term control for leachate generation, migration of contaminants and groundwater protection. It is not completely effective in reducing the risks that the Site presents.

The capping requirements under Alternatives 3B, 4, and 5 provide a long-term effective remedial approach if the systems are properly maintained. Long-term cap maintenance requirements include inspections, vegetation maintenance, and cap system repair. Maintenance is critical to the long-term effectiveness and permanence for containment because the landfill contents remain at the Site. Essentially, the capping alternative and component technologies are equally effective in providing a permanent containment of the waste.

- Reduction in Toxicity, Mobility, or Volume via Treatment

The No Action alternative would allow for the continued release of leachate to the ground water and thus does not meet this criterion. Alternative 2 would not by itself address this criterion at all.
For all the evaluated alternatives, no treatment technologies were proposed to reduce the toxicity, mobility or volume because there were no identified hot spots in the Landfill that would be amenable to treatment. However, there would be a reduction in the mobility of leachate to ground water as a result of the installation of surface controls and a cap which would reduce precipitation infiltration for all capping alternatives. Alternative 3A however, would result in the least reduction of leachate generation as compared to Alternatives 3B, 4 and 5 because Alternative 3A would employ an inferior cap only addressing those areas where waste materials are exposed.

- Short-Term Effectiveness

The No Action alternative does not have any other significant public health and environmental impacts associated with implementation. Alternative 3A is anticipated to have the next least short term effects because it has the smallest area to cap. All of the other capping alternatives (3B, 4, and 5) are anticipated to have similar short-term effects. During regrading operations related to installing a RCRA cap, a short-term risk to the on-site workers, the local residents in close proximity to the landfill, and the environment would exist. Health and safety measures would be implemented during construction to minimize these short term risks.

The capping alternatives would have the same short term effectiveness considerations during clearing and grubbing, erosion and sediment control construction and gas management system installation. Other short-term effectiveness considerations are related to increased vehicular traffic and noise during the construction.

Alternative 3A could be constructed in the least amount of time (one month), followed by Alternative 2, 3B and 5 each with six months. Alternative 4 has the longest construction time of one year.

- Implementability

All of the alternatives involve the use of commercially available products and accessible technology. Alternatives 3B, 4 and 5 are easily implemented technically. The RCRA Subtitle D soil cap alternatives would be simple to construct and maintain. The local availability of the clay has been tentatively confirmed with the Soil Conservation Service in San Juan, Puerto Rico. There are several construction companies in Puerto Rico constructing RCRA Subtitle D soil caps at municipal landfills. The availability of soils and construction companies capable to construct the required cap makes these alternatives fully implementable.

- Cost

The combination of Alternative 2 (SWA Institutional Controls) with Alternative 3B (SFDA Subtitle D Cover System), Alternative 4 (NDA Subtitle D Cover System) and Alternative 5 (SDA Subtitle D Cover System) provide the balance of trade-offs among alternatives with respect to the evaluation criteria. Following are the alternatives in order of total cost:

Alternative 1: $0
Alternative 2: $2,407,000
Alternative 3A: $244,500
Alternative 3B: $1,334,000
Alternative 4: $4,385,000
Alternative 5: $2,164,000
Alternatives 2, 3A,4 & 5: $10,290,000

- State Acceptance

The Environmental Quality Board concurs with the selected remedy for the Barceloneta Landfill. A letter of concurrence is attached to this ROD as Appendix IV.

- Community Acceptance

All significant comments submitted during the public comment period were evaluated and are addressed in the attached Responsiveness Summary which is included as Appendix V.

SELECTED REMEDY

EPA has determined, after reviewing the alternatives and public comments, that the combined Alternatives 2,3B,4 and 5 (RCRA subtitle D Cover System/Institutional Controls) is the appropriate remedy for the Site because it best satisfies the requirements of CERCLA and the NCP's nine evaluation criteria for remedial alternatives.

The major components of the selected remedy are as follow:

- Installing a low permeability cover system for the three Landfill cells meeting the requirements of the RCRA Subtitle D and Puerto Rico's Regulations Governing Landfill Closure . This cover system or landfill cap(s) will further reduce infiltration of precipitation water into the landfill and reduce leachate generation thus mitigating impacts to ground water.

- Regrading the Site and installing storm water management improvements at the Site to reduce infiltration of storm water into the Landfill and reduce leachate generation.

- Conducting long term ground water and surface water monitoring to evaluate the effectiveness of the cover system. It is anticipated that monitoring will be conducted on a quarterly basis for the first year, semi-annually for the next four years, and then annually. Monitoring will include the eight existing monitoring wells. Initially, the wells will be sampled for a broad parameter list. The list has been developed based on constituents detected above Safe Drinking Water Act Maximum Contaminant

Levels in the Remedial Investigation and on the requirements of the RCRA Subtitle D and Puerto Rico's Regulation Governing Landfill Closure (RMNHSW). After the first five years, the parameter list would be reviewed and those parameters not detected above standards would be omitted. The exact long term ground water monitoring program will be further defined during remedial design (RD).

- Conducting a landfill gas survey during predesign to determine the necessity of a landfill gas collection system. The appropriate type of system, if necessary, will be determined during RD.

- Implementing a long term operation and maintenance program for the cover system which will include inspection of the system and provision for repair.

- Recommending to appropriate authorities that institutional controls be emplaced. Institutional controls are recommended in order to protect the integrity of the landfill cover system and to reduce potential exposure to landfill contents. The institutional controls will include recommending that zoning restrictions be applied to the Site to limit future land use and recommending that a deed restriction be established to limit future land and ground-water use.

- Installing a perimeter fence with signs to restrict access.

- Reevaluating Site conditions at least once every five years to determine if a modification of the selected remedy is necessary.

STATUTORY DETERMINATIONS

As previously noted, CERCLA mandates that a remedial action must be protective of human health and the environment, be cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. CERCLA also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a site. CERCLA further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified.

For the reasons discussed below, EPA has determined that the selected remedy meets the requirements of CERCLA and provides the best balance of trade-offs among alternatives with respect to the evaluation criteria.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Contact with Landfill waste materials will be eliminated through capping the three disposal areas. In addition, capping will prevent further degradation of the groundwater from the leaching of contaminants into the groundwater.

Compliance with ARARs

The selected remedy will be in compliance with all ARARs. Action-specific ARARs for the selected remedy include RCRA and Puerto Rico's Regulations Governing Landfill Closure.

Cost-Effectiveness

The selected remedy is cost-effective because it has been demonstrated to provide overall effectiveness proportional to its cost. The combination of Alternatives 2, 3B, 4 and 5 contain critical components in meeting the remedial action objectives and satisfying the statutory criteria. The present worth cost of the selected remedy is $10,290,000.

Utilizationof Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable. However, because the contaminant source, the Site itself, could not be effectively excavated and treated as a result of the large volume of waste and the absence of hot-spots representing major sources of contamination, the remedy does not satisfy the statutory preference for treatment as a principal element. The selected remedy provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the Proposed Plan.

APPENDIX I - FIGURES

FIGURE 1. SITE LOCATION MAP

FIGURE 2. SITE SKETCH WITH MONITORING WELLS LOCATIONS

FIGURE 3. SPATIAL DISTRIBUTION OF CONSTITUENTS REPORTED ABOVE MCL's OR SMCL's IN GROUNDWATER DURING THE RI

SCALE 1:20000

1 MILE ... 0

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

REFERENCE: BARCELONETA QUADRANGLE, PUERTO RICO, 7.5 MINUTE TOPOGRAPHIC MAP

Golder Associates JACKSONVILLE, FLORIDA			TITLE: SITE LOCATION MAP		
CLIENT/PROJECT: BLTC/RI-FS/PR			DATE: 4/4/94	SCALE: AS SHOWN	JOB NO: 933-3928
DRAWN: TRG	CHECKED: MJT	REVIEWED: DJM	FILE NO: 933-3928	DWG NO / REV NO	FIGURE: 1

FIGURE 1

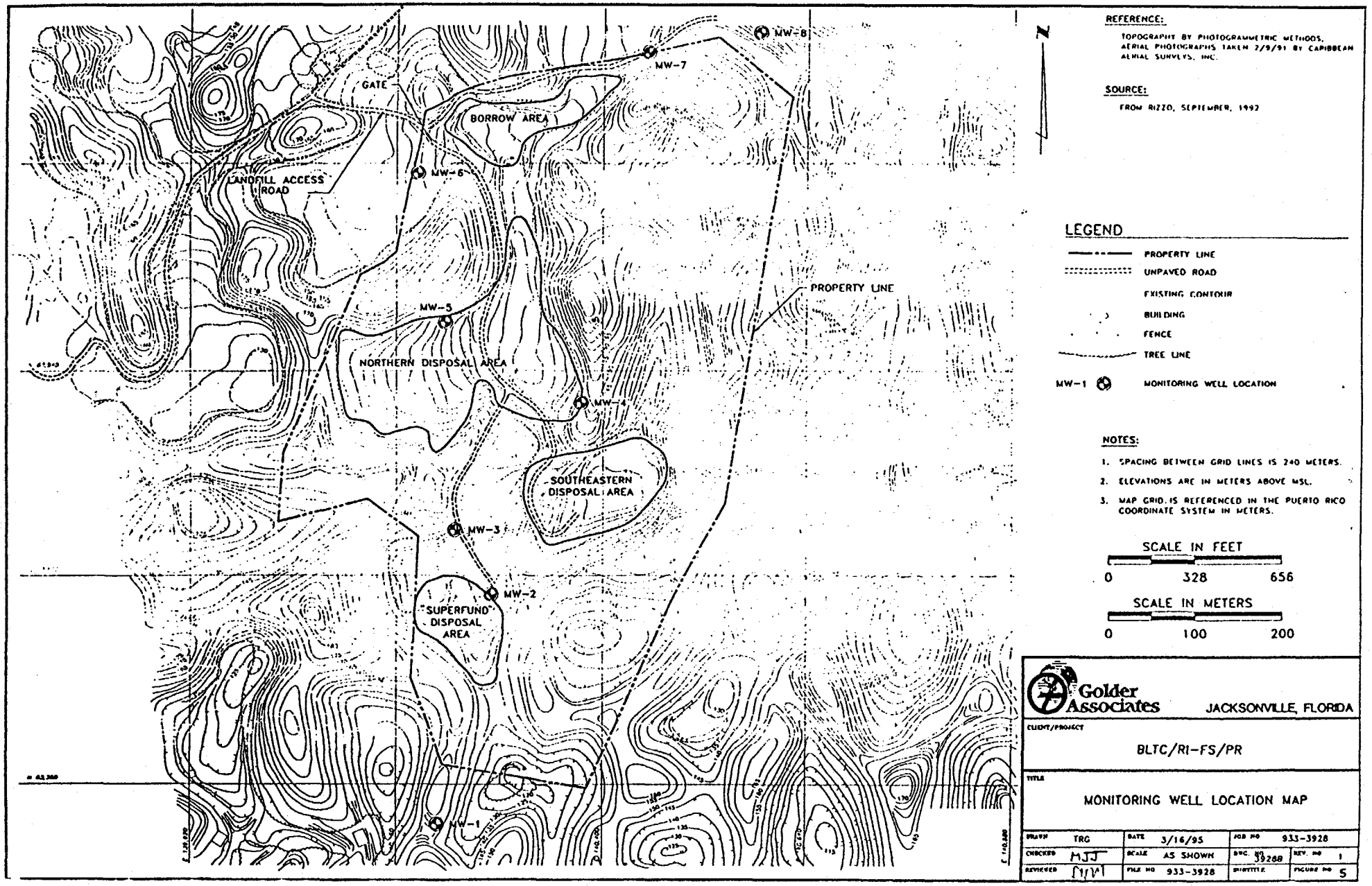

FIGURE 2

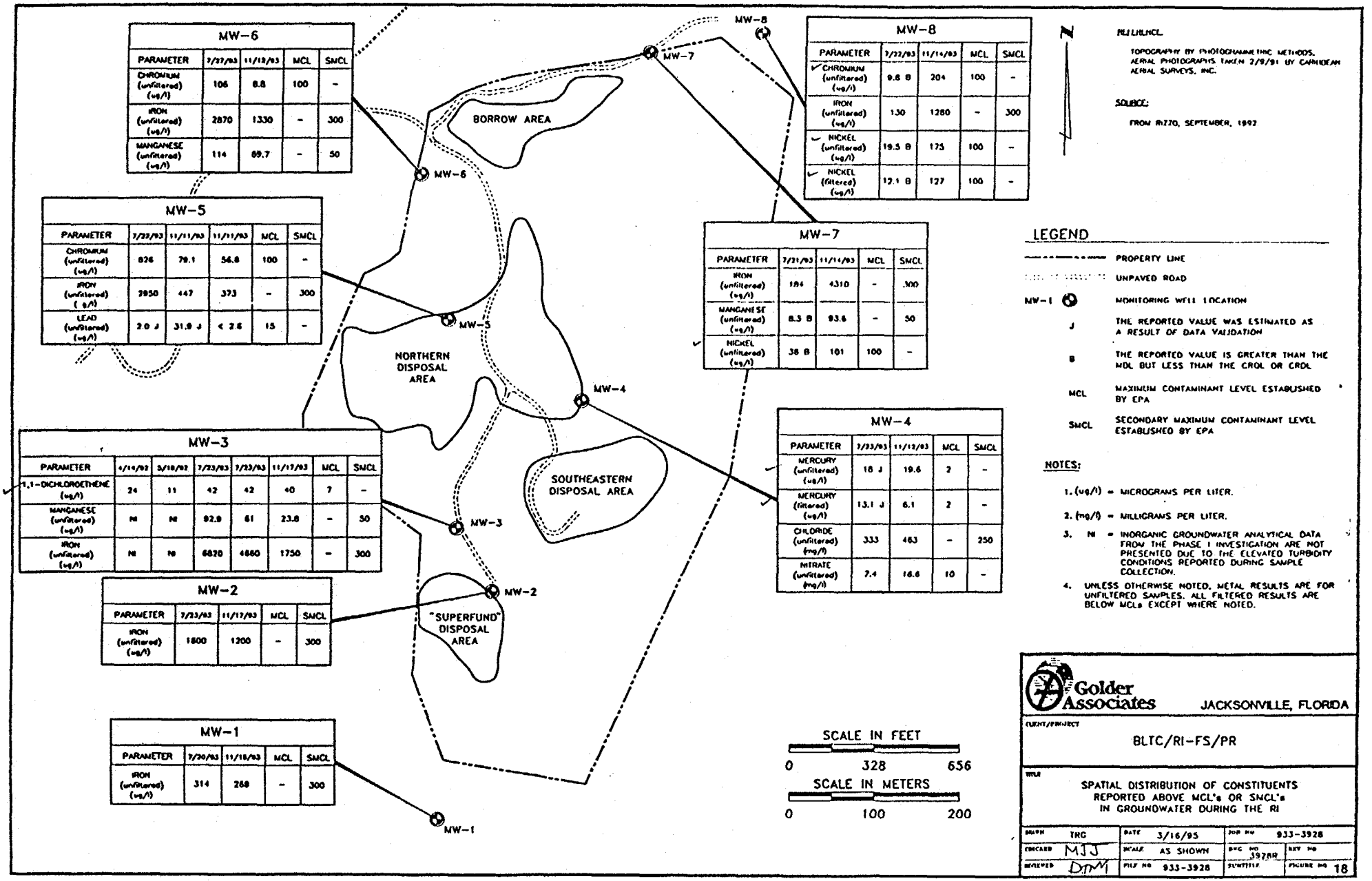

FIGURE 3

500031

APPENDIX II - TABLES

TABLE 1
SUMMARY OF THREATENED OR ENDANGERED SPECIES
Barceloneta Landfill Site
Barceloneta, Puerto Rico

Species occurring on the main island of Puerto Rico and considered by the Commonwealth of Puerto Rico Department of Natural Resources to be threatened or endangered.

COMMON NAME	SCIENTIFIC NAME	STATUS
CLASS AMPHIBIA		
Puerto Rican Crested Toad	*Peltophryne lemur*	T*
Eneida's Coqui	*Eleutherodactylus eneidae*	T
Golden Coqui	*Eleutherodactylus jasperi*	T*
Karl Schmidt's Coqui	*Eleutherodactylus karlschmidti*	T
CLASS REPTILIA		
Dryland Anole	*Anolis cooki*	T
Puerto Rican Boa	*Epicrates inornatus*	E*
Sloan's Skink	*Mabuya mabuya*	T
CLASS AVES		
Sharp-shinned Hawk	*Accipiter striatus venator*	T*
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	E*
PLANTS		
CLASS DICOTYLEDON		
Vahl's Boxwood	*Buxus vahlii*	E*
Palo de Ramon	*Banara vanderbiltii*	E*

Species likely to occur in the Barceloneta area and considered by the United States Fish and Wildlife Service to be threatened or endangered.

COMMON NAME	SCIENTIFIC NAME	STATUS
BIRDS		
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	T
REPTILES		
Puerto Rican Boa	*Epicrates inornatus*	E
AMPHIBIANS		
None		
MAMMALS		
None		
PLANTS		
Palo de Ramon	*Banara vanderbiltii*	E
Vahl's boxwood	*Buxus vahlii*	E
Palo de Nigua	*Cornutia obovata*	E
Palo de Rosa	*Ottoschulzia rhodoxylon*	E
Palms de Manaca	*Calyptroma rivalis*	T

Notes:
T – Threatened
E – Endangered
* – Likely to occur in the Barceloneta area

Reference:
Puerto Rican Department of Natural Resources, Regulations to Govern the Management of Threatened and Endangered Species in the Commonwealth of Puerto Rico, Appendix 1.

FN:\Disk\933-3928\tables\SPECIES.WK1

March 1995 933-3928

TABLE 2
SOIL HEADSPACE RESULTS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

DEPTH OF SAMPLE (meters)	DEPTH OF SAMPLE (feet)	BORING SS-1 (ppm)(a)	BORING SS-2 (ppm)	BORING SS-3 (ppm)	BORING SS-4 (ppm)	BORING SS-5 (ppm)	BORING SS-6 (ppm)	BORING SS-7 (ppm)	BORING SS-8 (ppm)	BORING SS-9 (ppm)	BORING SS-10 (ppm)	BORING SS-11 (ppm)	BORING SS-11B (ppm)	BORING SS-12 (ppm)
0-1.5	0-5	NA(b)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1.5-3.0	5-10	NA	NA	0(c)	---	NA	0	NA	NA	10	NA	NA	0.2	NA
3.0-4.6	10-15	0	0	7.5(c)	---	---	0	NA	NA	NA	NA	---	---	NA
4.6-6.1	15-20	---	---	---	---	---	4	NA	NA	NA	10	---	---	0
6.1-7.6	20-25	---	---	---	---	---	0	NA	7	NA	NA	---	---	0
7.6-9.1	25-30	---	---	---	---	---	8	15(c)	11(c)	41(c)	0	---	---	0
9.1-10.7	30-35	---	---	---	---	---	---	---	---	---	---	---	---	18
10.7-12.2	35-40	---	---	---	---	---	---	---	---	---	---	---	---	3
12.2-13.7	40-45	---	---	---	---	---	---	---	---	---	---	---	---	8
13.7-15.2	45-50	---	---	---	---	---	---	---	---	---	---	---	---	NA
15.2-16.8	50-55	---	---	---	---	---	---	---	---	---	---	---	---	18(c)

Notes:
(a) ppm = parts per million.
(b) NA = No headspace VOC measurement recorded.
(c) Value reported is average HNU reading for depth interval.
--- = Boring not advanced to this depth.
No headspace VOC measurements were recorded for soil borings SS-13 through SS-22 because they represent background conditions and metals were the only analytical parameters of concern.

FN:\Disk\933-3928\tables\HEADSPC.WK1

TABLE 3
SOIL BORING DRILLING SUMMARY
Barceloneta Landfill Site
Barceloneta, Puerto Rico

BORING I.D.	DATE DRILLED	DRILLING METHOD	TOTAL DEPTH OF BORING (meters)	ELEVATION AT AT TOP OF BORING (meters MSL)	MAXIMUM HEADSPACE VOC CONCENTRATION (ppm)	LABORATORY SAMPLE INTERVAL (meters)
SS-1	2/11/92	HSA	3.5	118.9	0	3.0-3.5
SS-2	2/11/92	HSA	3.5	132.0	0	3.0-3.5
SS-3	2/12/92	HSA	4.0	127.9	7.5	3.0-3.5
SS-4	2/12/92	HSA	1.5	145.5	NA	NS
SS-5	2/12/92	HSA	2.4	141.0	NA	NS
SS-6	1/17/92	HSA	8.5	145.1	8	7.6-8.1
SS-7	1/08/92-1/10/92	HSA/RW	8.5	139.5	15	7.6-8.1
SS-8	1/08/92-1/13/92	HSA/RW	9.1	142.3	11	8.2-8.7
SS-9	1/08/92-1/14/92	HSA/RW	8.5	119.2	41	7.6-8.1
SS-10	1/09/92-1/14/92	HSA/RW	9.3	118.3	10	9.0-9.3
SS-11	1/09/92-1/15/92	HSA/RW	2.3	125.3	NA	NS
SS-11A	1/15/92-1/16/92	HSA/RW	2.3	125.4	NA	NS
SS-11B	1/15/92-1/16/92	HSA	2.3	125.4	0.2	NS
SS-12	1/15/92-1/16/92	HSA/RW	16.6	127.3	18	15.2-15.7
SS-13A	1/12/94	HSA	4.0	NA	NA	0.6-1.2
SS-13B	1/12/94	HSA	4.0	NA	NA	3.0-4.0
SS-14	1/11/94	HA	1.2	NA	NA	0.6-1.2
SS-15A	1/11/94	HA	1.2	NA	NA	0.6-1.2
SS-15B	1/13/94	HSA	4.0	NA	NA	3.0-4.0
SS-16	1/13/94	HA	1.2	NA	NA	0.6-1.2
SS-17	1/11/94	HA	1.2	NA	NA	0.6-1.2
SS-18	1/12/94	HA	1.2	NA	NA	0.6-1.2
SS-19	1/12/94	HA	1.2	NA	NA	0.6-1.2
SS-20	1/12/94	HA	1.0	NA	NA	0.6-0.9
SS-21A	1/12/94	HSA	4.0	NA	NA	0.6-1.2
SS-21B	1/12/94	HSA	4.0	NA	NA	3.0-4.0
SS-22A	1/13/94	HA	4.0	NA	NA	0.6-1.2
SS-22B	1/13/94	HA	4.0	NA	NA	3.0-4.0

NOTES:

NA = Not Available
NS = No Sample Collected
HSA = Hollow Stem Auger
RW = Rotary Wash (water)
HA = Hand Auger

meters = meters below ground surface
meters MSL = meters above mean sea level
ppm = parts per million
VOC = Volatile Organic Compounds

FN:\Disk\933-3928\tables\3928BOR.WK1

500035

March 1995 933-3928

TABLE 4
SUMMARY OF WASTE DELINEATION BORINGS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

BORING I.D.	WASTE DISPOSAL AREA	TOTAL DEPTH OF BOREHOLE (meters bgs)	ELEVATION AT TOP OF BORING (meters MSL)	ELEVATION AT BASE OF WASTE (meters MSL)	THICKNESS OF WASTE (meters)	SUB-WASTE SOIL SAMPLE INTERVAL (meters bgs)
SS-7	Northern	8.5	139.5	132.3	6.7	7.6-8.1
SS-8	Northern	9.1	142.3	134.1	7.3	8.2-8.7
SS-9	Southeastern	8.5	119.3	112.2	6.1	7.6-8.1
SS-10	Southeastern	9.3	118.3	112.8	5.3	9.0-9.3
SS-11	Superfund	2.3	125.3	NA	0 (1)	NS
SS-11A	Superfund	2.3	125.4	NA	0 (1)	NS
SS-11B	Superfund	2.3	125.4	NA	0 (1)	NS
SS-12	Superfund	16.6	127.3	112.2	15.2	15.2-15.7
SB-1	Superfund	1.0	117 (2)	NA	0	NS
SB-2	Superfund	1.0	115 (2)	NA	0	NS
SB-3	Superfund	0.6	115 (2)	NA	0	NS
SB-4	Superfund	1.2	110 (2)	NA	0.3 (3)	NS
SB-5	Superfund	0.5	110 (2)	NA	0	NS

NOTES:
(1) = Borings SS-11, SS-11A and SS-11B were reportedly drilled immediately outside of the Superfund disposal area and only trace quantities of waste were encountered in SS-11 at 1.0 meter bgs and at 0.5 meter bgs in SS-11A and SS-11B.
(2) = Elevation at top of boring was estimated using the site topographic map prepared by Paul C. Rizzo and Associates (SCSR, 1992).
(3) = Base of waste not penetrated.
NA = Not Available
NS = Not Sampled
meters bgs = meters below ground surface
meters MSL = meters above mean sea level

FN:\Disk\933-3928\tables\waste.xlw

500036

TABLE 5
Page 1 of 4
TARGET COMPOUND LIST
Barceloneta Landfill Site
Barceloneta, Puerto Rico

COMPOUNDS	CAS NUMBER	CONTRACT REQUIRED QUANTITATION LIMIT (µg/l)	MAXIMUM CONTAMINANT LEVEL (µg/l)
VOLATILE COMPOUNDS			
Chloromethane	74-87-3	10	-
Bromomethane	74-83-9	10	-
Vinyl Chloride	75-01-4	10	2
Chloroethane	75-00-3	10	-
Methylene Chloride	75-09-2	10	6
Acetone	67-64-1	10	-
Carbon Disulfide	75-15-0	10	-
1,1-Dichloroethene	75-35-4	10	7
1,1-Dichloroethane	75-34-3	10	-
1,2-Dichloroethene (total)	540-59-0	10	100
Chloroform	67-66-3	10	100
1,2-Dichloroethane	107-06-2	10	5
2-Butanone	78-93-3	10	-
1,1,1-Trichloroethane	71-55-6	10	200
Carbon Tetrachloride	56-23-5	10	5
Bromodichloromethane	75-27-4	10	100
1,2-Dichloropropane	78-87-5	10	5
cis-1,3-Dichloropropene	10061-01-5	10	-
Trichloroethene	79-01-6	10	5
Dibromochloromethane	124-48-1	10	100
1,1,2 Trichloroethane	79-00-5	10	5
Benzene	71-43-2	10	5
trans-1,3-Dichloropropene	10061-02-6	10	-
Bromoform	75-25-2	10	100
4-Methyl-2-pentanone	108-10-1	10	-
2-Hexanone	591-78-6	10	-
Tetrachloroethene	127-18-4	10	5
Toluene	108-88-3	10	1000
1,1,2,2-Tetrachloroethane	79-34-5	10	-
Chlorobenzene	108-90-7	10	-
Ethyl Benzene	100-41-4	10	700
Styrene	100-42-5	10	100
Xylenes (total)	1330-20-7	10	10,000

FN:\Disk\933-3928\tables\tarcom.xls

500037

TABLE 5
Page 2 of 4
TARGET COMPOUND LIST
Barceloneta Landfill Site
Barceloneta, Puerto Rico

COMPOUNDS	CAS NUMBER	CONTRACT REQUIRED QUANTITATION LIMIT (µg/l)	MAXIMUM CONTAMINANT LEVEL (µg/l)
SEMI-VOLATILE COMPOUNDS			
Phenol	108-95-2	10	-
bis-(2-Chloroethyl) ether	111-44-4	10	-
2-Chlorophenol	95-57-8	10	-
1,3-Dichlorobenzene	541-73-1	10	600
1,4-Dichlorobenzene	106-46-7	10	75
1,2-Dichlorobenzene	95-50-1	10	600
2-Methylphenol	95-48-7	10	-
2,2'-oxybis (1-Chloropropane)	108-60-1	10	-
4-Methylphenol	106-44-5	10	-
N-Nitroso-di-n-propylamine	621-64-7	10	-
Hexachloroethane	67-72-1	10	-
Nitrobenzene	98-95-3	10	-
Isophorone	78-59-1	10	-
2-Nitrophenol	88-75-5	10	-
2,4-Dimethylphenol	105-67-9	10	-
bis-(2-Chloroethoxy) methane	111-91-1	10	-
2,4-Dichlorophenol	120-83-2	10	-
1,2,4-Trichlorobenzene	120-82-1	10	70
Naphthalene	91-20-3	10	-
4-Chloroaniline	106-47-8	10	-
Hexachlorobutadiene	87-68-3	10	-
4-Chloro-3-methylphenol	59-50-7	10	-
2-Methylnaphthalene	91-57-6	10	-
Hexachlorocyclopentadiene	77-47-4	10	50
2,4,6-Trichlorophenol	88-06-2	10	-
2,4,5-Trichlorophenol	95-95-4	25	50
2-Chloronapthalene	91-58-7	10	-
2-Nitroaniline	88-74-4	25	-
Dimethylphthalate	131-11-3	10	-
Acenaphthylene	208-96-8	10	-
2,6-Dinitrotoluene	606-20-2	10	-
3-Nitroaniline	99-09-2	25	-
Acenaphthene	83-32-9	10	-
2,4-Dinitrophenol	51-28-5	25	-
4-Nitrophenol	100-02-7	25	-

FN:\Disk\933-3928\tables\tarcom.xls

TABLE 5
Page 3 of 4
TARGET COMPOUND LIST
Barceloneta Landfill Site
Barceloneta, Puerto Rico

COMPOUNDS	CAS NUMBER	CONTRACT REQUIRED QUANTITATION LIMIT (µg/l)	MAXIMUM CONTAMINANT LEVEL (µg/l)
SEMI-VOLATILE COMPOUNDS (cont'd)			
Dibenzofuran	132-64-9	10	-
2,4-Dinitrotoluene	121-14-2	10	-
Diethylphthalate	84-66-2	10	-
4-Chlorophenyl-phenyl ether	7005-72-3	10	-
Fluorene	86-73-7	10	-
4-Nitroaniline	100-01-6	25	-
4,6-Dinitro-2-methylphenol	534-52-1	25	-
N-nitrosodiphenylamine	86-30-6	10	-
4-Bromophenyl-phenylether	101-55-3	10	-
Hexachlorobenzene	118-74-1	10	1
Pentachlorophenol	87-86-5	25	1
Phenanthrene	85-01-8	10	-
Anthracene	120-12-7	10	-
Carbazole	86-74-8	10	-
Di-n-butylphthalate	84-74-2	10	-
Fluoranthene	206-44-0	10	-
Pyrene	129-00-0	10	-
Butylbenzylphthalate	85-68-7	10	100
3,3'-Dichlorobenzidine	91-94-1	10	0
Benzo(a)anthracene	56-55-3	10	0.1
Chrysene	218-01-9	10	0.2
bis(2-Ethylhexyl)phthalate	117-81-7	10	6
Di-n-octylphthalate	117-84-0	10	-
Benzo(b)fluoranthene	205-99-2	10	0.2
Benzo(k)fluoranthene	207-08-9	10	0.2
Benzo(a)pyrene	50-32-8	10	0.2
Indeno(1,2,3-cd)pyrene	193-39-5	10	0.4
Dibenz(a,h)anthracene	53-70-3	10	0.3
Benzo(g,h,i)perylene	191-24-2	10	-

FN:\Disk\933-3928\tables\tarcom.xls

TABLE 5
Page 4 of 4
TARGET COMPOUND LIST
Barceloneta Landfill Site
Barceloneta, Puerto Rico

COMPOUNDS	CAS NUMBER	CONTRACT REQUIRED QUANTITATION LIMIT (µg/l)	MAXIMUM CONTAMINANT LEVEL (µg/l)
PESTICIDES/AROCLORS			
alpha-BHC	319-84-6	0.05	-
beta-BHC	319-85-7	0.05	-
delta-BHC	319-86-8	0.05	-
gamma-BHC (Lindane)	58-89-9	0.05	0.2
Heptachlor	76-44-8	0.05	0.4
Aldrin	309-00-2	0.05	-
Heptachlor epoxide	1024-57-3	0.05	0.2
Endolsulfane I	959-98-8	0.05	-
Dieldrin	60-57-1	0.1	-
4,4'-DDE	72-55-9	0.1	-
Endrin	72-20-8	0.1	2
Endosulfane II	33213-65-9	0.1	-
4-4'-DDD	72-54-8	0.1	-
Endosulfane sulfate	1031-07-8	0.1	-
4-4'-DDT	50-29-3	0.1	-
Methoxychlor	72-43-5	0.05	40
Endrin ketone	53494-70-5	0.1	-
Endrin aldehyde	7421-36-3	0.1	-
alpha-Chlordane	5103-71-9	0.05	2
gamma-Chlordane	5103-74-2	0.05	2
Toxaphene	8001-35-2	5	3
Aroclor-1016	12674-11-2	1	-
Aroclor-1221	11104-28-2	2	-
Aroclor-1232	11141-16-5	1	-
Aroclor-1242	53469-21-9	1	-
Aroclor-1248	12672-29-6	1	-
Aroclor-1254	11097-69-1	1	2
Aroclor-1260	11096-82-5	1	-

Note: - = No MCL has been established for this compound.

FN:\Disk\933-3928\tables\tarcom.xls

TABLE 6
TARGET ANALYTE LIST
Baceloneta Landfill Site
Barceloneta, Puerto Rico

ANALYTE	CONTRACT REQUIRED DETECTION LIMIT (µg/l)	MAXIMUM CONTAMINANT LEVEL (MCL) (µg/l)	SECONDARY MAXIMUM CONTAMINENT LEVEL (SMCL) (µg/l)
Aluminum	200	-	-
Antimony	60	6	-
Arsenic	10	50	-
Barium	200	2000	-
Beryllium	5	4	-
Cadmium	5	5	-
Calcium	5000	-	-
Chromium	10	100	-
Cobalt	50	-	-
Copper	25	-	1000
Iron	100	-	300
Lead	3	15*	-
Magnesium	5000	-	-
Manganese	15	-	50
Mercury	0.2	2	-
Nickel	40	100	-
Potassium	5000	-	-
Selenium	5	50	-
Silver	10	-	100
Sodium	5000	-	-
Thallium	10	2	-
Vanadium	50	-	-
Zinc	20	-	5000
Cyanide	10	200	-

FN:\Disk\933-3928\TARANL.XLS

NOTE: " - " = No MCL or SMCL has been established for this analyte.
* = Action level for lead in drinking water.

500041

TABLE 7
MONITORING WELL CONSTRUCTION DATA
Barceloneta Landfill Site
Barceloneta, Puerto Rico

MONITORING WELL NUMBER	SURFACE ELEVATION		BORING DEPTH		TOTAL DEPTH OF WELL		DEPTH TO TOP OF BENTONITE SEAL		DEPTH TO TOP OF SAND PACK		SCREENED INTERVAL		DEPTH TO TOP OF SUMP(a)	
	(meters)	(feet)	(meters)	(feet)	(meters)	(feet)	(meters)	(feet)	(meters)	(feet)	(meters)	(feet)	(meters)	(feet)
MW-1	146.09	479.29	103.6	340.0	81.9	269	67.5	221.5	71.2	233.5	74.4-80.5	244-264	80.5	264.0
MW-2	127.51	418.33	73.2	240.0	69.8	229	56.4	185.0	58.8	193.0	62.2-68.3	204-224	68.3	224.0
MW-3	128.78	422.50	85.3	280.0	80.8	265	67.1	220.0	68.3	224.0	73.2-79.2	240-260	79.2	260.0
MW-4	145.50	477.36	85.3	280.0	80.8	265	(b)	(b)	70.1	230.0	73.2-79.2	240-260	79.2	260.0
MW-5	141.01	462.63	91.4	300.0	83.8	275	71.9	236.0	74.1	243.0	76.2-82.3	250-270	82.3	270.0
MW-6	145.08	475.98	118.9	390.0	98.5	318	84.0	275.5	86.9	285.0	90.8-96.9	298-318	96.9	318.0
MW-7	140.53	461.05	109.7	360.0	105.5	346	92.5	303.5	96.0	315.0	99.4-105.5	326-346	(c)	(c)
MW-8	135.85	445.70	121.9	400.0	99.1	325	87.2	286.0	89.3	293.0	93.0-99.1	305-325	(c)	(c)

Notes:
a. All sumps that were installed were 5-foot lengths of 4" I.D. stainless steel solid-wall pipe.
b. In MW-4, bentonite slurry was placed directly on top of the sand pack. A bentonite pellet seal was not installed.
c. A sump was not installed due to collapse in the boring prior to well installation.

FN:\Disk1933-3928\tables\MONTWELL.WK1

March 1995 933-3928

TABLE 8
(Page 1 of 3)
GROUNDWATER ELEVATION DATA
Barceloneta Landfill Site
Barceloneta, Puerto Rico

MONITORING WELL NUMBER	TOC(a) ELEVATION (meters)	TOC ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)
			1/27/1992(b)		2/18/1992(b)		3/12/1992(b)		3/19-25/92(b)	
MW-1	146.570	480.87	69.995	229.64	69.931	229.43	76.177(c)	249.92 (c)	77.527(c)	254.35 (c)
MW-2	127.980	419.88	---	---	60.808	199.50	60.696	199.13	60.619	198.88
MW-3	129.310	424.24	---	---	---	---	60.107	197.20	60.208	197.53
MW-4	146.040	479.13	---	---	71.638	235.03	---	---	71.089	233.23
MW-5	141.620	464.63	---	---	---	---	---	---	---	---
MW-6	145.690	477.98	---	---	54.825	179.87	54.560	179.00	54.596	179.12
MW-7	141.130	463.02	---	---	---	---	40.228	131.98	40.210	131.92
MW-8	136.200	446.84	---	---	41.953	137.64	40.609	133.23	40.551	133.04

NOTES:
--- = Water level data not recorded.
Elevation data are provided referenced to meters and feet above mean sea level.
(a) = TOC is the top of casing from which water level measurements were recorded.
(b) = Water levels measured prior to development.
(c) = Groundwater elevation measurement may have been affected by water on the side of casing (Rizzo, September, 1992).

FN:\Disk1933-3928\elvdata2.wk1

TABLE 8
(Page 2 of 3)
GROUNDWATER ELEVATION DATA
Barceloneta Landfill Site
Barceloneta, Puerto Rico

MONITORING WELL NUMBER	TOC(a) ELEVATION (meters)	TOC ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)
			4/13-14/92		5/13-15/92		5/18-20/92		7/24/93	
MW-1	146.570	480.87	69.974	229.57	69.974	229.57	69.989	229.62	72.090	236.51
MW-2	127.980	419.88	60.686	199.10	60.500	198.49	60.860	199.67	65.050	213.42
MW-3	129.310	424.24	59.449	195.04	59.357	194.74	59.543	195.35	64.080	210.23
MW-4	146.040	479.13	71.324	234.00	71.342	234.06	71.333	234.03	71.240	233.72
MW-5	141.620	464.63	66.121	216.93	66.091	216.83	66.270	217.42	66.390	217.81
MW-6	145.690	477.98	54.584	179.08	54.584	179.08	54.612	179.17	55.010	180.47
MW-7	141.130	463.02	40.182	131.83	40.167	131.78	40.152	131.73	40.090	134.18
MW-8	136.200	446.84	40.438	132.67	40.094	131.54	40.338	132.34	41.920	137.06

NOTES: --- = Water level data not recorded.
Elevation data are provided referenced to meters and feet above mean sea level.
a. TOC is the top of well casing from which water level measurements were recorded.
b. Water levels measured prior to development.
c. Groundwater elevation measurement may have been affected by water on the side of casing (Rizzo, September, 1992).

FN:\Disk1933-3928\elvdata1.wk1

500044

TABLE 8
Page 3 of 3
GROUNDWATER ELEVATION DATA
Barceloneta Landfill Site
Barceloneta, Puerto Rico

MONITORING WELL NUMBER	TOC(a) ELEVATION (meters)	TOC ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)	GROUNDWATER ELEVATION (meters)	GROUNDWATER ELEVATION (feet)
			11/11-17/93		1/13/94	
MW-1	146.570	480.87	---	---	70.110	230.01
MW-2	127.980	419.88	63.880	209.58	64.180	210.56
MW-3	129.310	424.24	64.760	212.46	63.090	207.00
MW-4	146.040	479.13	71.730	235.32	71.660	235.12
MW-5	141.620	464.63	66.020	216.59	66.070	216.76
MW-6	145.690	477.98	54.660	179.33	54.490	178.76
MW-7	141.130	463.02	40.640	133.32	40.167	133.06
MW-8	136.200	446.84	41.320	135.55	40.094	135.32

NOTES:
--- = Water level data not recorded.
Elevation data are provided referenced to meters and feet above mean sea level.
a. TOC is the top of well casing from which water level measurements were recorded.
b. Water levels measured prior to development.
c. Groundwater elevation measurement may have been affected by water on the side of casing (Rizzo, September, 1992).

FN:\Disk\933-3928\tables\elvdata3.wk1

March 1995 933-3928

TABLE 9
MONITORING WELL REDEVELOPMENT SUMMARY
Barceloneta Landfill Site
Barceloneta, Puerto Rico

WELL NO.	DATE	WELL DEPTH (meters bgs)	DEPTH TO WATER (meters toc)	CASING VOLUME (gal)	DISCHARGE RATE (gpm)	TOTAL VOLUME DISCHARGED (gal)	STABILIZED FIELD PARAMETERS			TURBIDITY		METHOD
							pH (S.U.)	sp. cond. (μmhos/cm)	Temp (C)	INITIAL (NTU)	FINAL (NTU)	
MW-1	7/12/93	81.9	75.16	14.6	1.6-3	270	7.02	703	26.9	124	<1	SS PUMP
MW-2	6/17/93	69.8	64.75	10.8	NA	60	6.88	605	26.4	990	>1000	SS BAILER
	6/22/93		NA	NA	NA	12	7.02	550	26.7	125	904	SS BAILER
	6/30/93		64.65	11.0	1	185	7.05	542	39.8	>1000	195	SS PUMP
	7/1/93		NA	NA	NA	NA	NA	NA	NA	NA	NA	SURGE BLOCK
	11/10-11/93		64.10	11.1	NA	190	6.20	567	29.0	>1000	463	PUMP/SURGE
MW-3	6/17-18/93	80.8	66.92	29.7	1-6	600	7.01	547	26.4	432	>1000	SS PUMP
	6/21/93		66.92	29.7	NA	180	7.03	568	25.8	>1000	>1000	SS BAILER
	11/10/93		64.55	34.7	NA	100	5.77	561	26.3	10	>1000	PUMP/SURGE
MW-4	6/23/93	80.8	73.76	15.0	<1	80	6.73	1741	32.4	28	NA	PUMP/BAILER
	6/29/93		NA	NA	NA	NA	NA	NA	NA	NA	NA	SS PUMP
MW-5	7/13/93	83.8	75.28	18.3	2-6	265	6.85	710	27.8	110	6	SS PUMP
	7/15/93		NA	NA	<1	35	NA	NA	NA	NA	NA	SS BAILER
MW-6	7/14-15/93	98.5	90.56	4.4	<1	43	6.74	732	27.5	>1000	>1000	SS BAILER
	7/21/93		NA	NA	NA	65	6.40	650	27.0	>1000	32	SS PUMP
MW-7	7/2/93	105.5	100.23	11.0	<1	285	6.78	742	27.9	>1000	33	SS PUMP
	7/7/93		NA	NA	<1	40	7.03	739	25.3	>1000	>1000	SS BAILER
MW-8	7/8/93	99.1	NA	13.7	1	245	6.99	620	28.2	>1000	95	SS PUMP

NOTES:
meters bgs = meters below ground surface
meters toc= meters below top of casing
gal = gallons
gpm = gallons per minute
S.U. = Standard pH units
Sp. Cond. = Specific Conductance
umhos/cm = micromhos per centimeter
C = Degrees Celcius
NTU = Nephelometric tubidity units
SS Pump = Stainless steel submersible pump
NA = Not available

FN:\Disk1933-3928\tables\mwd.wk1

500046

TABLE 10
SUMMARY OF SLUG TEST RESULTS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

WELL NO.	BOUWER AND RICE METHOD				HVORSLEV METHOD			
	FALLING HEAD TEST HYDRAULIC CONDUCTIVITY		RISING HEAD TEST HYDRAULIC CONDUCTIVITY		FALLING HEAD TEST HYDRAULIC CONDUCTIVITY		RISING HEAD TEST HYDRAULIC CONDUCTIVITY	
	(CM/SEC)	(FT/DAY)	(CM/SEC)	(FT/DAY)	(CM/SEC)	(FT/DAY)	(CM/SEC)	(FT/DAY)
MW-1	NA	NA	9.4E-04	2.65	NA	NA	1.3E-03	3.78
MW-2	NA	NA	5.7E-05	0.16	NA	NA	7.9E-05	0.23
MW-3	6.7E-04	1.90	4.7E-04	1.33	7.6E-04	2.16	5.3E-04	1.50
MW-4	NA	NA	3.0E-05	0.08	NA	NA	4.1E-05	0.12
MW-5	9.0E-04	2.54	9.5E-04	2.70	1.1E-03	3.25	1.2E-03	3.46
MW-6	NA	NA	9.1E-04	2.58	NA	NA	1.2E-03	3.42
MW-7	NA	NA	1.2E-04	0.34	NA	NA	1.7E-04	0.47
MW-8	NA	NA	6.3E-05	0.18	NA	NA	9.0E-05	0.25
GEOMETRIC MEAN			2.8E-04	0.79			3.6E-04	1.04

NOTE: Geometric mean includes both falling head test and rising head test data.
NA = Not Available. No falling head test results are reported for the wells in which the screened interval brackets the water table. This could result in hydraulic conductivity values that are not representative of site conditions, based on information presented in Bouwer (1989).

FN:\Disk\933-3928\tables\slgsum.wk1

TABLE 11
SUMMARY OF SOIL GEOTECHNICAL DATA
Barceloneta Landfill Site
Barceloneta, Puerto Rico

Boring No.	Sample No.	Depth (feet)	USCS Classification	Natural Moisture (%)	Atterberg Limits				Grain Size Distribution			Compaction			Soil Water (lb/cu ft)			Permeability	pH
					L.L.	P.L.	P.I.	L.I.	% Finer No.10 Sieve	% Finer No.200 Sieve	% Finer 0.005mm	Max. Dry Density (lb/cu ft)	Optimum Moisture Content (%)	Gs	Mo	Wet	Dry	K (cm/sec)	
SS-3	SS-3	0-4	CH	26.7	80.9	32.3	48.6	NA	99.9	91.1	NA	90.3	30.5	2.72	36.5	NA	86.1	2.6E-07	6.1
SS-18	GEO-1	0.5-1.0	CH	27.07	57	26	31	0.03	100.0	87.4	65.0	94.4	26.9	2.71	29.1	116.2	90.0	3.2E-08	4.6
SS-20	GEO-3	0-.5	CH	41.31	84	34	50	0.15	100.0	96.8	85.6	80.3	39.0	2.75	40.8	107.9	76.6	4.6E-08	5.5
SS-20(1)	GEO-3	0-.5	CH	-	-	-	-	-	-	-	-	-	-	-	42.4	-	78.5	3.6E-08	-
SS-21	GEO-2	0-.5	CH	28.68	58	32	26	-0.14	100.0	90.6	78.5	91.7	29.7	2.78	31.8	111.4	87.2	2.0E-06	5.3

NOTES: (1) Soil Sample GEO-3 was re-tested at 97.7 percent of the maximum dry density and 2.9 percent above optimum moisture content.
LIQUID LIMIT (L.L.)
PLASTIC LIMIT (P.L.)
PLASTICITY INDEX (P.I.)
LIQUIDITY INDEX (L.I.)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)
NA = Not Available
mm = millimeter
lb/cu ft = pounds per cubic foot
cm/sec = centimeters per second

FN:\Disk1\933-3928\tables\soil-t11.wk1

March 1995 933-3928

TABLE 12
GROUNDWATER FLOW OF THE NORTH COAST LIMESTONES
Barceloneta Landfill Site
Barceloneta, Puerto Rico

FORMATION	THICKNESS (meters)	SLOPE (meters/meter)	PERMEABILITY (cm/s)	DISCHARGE (m3/s-km width)
Vega Alta-La Plata				
Aymamon Limestone	60	0.00076	0.1	0.046
Aguada Limestone	75	0.00076(a)	0.02	0.011
Cibao Limestone	150	0.0028(a)	0.002	0.008
Lares Limestone	130	0.0028(a)	0.0005	0.002
Total	—	—	—	0.067 = 0.80 for 12km
Manati-Tortuguero				
Aymamon Limestone	90	0.00057	0.1	0.0510
Aguada Limestone	60	0.00057	0.005	0.0020
Cibao Limestone	170	0.0028	0.0005	0.0024
Lares Limestone	110	0.0028	0.0002	0.0006
Total	—	—	—	0.0560 = 0.67 per 12km
Arecibo-Barceloneta				
Aymamon Limestone	60	0.00095	0.2	0.1140
Aguada Limestone	100	0.00095(a)	0.02	0.0190
Cibao Limestone	180	0.0021	0.001	0.0190
Lares Limestone	75	0.0021	0.0002	0.0003
Total	—	—	—	0.1523 = 2.28 for 15km
Camuy-Arecibo				
Aymamon Limestone	60	0.001	0.05	0.0300
Aguada Limestone	90	0.001	0.002	0.0018
Cibao Limestone	200	0.003(a)	0.001	0.0051
Lares Limestone	300	0.003(a)	0.0002	0.0018
Total	—	—	—	0.387 = 0.43 for 11km
Guajataca-Camuy				
Aymamon Limestone	60	0.001(a)	0.02	0.0120
Aguada Limestone	90	0.001(a)	0.002	0.0018
Cibao Limestone	200	0.003(a)	0.0005(a)	0.0030
Lares Limestone	300	0.003(a)	0.0002(a)	0.0018
Total	—	—	—	0.0186 = 0.20 for 11km
Aguadilla-Guajataca				
Aymamon Limestone	60	0.001(a)	0.02(a)	0.0120
Aquada Limestone	90	0.001(a)	0.002(a)	0.0018
Cibao Limesone	200	0.001(a)	0.005(a)	0.0010
Total	—	—	—	0.0148 = 0.25 for 17 km

Source: Giusti, 1978 Note: Total for entire belt = 4.6 (m3/s-km width)

(a) = Estimated

cm/s = centimeters/second

m3/s per km = cubic meters per second per kilometer of aquifer width.

FN:\Disk\933-3928\tables\regwflo.WK1

March 1995 | 933-3928

TABLE 13
BACKGROUND SOIL ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

SAMPLE ID / SAMPLE DATE / PARAMETER NAME	UNITS	SS-13A 01/12/94	SS-13B 01/12/94	SS-14A 01/11/94	SS-15A 01/13/94	SS-15B 01/13/94	SS-16A 01/13/94	SS-17A 01/11/94	SS-18A 01/12/94	SS-19A 01/12/94	SS-20A 01/12/94	SS-20C(a) 01/12/94	SS-21A 01/12/94	SS-21B 01/12/94	SS-22A 01/13/94	SS-22B 01/13/94	SS-1 02/11/92	SS-2 02/11/92	SS-3 02/12/92	SS-6 01/17/92	BACKGROUND 95% CONFIDENCE PREDICTION INTERVAL
Aluminum	mg/kg	20200	44700	22500	29800	22500	19300	14100	31000	16400	26600	27400	18000	22700	19000	18000	21600	26800	29500	10500J	43254
Antimony	mg/kg	<7.4J	7.9JB	11.1JB	8.3JB	9.4JB	7.6JB	8.5JB	<8.2J	<7.3J	11.2JB	14.5JB	<6.9J	11.5JB	9.5JB	8.5JB	<11.8R	<12.2R	<10.6R	14.6	17.9
Arsenic	mg/kg	3.6J	2.2JB	1.7JB	2.6JB	4.2J	1.2JB	1.7JB	8.4J	1.5JB	<1.1J	1.2JB	5.1J	10.6J	1.2JB	7.2J	1.4JB	<0.49	117J	11J	94.5
Barium	mg/kg	6.6B	31.1B	15.5B	34.7B	4.6B	7.8B	2.3B	25B	17.1B	7.4B	7.0B	12.6B	24.3B	15.3B	48.5B	8.0B	16.4B	25.4B	4.8B	101
Beryllium	mg/kg	1.3	0.69B	1.6	1.1B	0.49B	1.1B	0.27B	1.6	1.1B	1.2B	1.3B	1.1B	1.6	1.1B	0.93B	2.2b	2.2b	2.4b	0.4B	2.77
Cadmium	mg/kg	5.5	5.4	5.9	5.5	4.0	4.9	3.6	6.6	3.6	6.1	6.9	4.7	6.4	3.7	3.6	5.3	6	6.3	15.4J	8.12
Calcium	mg/kg	13200B	1898	9238	9238	2178	9498	277B	11600	6008	7368	7568	9728	893B	12208	11108	10408	11108	1160	108JB	11600 (1)
Chromium	mg/kg	257	218	296	270	204	286	201	269	154	357	360	217	317	153	123	243	310	290	282J	426
Cobalt	mg/kg	16.3	70.6	22.1	18.7	5.1B	19.7	1.3B	21.4	26.1	13.2B	12.9B	38	63.9	13.6	12.5	10.6B	19.4	35.4	2.6B	200
Copper	mg/kg	50.6	47.5	43.0	47.5	26.9	35.9	21.3	47.1	46.2	44.6	48.4	32.7	42.3	25.2	27.1	27.0J	39.5J	52.8J	16.2J	66.8
Cyanide, Total	mg/kg	0.46B	0.10B	0.72B	0.20B	0.11B	0.99B	<.06	0.86	0.18B	0.09B	<.07	<.06	0.22B	<.06	<.06	<2.4R	<2.1R	<2.3R	<1.3	NC
Iron	mg/kg	90500	88900	92400	91700	64800	82800	66500	86300	58900	117000	114000	78900	106000	56700	47300	81600	92800	99000	88500J	133297
Lead	mg/kg	9.2J	22.5J	7.7J	10.6J	10.3J	6.7J	4.0J	15.2J	18.7J	5.8J	12.4J	23.3J	24.4J	9.1J	8.1J	6.6J	16.1J	13.6J	5.2	28.8
Magnesium	mg/kg	4668	3718	4608	5278	2448	3418	968	11408	2318	5388	5228	3158	4078	5508	5248	3358	4468	4968	1548	1140 (1)
Manganese	mg/kg	697	3520	1630	2740	358	322	90.3	1940	3470	569	626	2190	2430	884	1818	203	1360	3190	171J	4544
Mercury	mg/kg	0.37	<.05	0.23	0.21	0.17	0.11	0.13	0.33	0.32	0.46	0.47	0.07B	0.09B	0.17	0.15	<0.12	<0.11	0.94	<0.11	1.74
Nickel	mg/kg	23.8	20.9	26.2	25.0	12.2	20.8	6.6B	29.1	13.6	22.1	22.6	17.4	27.6	14.3	13.3	13.7	23.9	26.9	10.8	37.1
Potassium	mg/kg	1238	1838	198	1788	69.8B	107B	<248	504B	82.1B	205B	188B	70.2B	139B	273B	411B	276Bb	236Bb	262Bb	92.6Bb	508
Selenium	mg/kg	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	<0.74J	<0.73J	<0.71J	<0.69R	NC
Silver	mg/kg	<.75	<.86	<.86	0.96B	<.82	<.83	<.81	<.98	<.87	<.91	<.92	0.85B	1.0B	<.81	<.81	<0.72	<0.75	<0.65	<0.60J	NC
Sodium	mg/kg	36.6B	52.4B	65.3B	53.9B	29.4B	51.5B	25.6B	134B	31.9B	61.6B	64.9B	62.1B	67.7B	61.1B	59.6B	2380	2660	2660	1135J	2660 (1)
Thallium	mg/kg	<.69	<.67	<.66	<.71	<.65	<.65	<.64	<.77	<.69	<.72	<.72	0.66B	<.66	<.64	<.64	0.32B	0.74B	0.61B	0.29JB	NC
Vanadium	mg/kg	304J	276J	267J	264J	194J	253J	181J	265J	175J	335J	346J	254J	325J	214J	162J	304	281	333	195J	411
Zinc	mg/kg	64	66.9	65.5	66.6	37.1	48	17.6	80.1	56.6	66.6	67.9	36.3	50.2	34.2	39.6	47.0	71.6	78.6	35.1J	93.7
VOLATILES ORGANICS																					
BENZENE	µg/kg	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<13	<13	<800	4.8	NA
CHLOROBENZENE	µg/kg	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<13	<13	<800	7.8	NA
1,1,1-TRICHLOROETHANE	µg/kg	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<13	<13	260B	<12	NA

NOTES:
a - duplicate sample of SS-20A
mg/kg - milligrams per kilogram
µg/kg - micrograms per kilogram
< - less than the contract required detection limit (CRDL) or contract required quantitation limit (CRQL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRDL.
b - from the 1992 SCSR data flagged as B. Not detected substantially above the level reported in laboratory or field blanks.
NA - not applicable
NS - not sampled
(1) - the 95 percent confidence prediction interval was not calculated due to the lack of a definable population distribution and apparent spatial variability. However, the highest background concentration is shown.
NC - not calculated due to high percentage of locations with non-detected values.
Shaded results indicate value exceeds the background 95% Confidence Prediction Interval.
No semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected.
Results for samples SS-1, SS-2, SS-3, and SS-6 were copied from the 1992 SCSR.
No semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected.

FN:\DISK\933-3928\TABLES\BACKMET.WK1

500050

TABLE 14
SUB-WASTE SOIL ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS

Barcelonota Landfill Site
Barcelonota, Puerto Rico

PARAMETERS SAMPLE DATE METALS	UNITS	SS-7 01/10/92	SS-8 01/13/92	SS-9 01/14/92	SS-9(a) 01/14/92	SS-10 01/14/92	SS-12 01/16/92	BACKGROUND 95% CONFIDENCE PREDICTION INTERVAL
ALUMINUM	mg/kg	15300	15900	22400	22300	NS	19200J	43254
ARSENIC	mg/kg	61J	49J	14.7J	23.8J	NS	37.8J	94.5
BARIUM	mg/kg	12.3B	8.6B	13.4B	14.6B	NS	24.3B	101
BERYLLIUM	mg/kg	0.18B	0.52B	1B	0.92	NS	1.2	2.77
CADMIUM	mg/kg	10.3	11.2	9.8	8.1	NS	14.7J	8.12
CALCIUM	mg/kg	1890	860B	8670	5730	NS	1850J	11600 (1)
CHROMIUM	mg/kg	282	273	189	187	NS	161J	426
COBALT	mg/kg	4B	6.2B	11.9B	12.9	NS	14.1	200
COPPER	mg/kg	31.1J	51.3J	42J	38.7J	NS	41.3J	66.6
IRON	mg/kg	70500J	77700J	66500J	63S00J	NS	65500J	133287
LEAD	mg/kg	6.9J	7.9J	8.8J	8.1J	NS	13.7	28.6
MAGNESIUM	mg/kg	636B	355B	769B	782B	NS	442BJ	1140 (1)
MANGANESE	mg/kg	247	193	510	597	NS	1570J	4544
MERCURY	mg/kg	<0.11	<0.11	0.35J	<0.12	NS	0.15J	1.74
NICKEL	mg/kg	19	13.8	21.4	19.8	NS	15.4	37.1
POTASSIUM	mg/kg	591Bb	744Bb	475Bb	639Bb	NS	741B	508
SILVER	mg/kg	<0.54	2.1B	1.3B	<0.55	NS	<0.62J	NC
SODIUM	mg/kg	2660J	3070J	2410J	2350J	NS	2830J	2680 (1)
THALLIUM	mg/kg	0.27B	0.29B	0.48B	0.37B	NS	0.69JB	NC
VANADIUM	mg/kg	232	325	232	239	NS	209J	411
ZINC	mg/kg	74.1J	85.4J	124J	102J	NS	83.2J	99.7
VOLATILE ORGANICS								
ACETONE	µg/kg	720J	<170	9900J	9600J	<1200	15000J	NC
BENZENE	µg/kg	7Bb	<7	<510	<520	<850	<1700	NC
SEMI VOLATILE ORGANICS								
BIS(2-ETHYLHEXYL)PHTHALATE	µg/kg	750	100B	75B	46B	NA	<420	NC
BUTYLBENZYL PHTHALATE	µg/kg	81B	<440	<450	<420	NA	<420	NC
2-METHYLPHENOL	µg/kg	<430	<440	<450	<420	NA	53B	NC
4-METHYLPHENOL	µg/kg	<430	<440	<450	<420	NA	3300	NC
PHENOL	µg/kg	<430	<440	<450	<420	NA	4700	NC

NOTES:
a - duplicate sample of SS-9
µg/kg - microgram per kilogram
mg/kg - milligram per kilogram
< - less than the contract required detection limit (CRDL) or contract required quantitation limit (CRQL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value was greater than the Method Detection Limit (MDL) but less than the CRDL or CRQL.
b - not detected substantially above level reported in the laboratory of field blanks.
NA - not applicable
NS - not sampled
(1) - The 95 percent confidence prediction interval was not calculated due to the lack of a definable population distribution and apparent spatial variability. However, the highest background concentration is shown.
NC - not calculated due to high percentage of locations with non-detected values.
No pesticides or polychlorinated biphenyls (PCBs) were detected.
Shaded results indicate value exceeds the background 95% Confidence Prediction Interval.

FN:\Dir\933-3928\table\subsoil.WK1

TABLE 15
LEACHATE ANALYTICAL RESULTS
SUMMARY OF DETECTED PARAMETERS

Barceloneta Landfill Site
Barceloneta, Puerto Rico

METALS	CONCENTRATION (mg/l)	MSWLF LEACHATE (mg/l)	LANDFILL LEACHATE (mg/l)
ALUMINUM	145.0	–	--
ARSENIC	0.116	0.0418	–
BARIUM	0.291	0.852	–
BERYLLIUM	0.010	0.0056	–
CADMIUM	0.019	0.022	–
CALCIUM	171.0	492	100–3,000
CHROMIUM	0.952	0.175	–
COBALT	0.076	–	–
COPPER	0.315	0.168	< 10
IRON	303.0	221	1–1,000
LEAD	0.112	0.162	< 5
MAGNESIUM	25.60	227	100–1,500
MANGANESE	2.630	–	0.01–100
NICKEL	0.176	0.326	0.01–1
POTASSIUM	262.0	409	200–1,000
SODIUM	875.0	821	200–1,200
VANADIUM	0.849	–	–
ZINC	5.460	0.32	0.1–100
VOLATILE ORGANICS			
BENZENE	0.014B	0.221	–
CHLOROBENZENE	0.087	0.128	–
ETHYLBENZENE	0.044	0.274	–
XYLENE	0.049	0.141	–
GENERAL CHEMISTRY			
ALKALINITY (to pH 4.5)	3,160	–	500–10,000
CHLORIDE	950	786	300–3,000
NITRATE	ND	–	0.1–10
SULFATE	ND	244	10–1,000
TOTAL ORGANIC CARBON	379	2048	200–30,000
TOTAL DISOLVED SOLIDS	3,750	5691	5,000–40,000
TOTAL SUSPENDED SOLIDS	5,760	813	–
pH (standard units)	5.8	6.79	4 – 8
SPECIFIC CONDUCTANCE (μmhos/cm)	7,200	–	–
TEMPERATURE (°C)	38.0	–	–
TURBIDITY (qualitative)	very turbid	–	–

NOTES:
MSWLF LEACHATE – from NUS, 1988.
LANDFILL LEACHATE – from Freeze and Cherry, 1979.
mg/l = milligrams per liter.
B = indicates the result is greater than the method detection limit (MDL)
but less than the contract required detection limit (CRDL) or the contract required quantitation limit (CRQL).
No analyses were performed for semi-volatile organic compounds (SVOCs),
pesticides, or polychlorinated biphenyls (PCBs).

FN:\DISK\933-3928\TABLES\LEACHATE.WK1

TABLE 16
(PAGE 1 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS
BARCELONETA LANDFILL SITE
BARCELONETA, PUERTO RICO

SAMPLE DATE	UNITS	MW-1 04/14/92	MW-1A (a) 05/18/92	MW-1 05/20/92	MW-1 07/20/93	MW-1 11/15/93	MW-2 04/15/92	MW-2 05/20/92	MW-2 07/23/93	MW-2 11/17/93	MW-3 04/14/92	MW-3 05/19/92	MW-3 07/23/93	MW-3 (b) 07/23/93	MW-3 11/17/93	PRIMARY MCL	SECONDARY MCL
ORGANICS: VOLATILES																	
ACETONE	µg/l	<10 J	<10	<10	<10 J	<10	34	<10	<10 R	<10	<10	<10	<10 R	<10 R	<10	-	-
BROMODICHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
CARBON DISULFIDE	µg/l	<10	<10	<10	<10	<10	4 B	<10	<10	<10	1B	<10	<10	<10	<10	-	-
CHLOROFORM	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
DIBROMOCHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
1,1-DICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	3 B	<10	5 B	5 B	24	11	42	42	40	7	-
TRICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	5	-
TOLUENE	µg/l	<10	<10	<10	<10	<10	<10	<10	1 B	1 J	<10	<10	<10	<10	<10	1,000	-
SEMIVOLATILES																	
BIS(2-ETHYLHEXYL)PHTHALATE	µg/l	1 BJ	<10	1 B	<10	<10	2 BJ	2 B	<19	<11	<10 J	<10	<10	<10	<11	6	-
PESTICIDES/PCBs																	
ENDOSULFAN I	µg/l	<0.050J	<0.050J	<0.050J	<0.050	<0.052	<0.050J	<0.050J	<0.054J	<0.052	<0.050J	<0.050J	<0.054J	<0.050	<0.052	-	-
ENDOSULFAN SULFATE	µg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
AROCLOR 1254	µg/l	NR	NR	NR	<1.2	<1.0	NR	NR	<1.1J	<1.0	NR	NR	<1.1 J	<1.2	<1.0	2	-

NOTES:
µg/l - micrograms per liter
< - less than the Contract Required Quantitation Limit (CRQL)
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRQL
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 on 07/23/93 (sample ID MW-21).
(c) Duplicate of MW-4 on 04/14/92 (sample ID DUP-1).
(d) Duplicate of MW-5 on 11/11/93 (sample ID MW-22).
(e) Duplicate of MW-7 on 05/20/92 (sample ID DUP-1).
(f) Duplicate of MW-7, 11/21/93 (sample ID MW-22).
(g) Duplicate of MW-8, (organics only) 07/22/93 (sample ID MW-20).

MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
NR - not reported
Shaded results indicate the sample exceeds the primary or secondary MCL.

FN:\DISK\933-3928\TABLES\ORGSUM.WK1

500053

TABLE 16
(PAGE 2 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS -- SUMMARY OF DETECTED PARAMETERS
BARCELONETA LANDFILL SITE
BARCELONETA, PUERTO RICO

SAMPLE DATE	UNITS	MW-4 04/14/92	MW-4 (c) 04/14/92	MW-4 05/19/92	MW-4 07/23/93	MW-4 11/12/93	MW-5 04/15/92	MW-5 05/20/92	MW-5 07/22/93	MW-5 11/11/93	MW-5 (d) 11/11/93	MW-6 04/15/92	MW-6 05/19/92	MW-6 07/27/93	MW-6 11/11/93	PRIMARY MCL	SECONDARY MCL
ORGANICS: VOLATILES																	
ACETONE	µg/l	140	150	<10	<10R	<10	14J	<10	<10	<10	<10	<10J	<10	<10R	<10	-	-
BROMOCHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
CARBON DISULFIDE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	-	-
CHLOROFORM	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	11	12	18	14	100	-
DIBROMOCHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	-
1,1-DICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	3B	<10	?	-
TRICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	2 B	<10	<10	<10	<10	3B	3B	3B	<10	5	-
TOLUENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	1,000	-
SEMIVOLATILES																	
BIS(2-ETHYLHEXYL)PHTHALATE	µg/l	<10J	<10J	1 B	<10	<10	<10J	3 B	<11	<11	<11	2BJ	<10	<10	<11	6	-
PESTICIDES/PCBs																	
ENDOSULFAN I	µg/l	<.050 J	<.050	<.050	<.054J	<.052	<.050	<.050	<.060	<.052	<.058	<.050	<.050	<.052J	<.060	-	-
ENDOSULFAN SULFATE	µg/l	<0.10	<0.10	<0.10	<0.10	0.1J	<0.10	<0.10	<.12	<0.10	<.12	<0.10	<0.10	<0.10	<.12	-	-
AROCLOR 1254	µg/l	NR	NR	NR	<1.1J	<1.0	NR	NR	<1.2	<1.0	<1.2	NR	NR	<1.0J	<1.2	2	-

NOTES:
µg/l - micrograms per liter
< - less than the Contract Required Quantitation Limit (CRQL)
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRQL
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 on 07/23/93 (sample ID MW-21).
(c) Duplicate of MW-4 on 04/14/92 (sample ID DUP-1).
(d) Duplicate of MW-5 on 11/11/93 (sample ID MW-22).
(e) Duplicate of MW-7 on 05/20/92 (sample ID DUP-1).
(f) Duplicate of MW-7, 11/21/93 (sample ID MW-22).
(g) Duplicate of MW-8, (organics only) 07/22/93 (sample ID MW-20).

MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
NR - not reported
Shaded results indicate the sample exceeds the primary or secondary MCL.

FN:\DISK\933-3928\TABLES\ORGSUM.WK1

500054

TABLE 16
(PAGE 3 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS – SUMMARY OF DETECTED PARAMETERS
BARCELONETA LANDFILL SITE
BARCELONETA, PUERTO RICO

SAMPLE DATE	UNITS	MW-7 04/13/92	MW-7 05/20/92	MW-7 (e) 05/20/92	MW-7 07/21/93	MW-7 11/14/93	MW-7(f) 11/15/93	MW-8 04/13/92	MW-8 05/18/92	MW-8 07/22/93	MW-8 11/14/93	MW-8(g) 07/22/93	SP-1 04/13/92	SP-1 07/22/93	SP-1 11/10/93	PUBLIC 07/26/93	PUBLIC 11/12/93
ORGANICS: VOLATILES																	
ACETONE	µg/l	<10	<10	<10	<10 J	<10	<10	<10	<10	<10	10J	<10	<10	<10	<10	<10R	<10
BROMODICHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 B	0.8 B
CARBON DISULFIDE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
CHLOROFORM	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 B	<10
DIBROMOCHLOROMETHANE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	2 B	<10
1,1-DICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TRICHLOROETHENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
TOLUENE	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
SEMIVOLATILES																	
BIS(2-ETHYLHEXYL)PHTHALATE	µg/l	<10 J	4 B	1 B	<12	<12	<10	1 B	1 B	<11	<10	<10	1 B	<11	<11	<12 R	<10 R
PESTICIDES/PCBs																	
ENDOSULFAN I	µg/l	<0.050J	0.120J	0.150J	<0.059	<0.052	<0.050	<0.050	<0.050 J	<0.060	<0.052	<0.052	<0.050	<0.054	<0.080	<0.060J	<0.053
ENDOSULFAN SULFATE	µg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.12	<0.10	<0.10	<0.10	<0.11	<0.12	<0.12	<0.11
AROCLOR 1254	µg/l	NR	NR	NR	<1.2	<1.0	<1.0	NR	NR	<1.2	<1.0	<1.0	NR	<1.1	<1.6	0.82 B	<0.8

NOTES:
µg/l – micrograms per liter
< – less than the Contract Required Quantitation Limit (CRQL)
J – the reported value was estimated as a result of data validation.
R – the data was rejected as a result of data validation.
B – the value is greater than the method detection limit (MDL) but less than the CRQL
b – not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 on 07/23/93 (sample ID MW-21).
(c) Duplicate of MW-4 on 04/14/92 (sample ID DUP-1).
(d) Duplicate of MW-5 on 11/11/93 (sample ID MW-22).
(e) Duplicate of MW-7 on 05/20/92 (sample ID DUP-1).
(f) Duplicate of MW-7, 11/21/93 (sample ID MW-22).
(g) Duplicate of MW-8, (organics only) 07/22/93 (sample ID MW-20).

MCL – maximum contaminant level established by USEPA.
– No MCL has been determined.
NR – not reported
Shaded results indicate the sample exceeds the primary or secondary MCL.

FN:\DISK\933-3928\TABLES\ORGSUM.WK1

500055

TABLE .
(PAGE 4 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

SAMPLE DATE / INORGANICS	UNITS	MW-1 04/14/92	MW-1A (a) 05/18/92	MW-1 05/20/92	MW-1 07/20/93	MW-1 07/20/93 (FILTERED)	MW-1 11/15/93	MW-1 11/15/93 (FILTERED)	MW-2 04/15/92	MW-2 05/20/92	MW-2 07/23/93	MW-2 07/23/93 (FILTERED)	MW-2 11/17/93	MW-2 11/17/93 (FILTERED)	MW-3 04/14/92	MW-3 05/19/92	MW-3 07/23/93	MW-3 07/23/93 (FILTERED)	MW-3(b) 07/23/93	MW-3(b) 07/23/93 (FILTERED)	MW-3 11/17/93	MW-3 11/17/93 (FILTERED)	PRIMARY MCL	SECONDARY MCL
ALUMINUM	µg/l	2140 J	1820	87.0 B	925	602	290	135	479000 J	NA	3150	818	1100	152 b	49000 J	58000	9230	704	5190	648	1760	301	-	-
ANTIMONY	µg/l	<49.0	<49.0 J	<49.0 J	<30.6 J	<30.6 J	<18.2	<18.2	<49.0	NA	<30.6	<30.6	<18.2	<18.2	<49.0	<49.0 J	<30.6	<30.6	<30.6	<30.6	<18.2	<18.2	6	-
ARSENIC	µg/l	3.7 BJ	<2.0 J	<2.0 J	<3.5	<3.5	<4.4	<4.4	52.5 J	NA	<3.5	<3.5	<4.4	<4.4	31.8 J	34 J	<3.5	<3.5	<3.5	<3.5	<4.4	<4.4	50	-
BARIUM	µg/l	25.0 B	30.0 BJ	20.0 BJ	26.6 B	28 B	17.8 B	16.7 B	249	NA	17.8 B	16.1 B	12.6 B	11.5 B	96.0 B	155 BJ	28.5 B	18.9 B	23.6 B	17.7	17.4 B	16.2 B	2,000	-
BERYLLIUM	µg/l	1.0 Bb	3.0 Bb	3.0 Bb	<0.30	<0.30	0.15	<0.10	8.0	NA	<0.30	<0.30	0.23 B	<0.10	2.0 Bb	5.0 b	<0.30	<0.30	<0.3	<0.3	0.15 B	<0.10	4	-
CADMIUM	µg/l	<4.0	<4.0	<4.0	<2.8	<2.8	<1.7	<1.7	23.0	NA	<2.8	<2.8	<1.7	<1.7	<4.0	4.0 B	<2.8	<2.8	<2.8	<2.8	<1.7	<1.7	5	-
CALCIUM	µg/l	139000	134000	95100	103000	95900	87000	81100	2250000	NA	120000 J	106000 J	108000	95000	524000	382000	141000 J	101000 J	131000	98400	111000	95900	-	-
CHROMIUM	µg/l	461	19.0 b	7.0 Bb	8 B	4.2 B	11.7	4.7 B	731	NA	6.6 B	<3.4	5.9 B	4.6 B	125	100	16.8	<3.4	9.8 B	<3.4	4.6 B	3.1 B	100	-
COBALT	µg/l	10.0 B	<9.0	<9.0	<4.1	<4.1	<1.6	<1.6	134	NA	5.0 B	<4.1	<1.6	<1.6	24.0 B	19.0 B	6.1 B	<4.1	<4.1	<4.1	<1.6	<1.6	-	-
COPPER	µg/l	19.0 B	9.0 Bb	5.0 Bb	2.4 B	3.1 B	<2.3	<2.3	447	NA	4.4 B	3.7 B	2.3	2.3	74.0	46.0	10.8 B	2.9 B	5.7 B	<1.7	<2.3	<2.3	-	1,000
IRON	µg/l	5360 J	2130	121 b	314	29.2 B	269	16.5 B	397000 J	NA	1800	46.3 B	1200	38.6 B	60900 J	55700	8820	38.5 B	4660	33.4	1750	166	-	300
LEAD	µg/l	8.0	4.0 B	<1.0	<2.0	<2.0	3.9	<2.6	87.2	NA	<2.0 J	<2.0 J	4.0	3.3 J	14.8	23.7 J	3.3 J	<2.0 J	3.3 J	<2.0 J	4.0	<2.6	15(*)	-
MAGNESIUM	µg/l	3600 B	3370 B	2730 B	3160 B	3140 B	2830 B	2740 B	99100	NA	3380 B	3050 B	2890 B	2620 B	20500	21500	5070	3170 B	4040	3010	3180 B	2880 B	-	-
MANGANESE	µg/l	123	61.0 J	5.0 BJ	11.8 B	3.5 B	9.7 B	2.1 B	2710	NA	18.9	3.9 B	13.3 B	4.3 B	944	640 J	92.9	16.1	61	13.5	23 B	6.9 B	-	50
MERCURY	µg/l	<0.20	<0.20 J	<0.20 J	<0.10	<0.10	<0.10	<0.10	0.68	NA	<0.10	<0.10	<0.10	<0.10	0.30	<0.20 J	<0.10 J	0.14J	<0.10	<0.10	<0.10	<0.10	2	-
NICKEL	µg/l	427	<10.0	<10.0	<6.4	<6.4	4.8 B	<3.3	225	NA	<6.4	<6.4	13.8 B	9.3 B	34.0 B	21.0 B	6.7 B	<6.4	<6.4	<6.4	<3.3	<3.3	100	-
POTASSIUM	µg/l	1380 Bb	1080 Bb	901 Bb	521 B	615 b	664 B	605 B	38200	NA	968 B	894 B	835 B	603 B	9400	9390	2140 B	836 B	1550	775	972 B	777 B	-	-
SELENIUM	µg/l	<3.0	<3.0 R	<3.0 R	<2.8	<2.8	<2.8	<2.8	<15.0	NA	<2.8 J	<2.8 J	<2.8	<2.8	<15.0	<15.0	<2.8	<2.8	<2.8 J	<2.8	<2.8	<2.8	50	-
SILVER	µg/l	<3.0	<3.0	<3.0	3.5 B	<2.8	<2.5	<2.5	<3.0	NA	<2.8	<2.8	<2.5	<2.5	<3.0	<3.0	<2.8	<2.8	<2.8	<2.8	<2.5	<2.5	-	100
SODIUM	µg/l	11900	8690 J	8520 J	8120	8190	8760	8690	25100	NA	8350	8530	8400	8420	26700	44400 J	8490	8530	8230	8360	8230	8500	-	-
THALLIUM	µg/l	<1.0	<1.0 J	<1.0 J	<3.4	<3.4	<2.9	<2.9	1.6 B	NA	<3.4 J	<3.4 J	<2.9	<2.9	<1.0	<1.0 J	<3.4 J	<3.4 J	<3.4 J	<3.4 J	<2.9	<2.9	2	-
VANADIUM	µg/l	15.0 B	10.0 B	<8.0	2.9 B	<2.2	1.8 B	<1.5	1090	NA	4.1 B	<2.2	4.7 B	<1.5	156	136	22.2 B	<2.2	12.6 B	<2.2	4.4 B	<1.5	-	-
ZINC	µg/l	163	136	37	712 J	814 J	11.2 B	5.4 B	798	NA	953 J	1210 J	33.9	26.0	121	97	742 J	1050 J	1030	839	10.5 B	9.8 B	-	5,000
GENERAL CHEMISTRY																								
ALKALINITY (AS CaCO3)																								
ALKALINITY TO pH 8.3	mg/l	ND	ND	ND	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	ND	NA	NA	NA	ND	NA	-	-
ALKALINITY TO pH 4.5	mg/l	236	296	269	240	NA	210	NA	184	NA	240	NA	250	NA	183	290	240	NA	NA	NA	240	NA	-	-
CHLORIDE	mg/l	13	17	18	20.7	NA	21.8	NA	14	NA	21	NA	20.7	NA	32	71	22.7	NA	NA	NA	16.1	NA	-	250
NITRATE (AS N)	mg/l	1.52	1.20	1.13	1.6	NA	1.6	NA	1.40	NA	1.3	NA	1.4	NA	0.99	0.97	1.6	NA	1.6	NA	1.6	NA	10	-
SULFATE	mg/l	ND	5	8	<5	NA	<5	NA	44	NA	7	NA	5	NA	14	21	5	NA	6	NA	6	NA	-	250
TOC	mg/l	2	ND	ND	6	NA	10.9	NA	6	NA	3.4	NA	2.9	NA	4	2	2.5	NA	1.6	2.5	17	NA	-	-
TDS	mg/l	261	338	311	403	75	175	137	306	NA	299	<10	268	273	355	489	299	178	299	299	275	264	-	500
TSS	mg/l	457	526	16	30	53	20	<5	35500	NA	13	17	64	7	5970	1020	1070	22	97	5	66	17	-	-
FIELD PARAMETERS																								
pH	s.u.	7.31	7.67	7.2	NR	NR	NR	NR	7.46	7.36	NR	NR	8.20	NR	7.12	7.34	NR	NR	NR	NR	NR	NR	-	6.5 - 8.5
SPECIFIC CONDUCTANCE	µmhos/cm	546	525	532	NR	NR	NR	NR	503	551	NR	NR	560	NR	700	658	NR	NR	NR	NR	NR	NR	-	-
TEMPERATURE	C	26.2	25.3	25.7	NR	NR	NR	NR	25.1	26.1	NR	NR	26.0	NR	24.4	25.2	NR	NR	NR	NR	NR	NR	-	-
TURBIDITY		C	C	C	NR	NR	NR	NR	VT	ST	NR	NR	NR	NR	ST	ST	NR	NR	NR	NR	NR	NR	-	-

NOTES:
µg/l - microgram per liter
mg/l - milligrams per liter
< - less than the Contract Required Detection Limit (CRDL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRDL.
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 (07/23/93)(sample ID MW-21).
(c) Duplicate of MW-4 (04/92)(sample ID DUP-1).
(d) Duplicate of MW-5 (11/93)(sample ID MW-22).
(e) Duplicate of MW-7 (06/92)(sample ID DUP-1).
(f) Duplicate of MW-7 (11/93)(sample ID MW-23).
(g) Duplicate of MW-8 (organics only)(07/22/93)(sample ID MW-20).
MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
NA - not analyzed
ND - not detected
NR - not reported
Inorganic parameters were analyzed from samples which were not filtered unless table specifically indicates sample was filtered.
C - sample was clear
ST - sample was slightly turbid
VT - sample was very turbid
Shaded results indicate the sample exceeds the primary or secondary MCL
(*) - Action level for lead in drinking water of 15 µg/l.

FN:\DISK\933-3926\TABLES\BARWIQ.WK1

50056

TABLE 1
(PAGE 5 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS
Barceloneta Landfill Site
Barceloneta, Puerto Rico

SAMPLE DATE / INORGANICS	UNITS	MW-4 04/14/92	MW-4(c) 04/14/92	MW-4 05/19/92	MW-4 07/23/93	MW-4 07/23/93 (FILTERED)	MW-4 11/12/93	MW-4 11/12/93 (FILTERED)	MW-5 04/15/92	MW-5 05/20/92	MW-5 07/22/93	MW-5 07/22/93 (FILTERED)	MW-5 11/11/93	MW-5 11/11/93 (FILTERED)	MW-5(d) 11/11/93	MW-5(d) 11/11/93 (FILTERED)	MW-6 04/15/92	MW-6 05/18/92	MW-6 07/27/93	MW-6 07/27/93 (FILTERED)	MW-6 11/12/93	MW-6 11/12/93 (FILTERED)	PRIMARY MCL	SECONDARY MCL
ALUMINUM	µg/l	<84.0 J	12600 J	9060	1580	1440	319	292	438 B	1020	910	700	156 B	172	123 J	157 J	173000 J	9460	2710	784	533	156 B	-	-
ANTIMONY	µg/l	<49.0	<49.0	<49.0 J	<30.6	<30.6	<18.2	<18.2	<49.0	<49.0 J	<30.6 J	<30.6 J	<18.2	<18.2	<18.2	<18.2	<49.0	<49.0 J	<30.6	<30.6	<18.2	<18.2	6	-
ARSENIC	µg/l	9.3 JB	16.2 J	7.08 JB	<3.5	<3.5	<4.4	<4.4	<2.0 J	<2.0 J	<3.5	<3.5	<4.4	<4.4	<4.4	<4.4	93.2 J	7.0 BJ	<3.5	<3.5	<4.4	<4.4	50	-
BARIUM	µg/l	56.0 B	69.0B	47.0B J	44.2 B	43.3 B	52.1 B	51.1 B	8.0 B	20.0 BJ	17.8 B	16.7 B	14.5 B	14.6 B	14.4	15.1	678	44.0 BJ	16.0 b	14.1 B	14.5 B	14.3 B	2,000	-
BERYLLIUM	µg/l	2.0 Bb	3.0 Bb	3.0 Bb	<0.30	<0.30	0.32 B	0.37 B	1.0 Bb	3.0 Bb	<0.30	<0.30	0.20 B	<0.10	<0.10	<0.10	172	6.0 b	0.74 b	<0.30	0.35 B	<0.10	4	-
CADMIUM	µg/l	<4.0	<4.0	4.0B	<2.8	<2.8	<1.7	<1.7	<4.0	<4.0	<2.8	<2.8	<1.7	<1.7	<1.7	<1.7	89.0	5.0	<2.8	<2.8	<1.7	<1.7	5	-
CALCIUM	µg/l	384000	410000	271000	277000 J	271000 J	317000	305000	93200	151000	114000	114000	112000	113000	109000	106000	2660000	178000	136000 J	133000 J	131000	129000	-	-
CHROMIUM	µg/l	355	406	733	14.7	<3.4	13.6	1.8 B	23.0 b	34.0	826	8.8 B	79.1	2.7 B	56.8	2.3	1920	99	106	<3.4	8.8 B	3.9 B	100	-
COBALT	µg/l	<9.0	10.0B	<9.0	<4.1	<4.1	<1.6	<1.6	<9.0	<9.0	<4.1	4.3 B	<1.6	<1.6	<1.6	<1.6	307	11.0B	<4.1	<4.1	1.8 B	<1.6	-	-
COPPER	µg/l	32.0	32.0	23.0 B	6.2 J	7.5 JB	<2.3	<2.3	3.0 Bb	8.0 Bb	12.1 J	5.9 B	<2.3	<2.3	<2.3	<2.3	691	32.0 b	8.4 b	8.8 B	<2.3	<2.3	-	1,000
IRON	µg/l	24000 J	25300 J	13900	173	39.5 JB	102	30.1 B	752 J	2300	2950	75.5 B	447	20.1 B	373	35.5 J	573000 J	32200	2870	41.9 B	1330	53.8 B	-	300
LEAD	µg/l	9.7	17.6	8.7 J	<2.0	<2.0	<2.6	<2.6	1.1B	1.9 Bb	2.0 J	<2.0	<2.6	<2.6	31.9 J	2.8 J	226	9.4 J	<2.0 J	<2.0 J	3.0	<2.6	15(*)	-
MAGNESIUM	µg/l	10900	10300	8610	11000	10700	11800	11600	3950 B	4980 B	4510 B	4490 B	4500 B	4460 B	4390	4460	41800	5800	4540 b	4530 B	4430 B	4460 B	-	-
MANGANESE	µg/l	292	338	144 J	7.0 B	6.2 B	5.6 B	6.1 B	13.0 B	27.0 J	32.2	8.0 B	7.1 B	5.8 B	5.5	6.2	31000	934 J	114	35.3	69.7	33.5	-	50
MERCURY	µg/l	6.6	11.3	14.9 J	16J	13.1 J	19.8	8.1	<0.20	<0.20 J	<0.1	<0.1	<0.10	<0.10	<0.10	<0.10	2.1	0.39 J	<0.10	<0.10	0.16 B	<0.10	2	-
NICKEL	µg/l	81.0	82.0	98.0	<6.4	6.5 B	9.7 B	3.4 B	<10.0	<10.0	77.3	25.6 B	37.2 B	25.3 B	31.7	26.5	910	43.0 B	81.6	51.2	47.7	39.9 B	100	-
POTASSIUM	µg/l	2910 B	2320 B	1940 B	1490 b	1600 B	1510 B	1570 B	879 Bb	1490 Bb	974 B	1020 B	1000 B	958 B	880	1010	9710	1470 Bb	928 Bb	966 b	705 b	708 B	-	-
SELENIUM	µg/l	<15.0	<15.0	<3.0	<2.8 J	<2.8 J	<2.8	<2.8	<3.0	<3.0 R	<2.8	<2.8	3.1 B	3.3 B	3.3	<2.8	<15.0	<3.0 R	<2.8 J	<2.8 J	<2.8	<2.8	50	-
SILVER	µg/l	<3.0	<3.0	<3.0	<2.8	<2.8	<2.5	<2.5	<3.0	3.0 B	2.8 B	<2.8	<2.5	<2.5	<2.5	<2.5	<3.0	<3.0	<2.8	<2.8	<2.5	<2.5	-	100
SODIUM	µg/l	38700	32100	36200 J	84200	83600	93200 R	182000 R	11200	13300 J	16600	16600	16400	16500	16100	16500	33700	12200 J	12300	12500	12400	12600	-	-
THALLIUM	µg/l	<1.0	<1.0	<1.0 J	<3.4 J	<3.4 J	<2.8	<2.8	<1.0	<1.0 J	<3.4	<3.4	<2.8	<2.8	<2.8	<2.8	4.4 B	<1.0 J	<3.4 J	<3.4 J	<2.8	<2.8	2	-
VANADIUM	µg/l	83.0	88.0	47.0 B	<2.2	<2.2	<1.5	<1.5	<6.0	11.0 B	11.6 b	<2.2	<1.5	<1.5	<1.5	<1.5	2430	120	10.9 Bb	<2.2	5.0 B	<1.5	-	-
ZINC	µg/l	86.0	103	65	1010	795	2.1 B	6.8 B	<5.0	27	833	876	9.8 B	5.3 B	2.4	5.9	2480	119	1050	733	13.8 J	19.2 J	-	5,000
GENERAL CHEMISTRY:																								
ALKALINITY (AS C=CO3)																								
ALKALINITY TO pH 8.3	mg/l	ND	ND	ND	ND	NA	ND	NA	ND	ND	ND	NA	ND	NA	ND	NA	ND	ND	ND	NA	ND	NA	-	-
ALKALINITY TO pH 4.5	mg/l	385	289	351	340	NA	360	NA	254	256	250	NA	260	NA	260	NA	266	294	310	NA	310	NA	-	-
CHLORIDE	mg/l	85	82	91	333	NA	463	NA	22	37	47	NA	41.6	NA	41.9	NA	20	32	35.5	NA	31.6	NA	-	250
NITRATE (AS N)	mg/l	7.69	8.13	29.1	7.4	NA	16.6	NA	1.85	1.72	2.5	NA	6.5	NA	3	NA	ND	27.6	2.6	NA	2.7	NA	10	-
SULFATE	mg/l	7	ND	ND	9	NA	8	NA	5	ND	6	NA	5	NA	5	NA	15	5	<5	NA	<5	NA	-	250
TOC	mg/l	3	3	2	2	NA	25	NA	ND	ND	<1	NA	7.3	NA	8.9	NA	48	ND	4.2	NA	3	NA	-	-
TDS	mg/l	706	736	639	1270	1570	1660	1700	396	375	312	355	344	367	330	372	393	446	473	413	390	385	-	500
TSS	mg/l	784	3550	530	<5	387	ND	<5	65	91	1040	676	<5	6	126	<5	32100	841	88	<5	<5	<5	-	-
FIELD PARAMETERS																								
pH	s.u.	7.00	7.00	7.34	NR	NR	NR	NR	7.20	7.31	NR	NR	NR	NR	7.10	7.16	NR	NR	NR	NR	6.13	NR	-	6.5 - 8.5
SPECIFIC CONDUCTANCE µmhos/cm		1095	1095	979	NR	NR	NR	NR	618	619	NR	NR	NR	NR	640	639	NR	NR	NR	NR	631	NR	-	-
TEMPERATURE	C	25.8	25.8	26.0	NR	NR	NR	NR	25.7	25.8	NR	NR	NR	NR	25.0	25.1	NR	NR	NR	NR	26.4	NR	-	-
TURBIDITY		ST	ST	ST	NR	NR	NR	NR	C	ST	NR	NR	NR	NR	ST	ST	NR	NR	NR	NR	ST	NR	-	-

NOTES:

µg/l - micrograms per liter
mg/l - milligrams per liter
< - less than the Contract Required Detection Limit (CRDL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRDL.
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 (07/23/93)(sample ID MW-21).
(c) Duplicate of MW-4 (04/92)(sample ID DUP-1).
(d) Duplicate of MW-5 (11/93)(sample ID MW-22).
(e) Duplicate of MW-7 (05/92)(sample ID DUP-1).
(f) Duplicate of MW-7 (11/93)(sample ID MW-23).
(g) Duplicate of MW-8 (organics only)(07/22/93)(sample ID MW-20).
MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
NA - not analyzed
ND - not detected
NR - not reported
Inorganic parameters were analyzed from samples which were not filtered unless table specifically indicates sample was filtered.
C - sample was clear
ST - sample was slightly turbid
VT - sample was very turbid
Shaded results indicate the sample exceeds the primary or secondary MCL
(*) - Action level for lead in drinking water of 15 µg/l.

FN:\DISK\933-3928\TABLES\BARWIQ.WK1

TABLE 16
(PAGE 6 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS

Barceloneta Landfill Site
Barceloneta, Puerto Rico

INORGANICS:	UNITS	MW-7 04/13/92	MW-7 05/20/92	MW-7(a) 05/20/92	MW-7 07/21/93	MW-7 07/21/93 (FILTERED)	MW-7 11/14/93	MW-7 11/14/93 (FILTERED)	MW-7(f) 11/14/93	MW-7(f) 11/14/93 (FILTERED)	MW-8 4/13/92	MW-8 05/18/92	MW-8 07/22/93	MW-8 07/22/93 (FILTERED)	PRIMARY MCL	SECONDARY MCL
ALUMINUM	µg/l	6940 J	752	1080	775	729	899	159 B	518	163 B	10800 J	78600	761	651	-	-
ANTIMONY	µg/l	<49.0	<49.0 J	<49.0 J	<30.6 J	<30.6 J	<18.2	<18.2	<18.2	<18.2	<49.0	<49.0	<30.6 J	<30.6 J	6	-
ARSENIC	µg/l	11.6 J	<2.0J	<2.0J	<3.5	<3.5	<4.4	<4.4	<4.4	<4.4	22.5 J	24.5 BJ	<3.5	<3.5	50	-
BARIUM	µg/l	22.0 B	14.0 Bb	14.0 Bb	11.8 B	11.7 B	13.1 B	11.3 B	12.3 B	11.6 B	58.0 B	278 J	10.1 B	10 B	2,000	-
BERYLLIUM	µg/l	2.0 Bb	3.0 Bb	3.0 Bb	<0.30	<0.3	0.21	0.13 B	0.18	0.13 B	2.0 Bb	7.0 b	<0.30	<0.30	4	-
CADMIUM	µg/l	<4.0	<4.0	<4.0	<2.8	<2.8	<1.7	<1.7	<1.7	<1.7	<4.0	10	<2.8	<2.8	5	-
CALCIUM	µg/l	480000	154000	169000	133000	125000	164000	135000	155000	137000	641000	3510000	115000	113000	-	-
CHROMIUM	µg/l	100	63	67	7.6 B	<3.4	77.7	<1.7	55	3.5	65.0	513.0	9.8 B	4.4 B	100	-
COBALT	µg/l	<9.0	<9.0	<9.0	<4.1	<4.1	7.6 B	<1.6	6.6	<1.6	<9.0	34.0 B	<4.1	<4.1	-	-
COPPER	µg/l	18.0 B	8.0 Bb	8.0 Bb	3.3 B	3.1 B	<2.3	<2.3	<2.3	<2.3	20.0 B	109	3.6 B	3.3 B	-	1,000
IRON	µg/l	14600 J	2280	3280	184	95.4 B	4310	30.7 B	2950	52.5	17300 J	105000	130	42 B	-	300
LEAD	µg/l	4.8	1.3 Bb	1.8 Bb	<2.0	<2.0	11.0	4 BJ	10.1 J	<2.0	17.4	104 J	<2.0	<2.0	15(*)	-
MAGNESIUM	µg/l	8530	4130 B	4410 B	3840 B	3820 B	4480 B	4110 B	4360	4200	7280	26200	2740 B	2760 B	-	-
MANGANESE	µg/l	266	47.0 J	61.0 J	6.3 B	6.8 B	93.6	25.5	70.4	21.1	370	1690 J	5.6 B	4.0 B	-	50
MERCURY	µg/l	<0.20	<0.20J	<0.20J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2J	<0.1	0.15 B	2	-
NICKEL	µg/l	31.0 B	81	88	38 B	36.5 B	101	50 B	87.8	49.2	<10.0	170	19.5 B	12.1 B	100	-
POTASSIUM	µg/l	2370 B	1370 Bb	1560 Bb	902 B	787 B	931 B	895 B	857 B	902 B	2560 B	7280	487 B	496 B	-	-
SELENIUM	µg/l	<15.0	<3.0R	<3.0R	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<15.0	<15.0R	<2.7 B	<2.8	50	-
SILVER	µg/l	<3.0	<3.0	<3.0	<2.6	<2.6	<2.5	<2.5	<2.5	<2.5	<3.0	<3.0	2.7 B	<2.6	-	100
SODIUM	µg/l	25500	24000 J	24100 J	24800	24800	28100	27900	28000	28800	33100	47500 J	12100	12500	-	-
THALLIUM	µg/l	<1.0	<1.0J	<1.0J	<3.4	<3.4	<2.8	<2.8	<2.8	<2.8	<1.0	<1.0J	<3.4	<3.4	2	-
VANADIUM	µg/l	84.0	10.0 B	13.0 B	<2.2	<2.2	11.0 B	<1.5	7.6 B	<1.5	75.0	434.0	<2.2	<2.2	-	-
ZINC	µg/l	55.0	10.0 B	13.0 B	951	778	11.6 B	6.1 B	6.6 B	4.6 B	54.0	292.0	931	753	-	5,000
GENERAL CHEMISTRY:																
ALKALINITY (AS CaCO3)																
ALKALINITY TO pH 8.3	mg/l	ND	ND	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	-	-
ALKALINITY TO pH 4.5	mg/l	243	256	262	270	NA	300	NA	290	NA	184	269	240	230	-	-
CHLORIDE	mg/l	45	61	60	67	NA	93.8	NA	84.5	NA	12	22	47.4	48.9	-	250
NITRATE (AS N)	mg/l	2.52	2.37	2.48	2.5	NA	3	NA	3.1	NA	1.32	1.23	1.4	1.9	10	-
SULFATE	mg/l	20	ND	ND	<5	NA	<5	NA	<5	NA	ND	24	<5	<5	-	250
TOC	mg/l	5	2	2	1.4	NA	4.2	NA	16.2	NA	2	3	<1	1.8	-	-
TDS	mg/l	384	448	450	444	456	365	355	400	283	231	348	303	339	-	500
TSS	mg/l	3840	113	190	18	<5	78	<16.5	40	<5	4440	14500	41	9	-	-
FIELD PARAMETERS																
pH	s.u.	7.09	7.23	7.23	NR	NR	NR	NR	NR	NR	7.30	7.78	NR	NR	-	6.5 - 8.5
SPECIFIC CONDUCTANCE	µmhos/cm	714	883	883	NR	NR	NR	NR	NR	NR	490	523	NR	NR	-	-
TEMPERATURE	C	24.8	25.6	25.6	NR	NR	NR	NR	NR	NR	26.4	24.7	NR	NR	-	-
TURBIDITY		ST	ST	ST	NR	NR	NR	NR	NR	NR	ST	ST	NR	NR	-	-

NOTES:

µg/l - micrograms per liter
mg/l - milligrams per liter
< - less than the Contract Required Detection Limit (CRDL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRDL.
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples
(b) Duplicate of MW-3 (07/93)(sample ID MW-21)
(c) Duplicate of MW-4 (04/92)(sample ID DUP-1).
(d) Duplicate of MW-5 (11/93)(sample ID MW-22).
(e) Duplicate of MW-7 (05/92)(sample ID DUP-1).
(f) Duplicate of MW-7 (11/93)(sample ID MW-23).
MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
ND - not detected
NR - not reported
Inorganic parameters were analyzed from samples which were not filtered unless table specifically indicates sample was filtered
C - sample was clear
ST - sample was slightly turbid
VT - sample was very turbid
Shaded results indicate the sample exceeds the primary or secondary MCL.
(*) - Action level for lead in drinking water of 15 µg/l

FN:\DISK\933-3928\TABLES\BARWIQ2.WK1

March 1995

933-3928

TABLE 16
(PAGE 7 OF 7)
GROUNDWATER AND SPRING ANALYTICAL RESULTS - SUMMARY OF DETECTED PARAMETERS

Barceloneta Landfill Site
Barceloneta, Puerto Rico

SAMPLE DATE / INORGANICS:	UNITS	MW-8 11/14/93	MW-8 11/14/93 (FILTERED)	SP-1 04/13/92	SP-1 07/22/93	SP-1 07/22/93 (FILTERED)	SP-1 11/10/93	SP-1 11/10/93 (FILTERED)	PUBLIC 07/26/93	PUBLIC 07/26/93 (FILTERED)	PUBLIC 11/12/93	PUBLIC 11/12/93 (FILTERED)	PRIMARY MCL	SECONDARY MCL
ALUMINUM	µg/l	381	182 B	191 Bb	812	577	186 B	1278	588	577	154 B	144	-	-
ANTIMONY	µg/l	<18.2	<18.2	<49.0	<30.6	<30.6	<18.2 J	<18.2 J	<30.6	<30.6	<18.2	<18.2	6	-
ARSENIC	µg/l	<4.4	<4.4	<2.0J	<3.5	<3.5	<4.4	<4.4	<3.5	<3.5	<4.4	<4.4	50	-
BARIUM	µg/l	9.9 B	8.5 B	16.0 B	12.4 B	11.9 B	10 B	10.3 B	29.0 B	28.5 B	28.2 B	27.2 B	2,000	-
BERYLLIUM	µg/l	0.23 B	0.12 B	1.0 Bb	<0.30	<0.30	0.23 B	<0.1	<0.30	<0.30	<0.1	<0.2 B	4	-
CADMIUM	µg/l	<1.7	<1.7	<4.0	<2.8	<2.8	<1.7	<1.7	<2.8	<2.8	<1.7	<1.7	5	-
CALCIUM	µg/l	126000	99700	83900	108000	96100	93500	81300	82600J	81300J	76200	73400	-	-
CHROMIUM	µg/l	204	16.1	9.0 Bb	<3.4	3.7 B	3.4 B	2.3 B	<3.4	<3.4	2.4 B	1.8 B	100	-
COBALT	µg/l	2.8 B	<1.8	<9.0	<4.1	<4.1	<1.8	<1.8	<4.1	<4.1	<1.8	<1.8	-	-
COPPER	µg/l	<2.3	<2.3	<3.0	3.8 B	8.2 B	<2.3	<2.3	190	154	29.8	27.4	-	1,000
IRON	µg/l	1280	137	249 J	301	25.9 B	71.7 B	18.9 B	36.8 B	30.7 B	33.4 B	20.1 B	-	300
LEAD	µg/l	<2.8	<2.8	4.7	<2.0	<2.0	<2.8	<2.8	3.6R	5.6R	2.8 B	2.8	15(*)	-
MAGNESIUM	µg/l	2950 B	2810 B	2950B	2810 B	2750 B	2760 B	2740 B	11400	11200	11100	10800	-	-
MANGANESE	µg/l	31.2	9.7 B	34.0	16.9	10.4 B	7.5 B	4.0 B	1.5 B	1.5 B	<0.08	1.5 B	-	50
MERCURY	µg/l	<0.1	<0.1	<0.2	<0.1	<0.1	0.15 B	<0.1	<0.1	<0.1	<0.1	<0.1	2	-
NICKEL	µg/l	175	127	<10.0	<6.4	<6.4	<3.3	<3.3	<6.4	<6.4	<3.3	<3.3	100	-
POTASSIUM	µg/l	580 B	589 B	1220 Bb	1010 B	913 B	965 B	960 B	1070J	1190J	997 B	1030 B	-	-
SELENIUM	µg/l	2.8 B	<2.8	<3.0	<2.8	<2.8	<2.8	<2.8	<2.8J	<2.8 J	<2.8	<2.8	50	-
SILVER	µg/l	<2.5	<2.5	<3.0	<2.8	<2.8	<2.5	<2.5	<2.8	<2.8	<2.5	<2.5	-	100
SODIUM	µg/l	14300	14100	10900	13000	12800	12600	12700	10000	10100	9860	9520	-	-
THALLIUM	µg/l	<2.8	<2.8	<1.0	<3.4	<3.4	<2.8	<2.8	<3.4J	<3.4J	<2.8	<2.8	2	-
VANADIUM	µg/l	2.8 B	<1.5	<6.0	2.8 B	2.7 B	2.3 B	<1.5	<2.2J	2.6J	4.5 B	2.7 B	-	-
ZINC	µg/l	4.5 B	4.2 B	<5.0	896	884	5.0 B	3.5 B	965	942	7 J	8.4 J	-	5,000
GENERAL CHEMISTRY:														
ALKALINITY (AS CaCO3)														
ALKALINITY TO pH 8.3	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	-	-
ALKALINITY TO pH 4.5	mg/l	230	NA	210	230	NA	250	NA	250	NA	230	NA	-	-
CHLORIDE	mg/l	48 B	NA	13	25.9	NA	28.5	NA	17.2	NA	17.1	NA	-	250
NITRATE (AS N)	mg/l	1.8	NA	3.40	2.7	NA	4	NA	1.3	NA	1.1	NA	10	-
SULFATE	mg/l	<5	NA	ND	5	NA	5	NA	9	NA	9	NA	-	250
TOC	mg/l	1.8	NA	ND	2.8	NA	4.8	NA	2	NA	84.2	NA	-	-
TDS	mg/l	263	206	241	336	289	324	323	340	345	278	282	-	500
TSS	mg/l	24	<5	6	147	427	<5	<5	<5	<5	35	35	-	-
FIELD PARAMETERS														
pH	s.u.	NR	NR	7.02	NR	NR	7.20	NR	NR	NR	NR	NA	-	6.5 - 8.5
SPECIFIC CONDUCTANCE	µmhos/cm	NR	NR	523	NR	NR	530	NR	NR	NR	NR	NA	-	-
TEMPERATURE	C	NR	NR	25.3	NR	NR	24.0	NR	NR	NR	NR	NA	-	-
TURBIDITY		NR	NR	C	NR	NR	C	NR	NR	NR	NR	NA	-	-

NOTES:
µg/l - microgrems per liter
mg/l - milligrams per liter
< - less than the Contract Required Detection Limit (CRDL).
J - the reported value was estimated as a result of data validation.
R - the data was rejected as a result of data validation.
B - the value is greater than the method detection limit (MDL) but less than the CRDL.
b - not detected substantially above the level reported in the blanks.
(a) MW-1A was collected prior to Round 2 and analyzed with Round 2 samples.
(b) Duplicate of MW-3 (07/93)(sample ID MW-21).
(c) Duplicate of MW-4 (04/92)(sample ID DUP-1).
(d) Duplicate of MW-5 (11/93)(sample ID MW-22).
(e) Duplicate of MW-7 (05/92)(sample ID DUP-1).
(f) Duplicate of MW-7 (11/93)(sample ID MW-23).
MCL - maximum contaminant level established by USEPA.
- No MCL has been determined.
ND - not detected
NR - not reported
Inorganic parameters were analyzed from samples which were not filtered unless table specifically indicates sample was filtered
C - sample was clear
ST - sample was slightly turbid
VT - sample was very turbid
Shaded results indicate the sample exceeds the primary or secondary MCL.
(*) - Action level for lead in drinking water of 15 µg/l.

FN:\DISK\933-3928\TABLES\BARWIQ2.WK1

APPENDIX III

ADMINISTRATIVE RECORD INDEX

BARCELONETA LANDFILL SITE
ADMINISTRATIVE RECORD FILE
INDEX OF DOCUMENTS

1.0 SITE IDENTIFICATION

1.2 Notification/Site Inspection Reports

P. 100001 - 100003 Report: Open Dump Inventory Report, prepared by U.S. EPA, September 15, 1980.

1.3 Preliminary Assessment

P. 100004 - 100007 Report: Potential Hazardous Waste Site, Identification and Preliminary Assessment, prepared by Mr. Wayne Pierre, U.S. EPA, September 14, 1981.

1.4 Site Investigation Reports

P. 100008 - 100017 Report: Potential Hazardous Waste Site, Site Inspection Report, prepared by Mr. David Lipsky, Assistant Field Investigation Team Leader, Fred C. Hart Associates, prepared for U.S. EPA, August 6, 1981.

P. 100018 - 100036 Report: Potential Hazardous Waste Site, Site Inspection Report, prepared by Mr. David Lipsky, Assistant Field Investigation Team Leader, Fred C. Hart Associates, prepared for U.S. EPA, August 6, 1981.

P. 100037 - 100042 Report: Potential Hazardous Waste Site, Site Inspection Report, prepared by Mr. Dave Lipsky, Assistant Field Investigation Team Leader, Fred C. Hart Associates, prepared for U.S. EPA, March 2, 1982.

P. 100043 - 100058 Report: Barceloneta Landfill, Site Investigation, Barceloneta, Puerto Rico, prepared by Ms. Kristen K. Stout, Imagery Analyst, The Bionetics Corporation, prepared for U.S. EPA, August, 1982.

P. 100059 - 100094 Report: Hazardous Ranking System Package, prepared by Mr. David Lipsky, Assistant Field Investigation Team Leader, Fred C. Hart Associates, prepared for U.S. EPA, August 3, 1982.

3.0 REMEDIAL INVESTIGATION

3.1 Sampling and Analysis Plans

P. 300001 - 300158 Plan: Revised Sampling and Analysis Plan, Remedial Investigation/Feasibility Study, Part 2: Slug Testing, Background Soil Sampling, Barceloneta Landfill Site, Barrio Florida Afuera, Barceloneta, Puerto Rico, prepared by Paul C. Rizzo Associates, Inc., prepared for Barceloneta Landfill Site PRP Group, March, 1993.

P. 300159 - 300335 Plan: Revised Sampling and Analysis Plan, Remedial Investigation/Feasibility Study, Part 1: Groundwater Sampling, Barceloneta Landfill Site, Barrio Florida Afuera, Barceloneta, Puerto Rico, prepared by Paul C. Rizzo Associates, Inc., prepared for Barceloneta Landfill Site PRP Group, June, 1993.

3.4 Remedial Investigation Reports

P. 300336 - 300611 Report: Revised Site Characterization Summary Report, Barceloneta Landfill Site, Barceloneta, Puerto Rico, prepared by Golder Associates Inc., prepared for Barceloneta Landfill PRP Group, c/o Mr. Gordon Spradley, Browning-Ferris Industries, Inc., May 1994.

P. 300612 - 300623 Guidance Document: Drinking Water Regulations and Health Advisories, prepared by Office of Water, U.S. EPA, May 1994.

P. 300624 - 301340 Report: Remedial Investigation Report, Barceloneta Landfill Site, Barceloneta, Puerto Rico, Volume 1 of 2, prepared by Golder Associates Inc., prepared for Barceloneta Landfill PRP Group, c/o Ms. Susan Gilliland, DuPont Corporate Remediation, March 1995.

P. 301341 - 302177 Report: Remedial Investigation Report, Barceloneta Landfill Site, Barceloneta, Puerto Rico, Volume 2 of 2, prepared by Golder Associates Inc., prepared for Barceloneta Landfill PRP Group, c/o Ms. Susan Gilliland, DuPont Corporate Remediation, March 1995.

P. 302178 - 302180 Report: Abbreviated Risk Assessment, Barceloneta Landfill, Barceloneta, Puerto Rico, prepared by U.S. EPA, Region II, May 4, 1995.

3.5 Correspondence

P. 302181 - 302435 Letter to Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, U.S. EPA, from Mr. Marc E. Dillon, P.G., Project Hydrogeologist, Golder Associates Inc., Mr. Mark J. Jordana, P.G., Senior Project Manager, Golder Associates Inc., and Mr. Donald J. Miller, P.E., Associate, Golder Associates Inc., re: Responses to EPA Comments, Revised Site Characterization Summary Report, Barceloneta Landfill Site, Barceloneta, Puerto Rico, December 9, 1994. (Attached: tables and chain of custody forms)

P. 302436 - 302436 Letter to Barceloneta Landfill PRP's Group, c/o Ms. Susan K. Gilliland, P.G., DuPont Specialty Chemicals, Corporate Remediation, from Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, U.S. EPA, re: Approval of a New Monitoring Well Location and Procedures Described in March 31, 1995 Letter, April 12, 1995.

P. 302437 - 302444 Facsimile transmittal sheet to Mr. Luis Santos, U.S. EPA, Mr. Mel Hauptman, U.S. EPA, Mr. Genaro Torres, Ms. Ivette Ortiz de Vega, Mr. Lisandro Reyes, and Ms. Linette Velez Rodrigues, from Mr. Don Miller, Golder Associates Inc., re: Barceloneta Landfill Site, Letter Regarding Filling Options for the Southeastern Disposal Area, April 20, 1995. (Attached letter to Mr. Mel Hauptman, Chief, New York/Caribbean Superfund Branch, U.S. EPA, Region II, from Mr. Donald J. Miller, P.E., Associate, Golder Associates Inc., re: Southeastern Disposal Area Fill Options, Barceloneta Landfill Site, April 19, 1995.)

P. 302445 - 302449 Facsimile transmittal sheet to Ingeniero Carlos Oneill, U.S. EPA, and Mr. Luis Santos, U.S. EPA, from Honorable Sol Luis Fontanes Olivo, Alcalde, Gobierno Municipal, Barceloneta, Puerto Rico, re: Copias de Convocatoria y Resolucion a Discutirse en la Asamblea Municipal, April 20, 1995. (Note: This document is written in Spanish.) (Attached: 1. Letter to Ingeniero Carlos Oneill, U.S. EPA, from Honorable Sol Luis Fontanes Olivo, Alcalde, Gobierno Municipal, Barceloneta, Puerto Rico, re: copias de la convocatoria y resolucion que discutiremos el miercoles 26 de abril a las 7:30 P.M. en la Asamblea Municipal de Barceloneta, April 20, 1995. (Note: This document is written in Spanish.) 2. Letter to Asamblea Municipal de Barceloneta, from Honorable Sol Luis Fontanes Olivo, Alcalde, Gobierno Municipal, Barceloneta, Puerto Rico, re: Convocatoria a Sesion Extraordinaria, undated. (Note: This document is written in Spanish.) 3. "Agenda, Sesion Extraordinaria, 26 de abril de 1995", prepared by Oficina del Alcalde, Gobierno Municipal, Barceloneta, Puerto Rico, undated. (Note: This document is written in Spanish.) 4. Resolution regarding the Barceloneta Landfill, undated. (Note: This document is written in Spanish.))

P. 302450 - 302450 Letter to Mr. Luis Santos, Remedial Project Manager, U.S. EPA, Region II, Caribbean Field Office, from Mr. Genaro Torres Leon, Director, Emergency Response and Superfund Area, Commonwealth of Puerto Rico/Office of the Governor, Environmental Quality Board, Superfund Program, re: Prospective Closure Plan, Barceloneta Landfill, April 25, 1995.

P. 302451 - 302452 Letter to Honorable Sol L. Fontanes Olivo, Alcalde, Municipio de Barceloneta, from Mr. Israel Torres Rivera, Director Interino, Area Control de Contaminacion de Terrenos, Gobierno de Puerto Rico, Oficina del Gobernador, Junta de Calidad Ambiental, re: Plan de Cierre Prospectivo Vertedero de Barceloneta, April 26, 1995. (Note: This document is written in Spanish.)

P. 302453 - 302762 Letter to Mr. Luis E. Santos, U.S. EPA, Region II, Caribbean Field Office, from Mr. Donald J. Miller, P.E., Office Manager/Associate, Golder Associates Inc., re: Monitoring Well Installation, Barceloneta Landfill Site, Barceloneta, Puerto Rico, April 27, 1995. (Attached: 1. Report: Comprehensive Quality Assurance Plan, prepared by and for Savannah Laboratories and Environmental Services, Inc., December, 1994. 2. Report: Statement of Qualifications, prepared by Savannah Laboratories & Environmental Services, Inc., undated.)

P. 302763 - 302786 Letter to Ms. Sara Cortez, Departamiento de Recursos Naturales, from Mr. Donald J. Miller, Associate, P.E., Golder Associates Inc., re: Monitoring Well Installation at Barceloneta Landfill, May 12, 1995. (Attached: 1. Figure: "Well Location", prepared by Golder Associates Inc., April 4, 1994. 2. Attachment 1: Letter to Barceloneta Landfill PRP's Group, c/o Ms. Susan Gilliland, Superfund Manager, DuPont Corporate Remediation, from Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, U.S. EPA, Region II, re: January 31, 1995 Meeting Summary and Modified RI/FS Schedule, Barceloneta Landfill Superfund Site, February 23, 1995. 3. Attachment 2: Letter to Mr. Luis E. Santos, U.S. EPA, Region II, Caribbean Field Office, from Mr. Donald J. Miller, P.E., Office Manager/Associate, Golder Associates Inc., re: Monitoring Well Installation, Barceloneta Landfill Site, Barceloneta, Puerto Rico, March 31, 1995. 4. Map: "Approximate Off Site Well Location", prepared by Golder Associates Inc., 4/4/95. 5. Report excerpt: "Monitoring Well Installation", prepared by Paul C. Rizzo Associates, Inc., November 25, 1991. 7. Attachment 3: Letter to Barceloneta Landfill PRP's Group, c/o Ms. Susan K. Gilliland, P.G., DuPont Specialty Chemicals, Corporate Remediation, from Ms. Carole Petersen, Chief, New York/Caribbean Superfund Branch II, U.S. EPA, re: Approval of the New Monitoring Well Location and Procedures Described in the March 31, 1995 Letter, April 18, 1995. 8. Attachment 4: Letter to Mr. Marc Dillon, Golder Associates Inc., from Honorable Sol Luis Fontanes Olivo, Mayor, Gobierno Municipal, Barceloneta, Puerto Rico, and Mr. Lisandro Reyes, Environmental Director, Gobierno Municipal, Barceloneta, Puerto Rico, re: Permit to Drill a Sampling Water Well in City's Properties, May 10, 1995.)

4.0 FEASIBILITY STUDY

4.3 Feasibility Study Reports

P. 400001 - 400008 Guidance Document: Presumptive Remedies: Policy and Procedures, Quick Reference Fact Sheet, prepared by Office of Solid Waste and Emergency Response, U.S. EPA, September 1993.

P. 400009 - 400023 Guidance Document: Presumptive Remedy for CERCLA Municipal Landfill Sites, Quick Reference Fact Sheet, prepared by Office of Solid Waste and Emergency Response, U.S. EPA, September 1993.

4.6 Correspondence

P. 400024 - 400025 Letter to Mr. Melvin Hauptman, P.E., Chief, Eastern New York/Caribbean Superfund Section II, U.S. EPA, Region II, from Mr. Donald J. Miller, P.E., Associate, Golder Associates Inc., re: Draft Feasibility Study Report, Barceloneta Landfill Site, June 14, 1995.

7.0 ENFORCEMENT

7.3 Administrative Orders

P. 700001 - 700039 Administrative Order on Consent, in the matter of the Barceloneta Landfill Site, Index No. II CERCLA-00304, September 28, 1990

7.7 Notice Letters and Responses

P. 700040 - 700043 Request for Information letter to Abbott Laboratories, from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700044 - 700048 Request for Information letter to Browning-Ferris Industries of Puerto Rico, from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700049 - 700053 Request for Information letter to Pfizer Pharmaceuticals, Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700054 - 700059 Request for Information letter to Carsera Foods, Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983. (Attached letter to Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, Region II, from Mr. Miguel Pagan, Chase Specialty Metals Corporation, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, September 1983.)

P. 700060 - 700064 Request for Information letter to Pfizer Disks Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700065 - 700069 Request for Information letter to Sterling Products International, Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700070 - 700074 Request for Information letter to Winthrop Laboratories, Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, June 15, 1983.

P. 700075 - 700077 Letter to Mr. William K. Sawyer, Office of Regional Counsel, U.S. EPA, Region II, from Mr. Steven J. Cieciura, Ph.D., Director of Engineering, Research and Technical Services, Schering Corporation, Puerto Rico, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, June 24, 1983.

P. 700078 - 700079 Letter to Mr. William K. Sawyer, Office of Regional Counsel, U.S. EPA, Region II, from Mr. Jose E. Casas, Environmental Engineer, Abbott Chemicals, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, July 6, 1983.

P. 700080 - 700083 Request for Information letter to E.I. DuPont de Nemours & Company, Inc., from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, July 7, 1983.

P. 700084 - 700085 Letter to Mr. William Sawyer, Office of Regional Counsel, U.S. EPA, Region II, from Mr. Candido Jimenez, President, Warner Lambert, Inc., Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, July 11, 1983. (Attached letter to Mr. William Sawyer, Office of Regional Counsel, U.S. EPA, Region II, from Mr. Candido Jimenez, President, Warner Lambert, Inc., Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, July 18, 1983.)

P. 700086 - 700094 Letter to William K. Sawyer, Esquire, Office of Regional Counsel, U.S. EPA, Region II, from Ms. Carol Dudnick, Union Carbide Corporation, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, July 13, 1983.

P. 700095 - 700099 Letter to Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. Othoniel Garcia, Quality Assurance Manager, USV Laboratories, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, July 19, 1983. (Attached Request for Information letter to USV Laboratories, from Mr. Conrad Simon, Director, Air and Waste Management Division, U.S. EPA, re: Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, July 7, 1983.)

P. 700100 - 700114 Letter to Mr. William K. Sawyer, Office of Regional Counsel, U.S. EPA, Region II, from Mr. John L. Ashby, Vice President and General Manager, Merck Sharp & Dohme Quimica de Puerto Rico, Inc., re: Response to Request for Information, July 20, 1983.

P. 700115 - 700117 Letter to Mr. Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. W.A. Adams, President, DuPont Agrichemicals Caribe, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, August 1, 1983.

P. 700118 - 700120 Letter to Mr. Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. I. J. Ferrer, Vice President and General Manager, Bristol Alpha Corporation, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, August 2, 1983.

P. 700121 - 700122 Letter to Mr. Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. Manuel L. Hormaza, Engineering and Maintenance Group Manager, The Upjohn Manufacturing Company, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, August 4, 1983.

P. 700123 - 700123 Letter to Mr. Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. Frank Lequerica, Vice President & General Manager, Cyanamid Agricultural de P.R., Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, August 9, 1983.

P. 700124 - 700126 Second Request for Information letter to Bristol-Alpha Corporation, from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700127 - 700129 Second Request for Information letter to American Cyanamid Company, from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700130 - 700132 Second Request for Information letter to Upjohn Manufacturing, Company, from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700133 - 700135 Second Request for Information letter to Roche Products, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700136 - 700138 Second Request for Information letter to Sterling Pharmaceuticals, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700139 - 700141 Second Request for Information letter to Warner Lambert, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700142 - 700144 Second Request for Information letter to Schering Pharmaceuticals Corporation/Schering Corporation, from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, December 1, 1987.

P. 700145 - 700145 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. C. M. Jimenez Barber, Environmental Compliance Manager, Schering Industrial Development Corporation, re: extension of deadline to submit response to the Request for Information, December 8, 1987.

P. 700146 - 700150 Letter to Andrew L. Praschak, Esquire, Office of Regional Counsel, U.S. EPA, Caribbean Field Office, from Ms. Laurel D. Breitkopf, Senior Attorney, Office of General Counsel, Abbott Laboratories, re: extension of time to respond to Second Information Request, December 23, 1987. (Attached: 1. Letter to Andrew L. Praschak, Esquire, Office of Regional Counsel, U.S. EPA, Caribbean Field Office, from Ms. Laurel D. Breitkopf, Senior Attorney, Office of General Counsel, Abbott Laboratories, re: request for extension of time to respond to Second Information Request, December 16, 1987. 2. Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Brian J. Smith, Division Counsel, Office of General Counsel, Abbott Laboratories, re: Response to Second Request for Information, February 1, 1988.)

P. 700151 - 700725 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Ms. Yazmin I Reyes, Environmental Manager, Bristol-Myers Barceloneta, Inc., re: enclosed certified document, January 4, 1988. (Attached: 1. "Attachment 3, Certification of Answers to Request for Information", prepared by Mr. Tibor A. Racz, General Manager, Bristol-Myers Barceloneta, Inc., prepared for U.S. EPA, January 4, 1988. 2. Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Tibor A. Racz, General Manager, Bristol-Myers Barceloneta, Inc., re: Response to Second Request for Information, December 22, 1987.)

P. 700726 - 700771 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Don Woodhouse, General Manager, Sterling Pharmaceuticals, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, January 12, 1988.

P. 700772 - 700775 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Edward A. MacMullan, Vice President of Manufacturing Operations, Roche Products, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, January 13, 1988.

P. 700776 - 700781 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Bernabe Martir, Manager, Environmental Affairs, The Upjohn Manufacturing Company, re: Response to Second Request for Information, January 14, 1988.

P. 700782 - 700897 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Dr. Richard S. Bowles, III, General Manager, Merck Sharp & Dohme Quimica de Puerto Rico, Inc., re: Response to Second Request for Information regarding the Barceloneta Landfill, Barceloneta, Puerto Rico, January 21, 1988. (Note: Pages 700891 - 700895 of this document are CONFIDENTIAL. They are located at U.S. EPA Remedial Records Center, 290 Broadway, New York, New York, 10007)

P. 700898 - 700904 Second Request for Information letter to Mr. Candido Jimenez, President, Warner Lambert, Inc., from U.S. EPA, Region II, re: Second Request for Information Pertaining to Barceloneta Landfill, Barceloneta, Puerto Rico, January 26, 1988.

P. 700905 - 700910 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Frank Lequerica, Vice President and General Manager, Cyanamid Agricultural de Puerto Rico, Inc., re: Response to Second Request for Information, January 28, 1988. (Attached letter to Mr. Wayne N. Pierre, Hazardous Waste Site Branch, U.S. EPA, Region II, from Mr. Frank Lequerica, Vice President & General Manager, Cyanamid Agricultural de Puerto Rico, Inc., re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, August 9, 1983.)

P. 700911 - 700913 Letter to Mr. Jose Font, U.S. EPA, from Mr. Eduardo Negron-Navas, Fiddler, Gonzalez & Rodriguez, Attorneys and Counsellors at Law, re: enclosed Certification of Answers to Request for Information, February 1, 1988. (Note: This document is written in Spanish.) (Attached: "Attachment 3, Certification of Answers to Request for Information", prepared by Mr. Frank Lequerica, Vice President and General Manager, Cyanamid Agricultural de Puerto Rico, Inc., prepared for U.S. EPA, January 29, 1988)

P. 700914 - 700914 Letter to Andrew L. Praschak, Esquire, Office of Regional Counsel, U.S. EPA, from Mr. William F. Kirchoff, Assistant Counsel, Regulatory and Governmental Affairs, Warner Lambert Company, re: Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, February 8, 1988.

P. 700915 - 700938 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Frank Lequerica, Vice President and General Manager, Cyanamid Agricultural de Puerto Rico, Inc., re: Additional Information Regarding the Second Request for Information, February 12, 1988.

P. 700939 - 701050 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Carlos M. Jimenez Barber, Environmental Compliance Manager, Schering Industrial Development Corporation, re: Response to Second Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, February 12, 1988.

P. 701051 - 701070 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Ms. Donna L. Kolar, Attorney, Browning-Ferris Industries of Puerto Rico, Inc., re: Response to Request for Information, February 17, 1988.

P. 701071 - 701073 Letter to Mr. Jose Font, U.S. EPA, from Mr. Eduardo Negron Navas, Fiddler, Gonzalez & Rodriguez, Attorneys and Counsellors at Law, re: enclosed Certification of Answers to Request for Information, February 17, 1988. (Note: This document is written in Spanish) (Attached: "Attachment 3, Certification of Answers to Request for Information", prepared by Mr. Carlos M. Jimenez Barber, Environmental Compliance Manager, Schering Industrial Development Corporation, February 16, 1988.)

P. 701074 - 701107 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. William G. Speenburgh, Manager, Environmental Control, Warner-Lambert Company, re: Response to Request for Information regarding Barceloneta landfill, Barceloneta, Puerto Rico, March 4, 1988.

P. 701108 - 701133 Letter to Mr. Jose C. Font, Project Manager, U.S. EPA, Caribbean Field Office, from Mr. Michael A. Miller, Manager, Remedial Engineering, Corporate Environmental Programs, General Electric Company, re: Response to Request for Information regarding Barceloneta Landfill, Barceloneta, Puerto Rico, March 4, 1988.

P. 701134 - 701136 Notice letter to Abbott Pharmaceuticals, E.I. DuPont de Nemours & Company, Honorable Sol Luis Fontanez, Mayor, Town of Barceloneta, Merck Sharp & Dohme Quimica de Puerto Rico, Inc., and Upjohn Manufacturing Company, re: Request to perform RI/FS at the Barceloneta Landfill, Barceloneta, Puerto Rico, June 18, 1990.

P. 701137 - 701139 Notice Letter to Union Carbide Corporation, from U.S. EPA, Region II, re: Request to perform RI/FS at the Barceloneta Landfill, Barceloneta, Puerto Rico, and notification of PRP status, August 16, 1990.

P. 701140 - 701180 Facsimile transmittal sheet to Mr. Jose Font, U.S. EPA, Region II, Caribbean Field Office, from Mr. Jim Doyle, Office of Regional Counsel, U.S. EPA, Region II, re: enclosed letter from Hoffmann-LaRoche regarding Barceloneta Landfill, October 4, 1990. (Attached: 1. Letter to James Doyle, Esquire, Office of Regional Counsel, U.S. EPA, from Mr. John D. Alexander, Senior Counsel, Hoffmann-LaRoche, Inc., re: Ammendment to 104(e) response, September 25, 1990. 2. Analytical results, prepared by Analytikem, prepared for Hoffmann-LaRoche, Inc., July 31, 1987.)

P. 701181 - 701181 Letter to Mr. Jose C. Font, New York/Caribbean Compliance Branch, U.S. EPA, from Ms. Laurel D. Breitkopf, Division Counsel, Office of General Counsel, Abbott Laboratories, re: Updated Response to Request for Information, Barceloneta Landfill, Barceloneta, Puerto Rico, October 18, 1990.

P. 701182 - 701192 Second Request for Information letter to Browning-Ferris Industries of Puerto Rico, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, undated.

P. 701193 - 701201 Second Request for Information letter to Abbott Chemicals, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, undated.

P. 701202 - 701209 Second Request for Information letter to Roche Products, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, undated.

P. 701210 - 701337 "Answers to Attachment 2, EPA's Second Request for Information on the Barceloneta Landfill", prepared by E.I. DuPont DeNemours & Company, prepared for U.S. EPA, undated.

P. 701338 - 701346 Second Request for Information letter to E.I. DuPont de Nemours & Company, from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, undated.

P. 701347 - 701355 Second Request for Information letter to Merck, Sharp and Dohme Quimica de Puerto Rico, Inc., from Mr. Stephen D. Luftig, Director, Emergency and Remedial Response Division, U.S. EPA, Region II, re: Second Request for Information Pertaining to the Barceloneta Landfill, Barceloneta, Puerto Rico, undated.

10.0 PUBLIC PARTICIPATION

10.2 Community Relations Plan

P. 1000001 - 1000034 Letter to Ms. Catherine E. Moyik, TES Regional Project Officer, U.S. EPA, from Mr. Scott B. Graber, TES V Regional Manager, CDM Federal Programs Corporation, re: Final Community Relations Plan Revision for Barceloneta Landfill, May 26, 1992. (Attached report: Final Community Relations Plan, Community Relations Work Assignment, Barceloneta Landfill, Barceloneta, Puerto Rico, prepared by Booz-Allen & Hamilton Inc., prepared for Office of Waste Programs Enforcement, U.S. EPA, May 26, 1992.)

10.3 Public Notices

P. 1000035 - Public Notice: "Aviso de Reunion Publica sobre
1000035 Limpieza por Superfondo del Vertedero de Barceloneta Martes, 9 de Julio de 1991 - 6:30 P.M., Casa Alcaldia de Barceloneta", prepared by U.S. EPA, undated. (Note: This document is written in Spanish.)

P. 1000036 - Public Notice: "Aviso de Reunion Publica sobre
1000036 Limpieza por Superfondo del Vertedero de Barceloneta Martes, 7 de Enero de 1992 - 6:30 P.M., Barrio Tosas, Barceloneta, Puerto Rico", prepared by U.S. EPA, undated. (Note: This document is written in Spanish.)

10.6 Fact Sheets and Press Releases

P. 1000037 - Fact Sheet: "Hoja de Datos Superfondo, El
1000038 Vertedero de Barceloneta, Puerto Rico", prepared by U.S. EPA, Region II, July 1991. (Note: This document is written in Spanish.)

P. 1000039 - Fact Sheet: "Superfund Fact Sheet, Barceloneta
1000040 Landfill Site, Barceloneta, Puerto Rico", prepared by U.S. EPA, Region II, July, 1991.

P. 1000041 - Fact Sheet: "Superfund Fact Sheet, Barceloneta
1000042 Landfill Site, Barceloneta, Puerto Rico, EPA Considers Containment as Presumptive Remedy for Barceloneta Landfill", prepared by U.S. EPA, Region II, Caribbean Field Office, undated.

P. 1000043 - Fact Sheet: "Hoja de Informacion del Superfondo,
1000044 Vertedero de Barceloneta, Barceloneta, Puerto Rico, La EPA Considera la Contencion Como Remedio Presuntivo para Vertedero de Barceloneta", prepared by U.S. EPA, Region II, Caribbean Field Office, undated.

APPENDIX IV

PUERTO RICO ENVIRONMENTAL QUALITY BOARD
LETTER OF CONCURRENCE

Golder Associates Inc.
8933 Western Way, Suite 12
Jacksonville, FL USA 32256
Telephone (904) 363-3430
Fax (904) 363-3445

Golder Associates

January 24, 1996 933-3928

Mr. Luis Santos
Project Manager
U.S. Environmental Protection Agency
Centro Europa Building, Suite 417
1492 Ponce de Leon Avenue, Stop 22
San Juan, Puerto Rico 00907

RE: TECHNICAL COMMENTS CONCERNING
EPA'S PROPOSED PLAN FOR THE
BARCELONETA LANDFILL, PUERTO RICO

Dear Luis:

On behalf of the Barceloneta Landfill PRP Group, Golder Associates Inc. submits the following technical comments to the agency's proposed plan for the above referenced site.

1. In the third paragraph of the left-hand column on the first page, the agency makes specific reference to the RI report dated March 1995 and the FS report dated September 1995. However, the Risk Assessment is not similarly identified. Specific reference to the Abbreviated Risk Assessment produced in May of 1995 should be made.

2. In the last paragraph of the right-hand column on page 3, the proposed plan describes the results of the risk assessment activities at the site. In the paragraph, the proposed plan indicates that consistent with the presumptive remedy approach, the risk assessment was conducted by comparing groundwater concentrations to MCLs and because MCLs were exceeded remediation is necessary. However, the presumptive remedy guidance only states that if ARARs are exceeded, remedial action is generally warranted. This statement in the proposed plan should be modified to reflect that remediation is generally warranted.

   The fourth sentence in the last paragraph of the right-hand column on page 3 continues by describing that a reasonable maximum human exposure was used. However, as stated above, the risk assessment simply used the presumptive remedy approach of comparing monitoring well results with MCLs. This sentence should be deleted.

   The sixth sentence in the last paragraph of the right-hand column on page 3 (continuing to the top of the left-hand column on page 4) is not discussed in the Abbreviated Risk Assessment. If this statement represents the agency's belief, it should be stated as such by beginning the sentence in question with the statement, "However, it is EPA's belief that if no action is taken...."

500079

3. In the first and second bullets of the left-hand column on page 5, the agency proposes a suite of analytes for the long term groundwater monitoring program for the site. This suite of analytes is different than that described in the FS document. In the FS document, a suite of volatile organic compounds (VOCs) analyzed by EPA Method 601 along with mercury, chromium, and nickel were proposed (along with the parameters listed in the last five bullets). In the proposed plan, the agency substituted volatile organic compounds and metals in accordance with 40 CFR Part 258, Appendices I and II, even though Appendix II is not applicable for detection monitoring (such as the long term groundwater monitoring proposed for this site). The only reason provided for the different parameter group from that proposed in the FS is to be more conservative. As described below, the parameter group proposed in the FS is already consevative.

   As part of the RI for this site, a very broad suite of analytical parameters was used to determine which constituents were present and at what concentrations. This broad suite included the complete target compound list and target analyte list (149 different parameters). As a result of four rounds of groundwater sampling using this broad parameter list (149 different parameters), the only organic compound detected above MCL was 1,1-dichloroethene. Similarly, only a few metals were detected above MCL (mercury, chromium, and nickel) in the last two rounds of groundwater sampling, and of these, only mercury was detected above MCLs in the dissolved metal analyses. It is unreasonable for the proposed plan to include so many parameters with this much data available.

   The parameter group proposed in the FS document is a conservative suite of initial parameters for the long term monitoring program for the site. The proposed parameters includes 29 VOCs (EPA Method 601), three metals (mercury, chromium, and nickel), chloride, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), pH, and Specific Conductivity. Chloride, TDS, TSS, pH, and Specific Conductivity historically are common landfill indicator parameters. The 29 VOCs included on EPA's Method 601 list are sufficient to monitor the historical detections as well as provide ample assurance of detecting any other organic impact. The three metals (mercury, chromium, and nickel) were proposed because these parameters were detected above MCLs and it is appropriate to monitor the trend of these compounds over time. Consequently, the Barceloneta Landfill PRPs do not believe the expansion of the parameter list to include Appendices I and II volatile organic and metal constituents is necessary or appropriate for this site.

4. In the second paragraph under the Short-Term Effectiveness bullet on the left-hand column on page 8, mention is made of a leachate control system. Leachate was only detected in one of seven borings that were drilled through the waste disposal areas at the site. The leachate was analyzed and found to be typical of, or less concentrated than, landfill leachate referenced by EPA and others in the literature (see references in the RI Report (Freeze and Cherry (1979) and NUS

Corportation (1988)). Consequently, none of the remedies proposed in the FS include a provision for the installation of a leachate control system. The reference to a leachate control system should be deleted.

Should you have any questions concerning any of these comments, please call.

Very truly yours,

GOLDER ASSOCIATES INC.

Donald J. Miller, P.Eng.
Principal

cc: Barceloneta Landfill PRP Group

500081

PITNEY, HARDIN, KIPP & SZUCH

(MAIL TO)
P.O. BOX 1945
MORRISTOWN, NEW JERSEY 07962-1945

(DELIVERY TO)
200 CAMPUS DRIVE
FLORHAM PARK, NEW JERSEY 07932-0950
(201) 966-6300
FACSIMILE (201) 966-1550

26 EAST 64TH STREET
NEW YORK, NEW YORK 10021
(212) 371-8880
FACSIMILE (212) 371-8540

PETER J. HERZBERG

DIRECT DIAL NUMBER
(201) 966-8058

January 25, 1996

VIA FEDERAL EXPRESS

Mr. Luis Santos
Project Manager
U.S. Environmental Protection Agency
Centro Europa Building, Suite 417
1429 Ponce de Leon Avenue, Stop 22
San Juan, Puerto Rico 00907

Re: **Comments to USEPA's Proposed Plan for the Barceloneta Landfill Barceloneta, Puerto Rico**

Dear Mr. Santos:

On behalf of the Barceloneta Landfill PRP Group (the "PRP Group")[1], we submit the following comments to the United States Environmental Protection Agency's (USEPA) Proposed Remedial Action Plan (PRAP) for the Barceloneta Landfill (the "Site").

The PRP Group concurs with the proposed selected remedies for the Northern Disposal Area (NDA) and the Southern Disposal Area, also known as the Superfund Disposal Area (SFDA), subject to

[1]The members of the Barceloneta Landfill PRP Group included the following: Abbott Laboratories, American Home Products Corp., Browning-Ferris Industries, E.I. duPont de Nemours & Co., Merck & Co. Inc., Nycomed, Inc., Roche Products, Inc., Schering-Plough Corporation, Union Carbide Chemical & Plastics Co., Inc., and Upjohn Manufacturing. The PRP Group does not include the City of Barceloneta, which has failed to pay for any of the Remedial Investigation/Feasibility Study (RI/FS) activities undertaken by the PRP Group pursuant to the AOC.

the technical comments regarding the details of the selected remedies, submitted by the PRP Group's environmental consultant, Golder Associates Inc.[2]

These comments focus on the Southeastern Disposal Area (SDA) as part of the "Superfund National Priorities List (NPL) site", as defined in the third paragraph in the left column on page 3 of the PRAP. USEPA's efforts to include the SDA as part of a Record of Decision (ROD) is beyond its legal authority and impractical. The scope of the ROD should be limited to the NDA and SFDA only.

I. USEPA Has No Authority to Include the SDA As Part of the Site

USEPA cannot properly include the SDA as part of the NPL listed site. The Site was proposed for inclusion on the Superfund NPL in December 1982, and was subsequently approved and listed as an NPL site in September 1983. Approval for listing the Site on the NPL was premised on the findings of the Hazardous Ranking System (HRS) score in accordance with the National Contingency Plan (NCP).

The HRS scoring for the Barceloneta site was only prepared for the areas identified as the NDA and the SFDA. The HRS was prepared for only these two areas because the SDA did not exist as a disposal area in 1982. In fact, the USEPA and Puerto Rico Environmental Quality Board (PREQB) allowed the SDA to be opened and operated by the City of Barceloneta after the landfill was listed on the NPL. To date, the USEPA continues to allow the City of Barceloneta to dispose of waste in the SDA, which is inconsistent with the mandates of CERCLA.

An NPL site includes all releases evaluated as part of the HRS[3] analysis. 55 Fed. Reg. 6154 (1990). Furthermore, "HRS

---

[2]The PRP Group, however, does not concede or agree that it is fully responsible for implementing the selected remedy for the NDA or SFDA.

[3]The HRS serves as a screening device to evaluate the relative potential of uncontrolled hazardous substances to cause harm to human health or the environment. The HRS score is calculated by estimating risks presented in three potential pathways of human or environmental exposure: groundwater, surface water, and air. Within each pathway, the HRS considers factors which indicate the presence or likelihood of a release to the environment; the nature

data upon which the NPL placement was based will, to some extent, describe which release is at issue." UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, SUPERFUND FACILITY (SITE) BOUNDARIES (1995). Thus, since the HRS did not include the SDA, the SDA cannot be considered part of the NPL listed site.

Also, USEPA cannot justify inclusion of the SDA simply because it is within the boundaries of the property owned by the Municipality of Barceloneta on which it conducted landfilling activities. A CERCLA site is not defined by its property boundaries. CERCLA defines the term "facility" as "... impoundment, ditch, landfill, ... or any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located." CERCLA §101(9), 42 U.S.C. § 9601(9). While there is no dispute that portions of the Barceloneta Landfill constitute a facility under CERCLA, there is an issue as to the extent of the facility.

In *Nurad, Inc. v. William E. Hooper & Sons Co.*, 966 F.2d 837 (4th Cir. 1992), the Fourth Circuit held that "facility" was properly confined to the area in and around designated underground storage tanks since that was the only area where hazardous substances had "come to be located." The court specifically noted that this was true even though the tanks were part of a larger piece of property.

The USEPA recently issued guidance regarding the definition of a facility which is essentially the same as the *Nurad* holding. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, SUPERFUND FACILITY (SITE) BOUNDARIES (1995). The guidance specifies that only waste disposal areas of a installation are considered Superfund sites, even if the site name suggests that the entire installation or property boundary is covered. Thus, as a legal matter, the site is not coextensive with the property boundaries of an installation.

In addition, by attempting to include the SDA in the NPL Site requiring CERCLA remediation, USEPA has failed to comply with the notice and comment requirements for rulemaking under the

---

and quantity of the substances presenting the potential threat; and the human or environmental targets potentially at risk from the site. The factors are assigned a numerical value which is used to compute a final score for the site; if the score is 28.50 or greater, the site is eligible for listing on the NPL. *See* 40 C.F.R. Part 300, Appendix A (1994).

Administrative Procedure Act (APA), 5 U.S.C. § 553(c). It is elementary that a hazardous waste site can only be placed on the NPL after rulemaking by notice and comment. *Anne Arundel County, Md. v. United States Environmental Protection Agency*, 963 F.2d 412, 414 (D.C. Cir. 1992). *See* Administrative Procedure Act ("APA"), 5 U.S.C. § 553(c). To list a site, the USEPA must make a determination to include the site on the NPL, notice its intent to list the site, accept comment and make a final determination. Administrative determinations, which are not made in the manner set forth in the APA, are void. Indeed, if the USEPA determines a site should be included on the NPL, the USEPA must (1) publish the proposed rule in the Federal Register and solicit comments through a public comment period and (2) publish the final rule in the Federal Register and make available a response to each significant comment or new data submitted during the comment period. 40 C.F.R. § 300.425(d)(5).[4]

In sum, the Barceloneta Site should not include the SDA as part of the NPL listed site for remediation. The SDA was not included in the HRS process to allow for proper inclusion on the NPL, nor was it included in USEPA's proposal to list the area on the NPL. It is hardly dispositive that the Barceloneta Landfill site name has, in the past, commonly been used to refer to the

---

[4]The only exception to this rule is if EPA determines that the SDA poses an imminent and substantial endangerment caused by and actual or threatened release. CERCLA, § 106, 42 U.S.C. §9606; UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, OSWER DIRECTIVE No. 9833.0-1A, GUIDANCE ON CERCLA SECTION 106(A) UNILATERAL ADMINISTRATIVE ORDERS FOR REMEDIAL DESIGNS AND REMEDIAL ACTIONS (1990).

No data supports a claim that this area poses an imminent and substantial endangerment. The Remedial Investigation data would not support such an administrative determination by USEPA. The Final Feasibility Study does not indicate that there are observed releases of hazardous substances that can be clearly attributed to the SDA. Also, USEPA's abbreviated risk assessment concluded that the site poses a low level long-term threat. In fact, USEPA's PRAP clearly refutes that this area poses a imminent hazard because it provides for this area to remain open for waste disposal for a period of two and one half years to six years, as stated in the third paragraph in the left column on page 9 of the PRAP. Clearly, the SDA poses, little, if any, risk to human health and the environment. Any minimal risks can and should be addressed under local programs, not through the Superfund program.

entire parcel of land owned by the City of Barceloneta. Rather, according to the CERCLA definition of a "facility" and USEPA's guidance, only the two disposal areas operational at the time of NPL listing comprise the Superfund site; *i.e.*, the NDA and SFDA.[5]

If USEPA chooses to list the SDA on the NPL in the future and to bring it within the regulatory sphere of Superfund, the USEPA will have to comply with the administrative procedures set forth above for listing a release on the NPL. Since it has not complied with the procedures, the SDA cannot be included as part of the NPL listed site subject to remediation. Presently, the USEPA does not have authority to include the SDA within the NPL listed site based on the administrative record, nor does it have authority to issue a proposed remedial action plan for the SDA prior to complying with the proper administrative procedures.

II. The City of Barceloneta is Responsible for Closure of the SDA, Which Should be Done as a Separate Unit Under Puerto Rican Law

Under Section 107(a) of CERCLA, a party can be held responsible for cleanup of a Superfund site if a *prima facie* cause of action consisting of five elements can be made: (1) the party falls within one of the four classes of responsible parties defined in CERCLA Section 107(a); (2) the site is a facility; (3) there is a release or threatened release of hazardous substances at the facility; (4) the release or threaten release of hazardous substances must cause response costs to be incurred; and (5) the costs and response actions are consistent with the NCP promulgated under CERCLA. *See* 42 U.S.C. §9607(a); *B.F. Goodrich Company, et al. v. Harold Murtha, et al.*, 958 F.2d 1192 (2d Cir. 1992). Most of the *prima facie* elements have not been satisfied to hold the

---

[5]Nor is it of any significance that the PRPs addressed the SDA as part of the RI/FS. The proposed plan states in the third paragraph of the left column on page 3, that the PRPs signed an AOC in September 1990 in which the PRP Group agreed to perform the RI/FS (Remedial Investigation/Feasibility Study) for the three areas. The only reason an RI/FS was conducted for the SDA by the PRP Group was because the private PRPs were ordered by USEPA to do so even though the Group disputed that the SDA was part of the listed NPL site. In fact, City of Barceloneta believed that the SDA was its responsibility. The City of Barceloneta retained an environmental consultant to prepare a closure plan for the SDA and NDA and relied on the PRP Group to prepare the FS for the NDA and the SFDA.

private PRPs responsible for the SDA as addressed above, *i.e.*, elements (1)-(3) and (5).

Members of the PRP Group did not dispose of hazardous waste in the SDA. The SDA was opened for waste disposal after Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901 *et seq.* was in effect. Any hazardous waste from the members of the PRP Group were disposed in accordance with RCRA regulations. At the most, some members of the PRP Group may have continued to dispose of solid waste, *i.e.*, office and cafeteria trash. Moreover, the burden of proof to hold a PRP liable for solid waste disposal requires a showing that hazardous substances are contained in the solid waste; such a showing for office and cafeteria trash is extremely difficult and indeed similar cases have been dismissed on motions for summary judgment. *See B. F. Goodrich v. Murtha*, 840 F. Supp. 180 (D. Conn. 1993).

Indeed, the City of Barceloneta should be responsible for the management, care, and coordination of the proper closure of the SDA in conjunction with the requirements of the local agencies responsible for closure of municipal landfills. In addition to the fact that the SDA has not been properly designated as part of the Site to bring it within CERCLA regulation, courts have held that parties are only liable under CERCLA for costs of remediation caused by hazardous substances. In *Barnes Landfill, Inc. v. Town of Highland,* 802 F. Supp. 1087 (S.D.N.Y. 1992), the court held that "[o]rdinary closing or clean-up costs not pertaining to hazardous substances, incurred under state law or otherwise, would not be a basis for holding defendants responsible under CERCLA" and that the owner/operator was responsible for those costs. *Id.* at 1088. Consistent with the *Barnes* decision, the district court in *City of Seattle v. Amalgamated Services, Inc.*, 1994 WL 869839, *2 (W.D. Wash. March 4, 1994), held that as a matter of law, "costs required to meet the minimum functional standards required by State and local law in the closure" of a landfill are excluded from CERCLA Section 107(a)(4) costs and that the owner/operator of a landfill may not seek to recover those costs. See also *Town of Wallkill v. Tesa Tape, Inc.*, 891 F. Supp. 955 (S.D.N.Y. 1995).

The City of Barceloneta is the party that owns and operates the SDA as a municipal landfill and should be required to close the landfill in accordance with Puerto Rican laws and regulations. Presently, the SDA is the only solid waste unit the City has to dispose for its residents' wastes. It has clear liability under Puerto Rican law to close the landfill. P.R. Laws Ann. tit. 12, §1301 *et. seq.* (1980). The private PRPs should not

be required to close this area merely because of their potential ability to finance the closure of a municipal landfill.

There are many reasons to support why the SDA should be under the jurisdiction of Puerto Rican officials. First, the SDA was opened upon approval of the USEPA, PREQB and/or PRSWMA after the NDA and SFDA were listed on the NPL. Second, the PREQB and/or PRSWMA continued to allow the City of Barceloneta to dispose of wastes. Third, the City of Barceloneta has virtually admitted it is responsible for closure of the SDA by hired its own environmental consultant to prepare a closure plan for the SDA and NDA, which closure plan was submitted to the Puerto Rican agencies and the USEPA. Fourth, the City of Barceloneta is required under Puerto Rican laws and regulations to close the SDA. Fifth, the selected remedy for closure of the SDA in the PRAP is appropriate and consistent with Puerto Rico's Solid Waste Management Authority Act and regulations promulgated thereto. Sixth, there is a no need for the SDA to be closed under the Superfund program because EPA has concluded that the Site "poses a relatively low long-term threat to public health and the environment." (PRAP at page 20.) Moreover, this area is not properly included in the NPL listed site because legally-mandated administrative procedures were not followed, as stated in Point I above.

There are additional reasons to let Puerto Rican officials remediate and close the SDA. That is, once a ROD is issued, USEPA will look to the PRP Group and the City of Barceloneta to finance the closure. The City of Barceloneta has shown no indication or ability to finance this project. As a result, the private PRPs, if not also the City of Barceloneta, will look to the Fund for reimbursement of the costs not attributed to the PRP Group for which there is a reasonable basis.[6] USEPA could

---

[6]The PRP Group will seek a refund for the costs for closure of the SDA because they are not responsible for those costs and the divisibility of harm can be established resulting in a reasonable basis for apportioning the liability for the SDA solely to the City of Barceloneta. In *U.S. v. Alcan Aluminum Corp.*, 964 F.2d 252 (3d Cir. 1992), the Court relied on Sections 433A and 881 of the Restatement on divisibility of liability among tortfeasors. The *Alcan* court reasoned that joint and several liability for clean up of an entire site can be avoided if the parties can establish the divisibility of the harm caused by each party's waste and there is a reasonable basis for apportioning the damages incurred as a result of that harm.

avoid having to reimburse settling parties for the closure costs of the SDA, if it does not include the SDA as part of the NPL listed site.

In further support of giving supervision over the closure of the SDA to the Puerto Rican authorities, Puerto Rico has been given federal grants to help fund closure of municipal landfills. These funds are disbursed by PRSWMA based on need. A large number of municipal landfills in Puerto Rico need funding to get into compliance and/or closure. PRSWMA has advised the PRP Group and the City of Barceloneta that it will not provide its limited grant funding to the City of Barceloneta for closure of the SDA because the SDA is regulated under the Superfund program. Thus, by including the SDA in the NPL listed site, a significant source of funding for the City of Barceloneta to properly close the SDA will be lost. The result will be to increase the burden on the already taxed Superfund for the closure costs for the SDA.

In sum, it is more advantageous to the City of Barceloneta and the USEPA for the SDA to be deferred to the PRSWMA and PREQB to oversee closure in accordance with Puerto Rico's regulations. The City of Barceloneta would have a great probability of obtaining federal grant funds from PRSWMA for the closure of the SDA and the Superfund would not be subject to funding the orphan share. In addition, the level of protection to human health and the environment would be the same if the SDA was deferred to the local agencies because the Puerto Rico Solid Waste Management Authority Act and applicable regulations would require the landfill to be closed in the same manner as the proposed remedy in the PRAP and there is only a "relatively low long-term threat to public health and the environment". (PRAP at 2.) While EPA would like the private PRPs to close the SDA, due to their "deep pockets", this clearly is unfair in the extreme since the private PRPs did not contribute hazardous waste to this disposal area and are not responsible for its closure.

III. The PRAP is Not Practical to Implement

The USEPA states in paragraph 2 of the right column on page 2 of the PRAP, that it "will require the coordinated closure of all areas of the Site." Not only is it unclear what USEPA is suggesting by this statement, but it is also impractical to coordinate the closure of the three areas the USEPA designates as the site because USEPA is proposing to close two of the three areas immediately and allow the City of Barceloneta to continue disposing

waste in the SDA for two and one half to six years. (See PRAP at 9.)

Significantly, the PRAP does not provide a plan for how such on-going disposal activity can be coordinated with closure of the two inactive areas. The private PRPs do not own or operate the municipal landfill. They have no authority to control the City of Barceloneta's landfill operations, nor does EPA have the ability to provide the private PRPs with such authority. The private PRPs will not undertake to operate a municipal landfill even if such authority is granted to them. Such a legal obligation is beyond the scope of CERCLA. Clearly, USEPA's vision of how the coordination of the closure of the two areas that comprise the NPL listed site will work, along with and the on-going operation of the SDA, should be more comprehensive in the proposed plan.

In addition, the PRAP, as drafted, would require the mobilization and construction of landfill caps for the NDA and SFDA and then demobilization. Two and one half to six years later, closure of the SDA would required remobilization and construction of a cap once USEPA determines that it should be closed, and then demobilization for a second time after capping is complete. Not only is this not a cost-effective approach to remediation, it is not a logical approach for closure of landfills. A significant portion of the remedial costs are associated with mobilization and demobilization. Indeed, the term "arbitrary and capricious" well describes this process.

Furthermore, the surrounding area will be subject to short-term disturbances, such as increased vehicular traffic and noise during the construction phase. To plan to unnecessarily create these types of disturbances twice is a burden on the surrounding area with little resulting benefit because there is a negligible threatened risk from the NPL listed portion of the landfill. In fact, the USEPA' abbreviated risk assessment concluded that the site poses a "relatively low long-term health threat".

Also, USEPA states in the fifth paragraph in the left column on page 8, that the alternatives are "easily implemented technically." While capping a landfill is usually not technically difficult to implement, the proposed plan for the on-going operation of the SDA results in difficult technical implementability issues, such as access to the SDA during and after closure of the NDA. Presently, access to the SDA is through the middle of the NDA. During and once a cap is constructed for the NDA, access to the SDA will have to be constructed and maintained. Give the steep slope on the NDA a stable, all weather road will

most likely need to be constructed on top of the cap which would be expensive and increase the cost of capping the NDA which is not addressed in the PRAP. It should not be the burden of PRPs whose obligation under CERCLA is to cleanup a NPL listed site and not to provide on-going access for waste disposal. Thus, USEPA's "coordination" must be clearly articulated.

Furthermore, the PRP Group does not have control over the landfill to prevent intrusion into the NDA cap once it is constructed. That is, the cap could be damaged by operators using the soil cap for daily cover. In addition, as trucks enter the landfill, it is likely that debris from the trucks will spill while crossing the NDA cap resulting in additional operations and maintenance problems and costs not anticipated in the FS and resulting in a great burden to USEPA and the PRP Group.

The practical solution for coordinating the closure of the entire landfill is to defer closure of the NDA and SFDA until the SDA is no longer an active waste disposal facility. In the interim, the selected site wide institutional controls can be implemented by restricting access to further reduce any potential risk the NDA and SFDA may pose by restricting access. Once the SDA is no longer active, the PRPs can coordinate with the City of Barceloneta and mobilize once to properly and completely close the NDA and SFDA. Any short-term disturbances to the surrounding community, such as increased vehicular traffic and noise will only occur once, as opposed to the proposed plan to carry out this activity twice, with no coordination between the proposed closure plan and the on-going waste disposal. In addition, this solution is a more cost effective remedial proposal than that presently proposed by the USEPA. USEPA should reconsider and abandon the concept set forth in the PRAP for a more practical approach of allowing the implementation of the closure of the NDA and SFDA to occur concurrently with the closure of the SDA.

IV. Conclusion

We request the USEPA to reconsider the scope of the PRAP because the SDA cannot be included in the ROD. USEPA did not follow administrative procedures to include the SDA as part of the NPL listed site, and thus, it is not properly regulated under CERCLA. Moreover, the SDA cannot be included as part of the NPL listed site because the EPA allowed the SDA to be opened and operated by the City of Barceloneta <u>after</u> the NDA and SFDA were listed on the NPL. In addition, the remedy selected for the NDA and SFDA is not practical to perform until the SDA ceases to take in additional wastes. Finally, a coordinated closure of the NDA

and SFDA concurrent with the City of Barceloneta's closure of the SDA is a more practicable, cost effective approach without jeopardizing overall protection of human health and the environment because, as USEPA states, the NPL listed site poses a relatively low level long-term threat.

Respectfully submitted,

Peter J. Herzberg /hs

PETER J. HERZBERG

PJH
Enclosures
cc: James Doyle, Assistant Regional Counsel
Melvin Hauptmann, P.E., Chief, Eastern New York/Caribbean Superfund Section II

COTICAM
COMITE TIMON CALIDAD AMBIENTAL DE MANATI
MANATI • VEGA BAJA • CIALES • MOROVIS • FLORIDA • BARCELONETA

Oficina Central Manatí 884-6083 854-2110 ext.35
P.O. Box 1459, Manatí, Puerto Rico 00674

26 de enero de 1996

Sr. Luis Santos, Gerente de Proyecto
Agencia Federal de Protección Ambiental
Oficina Regional del Caribe
Edificio Centro Europa 417
1492 Avenida Ponce de León
San Juan, Puerto Rico 00907-4127

Estimado señor Santos:

Como Presidente del Comité Timón de Calidad Ambiental (COTICAM) entendemos que la decisión tomada por la Junta de Calidad Ambiental y muy en particular por la E.P.A. sobre el cierre del vertedero de Barceloneta ubicado en el Barrio Florida Afuera es muy acertada.

Consideramos que es un poco tardía por las consecuencias ya ocasionadas a la naturaleza de esta área y muy especialmente a nuestro suelo y nuestras aguas subterráneas.

Dentro de esa decisión que respaldamos tenemos que señalar que entre las opciones y decisiones que se puedan implantar en ese cierre las mejores serían la remoción y restauración de esa área o de esos terrenos.

Si la otra opción de encapsulación nos garantiza que ahora y en el futuro no nos creará problemas ni riesgos más allá de los ocurridos entonces la respaldamos.

También dónde se incluyen los medios de cierre solicitamos que se analicen hasta donde sea posible y se restablezcan las áreas que han sido afectadas si es que las hay. Vertederos de esa naturaleza son improcedentes en un futuro.

Entendemos que se requiere un sistema de monitoreo bien detallado de los pozos. Se debe tener además un plan de contingencia para que de surgir algún problema este se puede atacar a tiempo. Sugerimos que se ubiquen además de los pozos de observación algunos pozos de extracción para recoger, concentrar y extraer el contaminante que pudiera surgir evitando así que los lixibiados vayan gradiente abajo de surgir la situación.

Nosotros como comunidad lo que podemos decir es que confiamos en que ustedes los que tienen en sus manos la potestad de tomar decisiones lo hagan lo más justamente posible. Esperamos que tengan en cuenta que la Justicia Ambiental debe ser aplicada en este caso y en otros que no vienen a lo mejor directamente a estar relacionados con el problema que tratamos de resolver con el referido vertedero.

Sí me gustaría recibir de ustedes información y orientación sobre deberes y derechos que tenemos las comunidades menos privilegiadas y que estamos acosadas diariamente con los vertederos clandestinos que por ende están causando los mismos problemas por los cuales se cierra éste. Dichos vertederos abundan y crecen gigantemente en Puerto Rico y en estos momentos existen en esa misma jurisdicción en diferentes sectores y pueblos de la región. Entre otros están el de la carretera 167 del Bo. Cortés de Manatí y el de 3 millas y media en la carr. 672 del Bo. Palo Alto Sector Hoyos y Calderas (Coto Sur) de Manatí.

Si es que andamos buscando proteger nuestras aguas subterráneas en estos vertederos donde hay miles de toneladas de chatarra y toda clase de desperdicios cubriendo o rodeando un sin número de sumideros que sirven de recarga a nuestro acuífero Aymamón. Estas contaminaciones han sido señaladas por la Junta de Planificación en su Plan de Manejo de la Laguna Tortuguero pues la misma está seriamente impactada por los problemas que estamos señalando.

Como representantes y miembros de las comunidades, le informamos y le solicitamos con urgencia que se tome acción sobre nuestra solicitud. Tenemos informes en nuestro poder donde la Junta de Calidad Ambiental en el 1992 le solicitó a Recursos Naturales que declarara esta zona crítica por los hallazgos encontrados a través de sus investigaciones al igual que tenemos señalamientos de otros estudios y entre ellos el de Conservación de Suelos Federal. Estos estudios tienen base y justifican lo que señalan pues se han cerrado diferentes pozos en estas jurisdicciones por contaminación de nitrato y otros contaminantes que siguen llegando a través de escorrentías que llegan a los sumideros y de ellos a nuestras aguas potables.

600093A

Es preocupante y hay momentos de desesperación y confusión pues si esto continúa sin control podemos un día quedar sin agua limpia y no sería tan tarde si la acción no se toma ahora pues hace alrededor de cuatro años el Sr. Arturo Torres, Subdirector de Servicios Geológicos dijo en una reunión de esta organización que de no actuar y buscarle soluciones de limpieza y prevención a estas fuentes podríamos estar sin ese precioso líquido en o antes de 10 años. Esto suena alarmante pero mientras sigan las autoridades y las fuentes que hemos señalado sin una acción positiva entonces no tendremos otros recursos a donde recurrir que no sea aquel que emana de la ciudadanía.

Atentamente,

Frank Coss
Presidente
COTICAM

Translation

Center Office Manatí
P.O. Box 1459, Manatí,
Puerto Rico 00674

884-6083 854-2110
ext. 35

January 26, 1996

Mr. Luis Santos, Proyect Manager
Environmental Protection Agency
Caribbean Fiel Office
Centro Europa Building,Suite 417
1492 Ponce De Leon Ave.
San Juan, Puerto Rico 00907-4127

Dear Mr. Santos:

As the President of Comité Timón de Calidad Ambiental (COTICAM) we understand that decision took by Enviromental Quality Board and in particular by EPA about the close of Barceloneta landfill in Barrio Florida Afuera is correct.

We consider that it's late for the consecuences wich cause by the nature in this area and very especial in our soil and our ground waters.

In that decision we support, we have to point between the options and the decisions that can implant in the close landfill. the improvements maybe the removal and restauration of those areas in the soil.

Is the other option of containment can Warranty that now and in the future not will create problems, no risk beyond of the success that we support.

Where Also is include the medium to close, We apply to be analysis until be possible and reestablish the areas that have been affected it is presumed. the Landfills of that nature are improper for future.

We understand that require a monitor system full detail in the well. Is should be have a contingency plan for the posible problems to be attack at time. We suggetts to place futhermore of the observation wells. The extract wells to pickup, containt, and take out the posible pollutan avoid the leacheat go down to be occur that situation.

We as the comunitty can argue that we trust in you who have the power to make desicions, do as fairly posible. we expect that take in mind the Environmental Justice. is should be apply in this case and in other that might be not related with this case that we tray to resolve with the mention landfill.

I like to receive information and advice about the rights and duties that have the least privilege comunitty and we are pursuit by the ilegal solid-wastes. In order to the same problems. that landfills abundant and grow up bigger in Puerto Rico. At this moment exits in the jurisdiction. In different sectors and towns in the region. Among theirs at the road 167 at Bo. Cortés de Manatí and the 3 miles in half at the road 672 in th Bo. Palo Alto, Sector Hoyos y Calderas (Coto Sur) of Manatí.

We are looking to protect the ground waters in those landfills there are miles of tons of Scrap iron and every type of disposal that cover around many sewer that overload to our aquifer Aymamón. this pollutant have been point by the Planning Board in their managment plan of the Laguna Tortuguero. Because that have a great impact like the above.

As the represant and menbers of the comunnitty we inform and we apply urgently take action about our demand. We have files in our hands where the Environmental Quality Board in 1992, aplied to Natural Resources (DRNA) to declared critic zone by the finding trowght of their investigation and also we have signs of other studies and between the Soil Conservation Service. That studies have a base and justification that means the close of diferents wells in that jurisdiction by pollutant of nitrate and other pollutants that follow arrival across storm waters that comming to the sewer from their to our potable waters.

Is to worry and moment exasperating and confussion because if that continue without control some day will don't have clean water and will be not late if the action dont take place now. Because four years ago Mr. Arturo Torres, Subdirector of the Geological Survey said in a meeting that this organization if don't took action and find solution about clean up and prevent at this emition we culd be without this preciuos liquid in or before ten years. That sound is alarmant,but a while the autorities continue and the emitions above describe withouth a positive action then we will haven't other resources where to go that not been that came from the humanity.

Sincerely

Frank Coss
Presidente
COTICAM

APPENDIX V

RESPONSIVENESS SUMMARY

BARCELONETA LANDFILL SUPERFUND SITE
BARCELONETA, PUERTO RICO

RESPONSIVENESS SUMMARY

BARCELONETA LANDFILL SUPERFUND SITE
BARCELONETA, PUERTO RICO

A. INTRODUCTION

A Responsiveness Summary is required by Superfund policy. It provides a summary of citizens' comments and concerns received during the public comment period, and the responses of the United States Environmental Protection Agency ("EPA") to those comments and concerns. All comments summarized in this document have been considered in EPA's final decision of a remedial action for the Barceloneta Landfill Superfund Site (the "Site").

EPA held a public comment period from December 27, 1995 through January 26, 1996 to provide interested parties with the opportunity to comment on the RI/FS and Proposed Plan for the Site. A public meeting was held on January 18, 1996 to discuss the remedial alternatives described in the FS and to present EPA's preferred remedial alternatives for controlling contamination at the Site. The meeting was held at the Tosas Ward's Christian Pentecostal Church in Barceloneta, Puerto Rico.

B. OVERVIEW

At the time of the public comment period, EPA had already selected a preferred alternative for the Site. EPA's recommended alternative addressed the three landfill disposal areas and called for capping the disposal areas pursuant to promulgated federal and commonwealth regulations governing closure of municipal landfills. The selected remedy described in the Record of Decision is the combination of Alternatives 2, 3B, 4, and 5 which specifies a RCRA Subtitle D Cover System, as well as institutional controls.

Comments received during the public comment period were supportive of capping the disposal areas although the majority of concerns raised by the public at the public meeting focused on the issue of contamination to the groundwater.

C. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Community interest in the Site appears to be relatively high. In general, most concerns are related to the potential for contamination of the groundwater (and drinking water) and the length and complexity of the Superfund process.

EPA performed a number of community relations related activities at the Site. EPA met with local officials and interested citizens to initiate community involvement and discuss their concerns regarding the Site. A Community Relations Plan ("CRP") was formulated, including an outline of community concerns, a listing of required and suggested community relations activities, and a comprehensive list of federal, state, and local contacts. A written CRP was

finalized and Site information repositories were established, one at the EPA Region II office in New York City, one at the EPA Caribbean Field Office in Santurce, one at the Environmental Quality Board ("EQB") in Hato Rey, and one locally at the Sixto Escobar Municipal Library in Barceloneta. The information repositories, which contain the RI/FS Report and other relevant documents, were updated periodically. Additionally, the EPA Proposed Plan, describing the Agency's proposed remedial action for the Site, was sent to the information repositories and distributed for review to citizens and officials on EPA's Site mailing list.

To obtain public input on the RI/FS and proposed remedy, EPA established a public comment period from December 27, 1995 to January 26, 1996. A public meeting notice appeared in the December 27, 1995 edition of the San Juan Star, El Nuevo Día, and in the December 28, 1995 edition of the El Periódico El Norte. A public meeting was held on January 18, 1996. Approximately 40 people attended the meeting. The audience consisted of local business people, residents, and commonwealth and local government officials. The question and answer session lasted approximately 30 minutes, during which time comments and questions were presented pertaining to the following issues: drinking water contamination, cleanup schedule, remedy implementation, and Site-related risks. A summary of these comments/questions is provided in Section D, Part I, below.

D. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES

Part I - SUMMARY AND RESPONSE TO LOCAL COMMUNITY CONCERNS

The following are verbal questions and comments from the public meeting held at the Tosas Ward's Christian Pentecostal Church in Barceloneta, Puerto Rico on January 18, 1996.

1. A resident in the vicinity of the Landfill asked and commented: The wells that have been drilled are on the periphery of the Site and the waste. Would it be advisable to drill a well at the center of the Site through the largest amount of waste, so that the strata of limestone rock could be seen as well as any contamination?

EPA Response: Monitoring wells have been located inside the perimeter of the landfill property to determine groundwater flow and to define the nature and extent of contamination. The hydrogeologic evaluation and analytical results indicate that the monitoring wells are sufficient to define the geology and to characterize contamination originating from the Site. A monitoring well was not drilled into the center of the landfill for several reasons. Monitoring wells are not generally drilled through waste because of health and safety concerns. Also, monitoring wells are used to define the geology of the area, and to determine the nature

and extent of groundwater contamination. The geology of the area has already been defined through interpretation of the monitoring well data. The nature and extent of contamination has been evaluated using monitoring well data. It is unlikely that a monitoring well located at the center of the landfill would provide any additional information regarding the source of the contamination, the nature and extent of contamination, or the geology of the area.

2. A resident in the vicinity of the Landfill asked and commented: There is some concern about the locations and depths where groundwater samples were obtained. It seems that in order to determine the impact on drinking water, ground water samples were obtained from great depths. However, the aquifers existing beneath the Barceloneta Landfill are not one big aquifer, but several aquifers, existing like pockets of water not related to one another. Are the monitoring wells strategically placed so that all areas of contamination have been discovered? Should not they be place throughout the Landfill. It seems as though the waste initially brought to the Landfill could have been disposed in an area where a well does not exist.

EPA Response: Monitoring wells have been strategically placed to determine the geological and hydrogeologic properties of the aquifers beneath the Site. The wells were drilled at varying depths and various locations to define the aquifer and aquifer properties. EPA believes that a sufficient number of wells were installed at various locations to adequately define the nature and extent of the contamination in the aquifers beneath the Site.

3. A resident in the vicinity of the Landfill asked and commented: It is agreed that a combination of alternatives, as in EPA's preferred remedy, is the best choice for the Barceloneta Landfill, where all the disposal areas will be remediated similarly at the Superfund site. It is not known exactly what type of wastes were brought in by truck for disposal in the landfill. It is also not known exactly in what areas of the landfill this waste was disposed. In addition, it is suggested that the clay cap should be 24 inches and not 18 inches thick.

EPA Response: The combination of alternatives selected for the Site include placing a cover system consistent with RCRA Subtitle D and Puerto Rico's Regulations Covering Landfill Closure over the three disposal areas. The RCRA Subtitle D and Commonwealth regulations indicate that the cover should minimize infiltration and promote runoff. These regulations state that the cover system should include a barrier layer with a maximum permeability of $1x10^{-5}$ cm/s, which must be at least 18 inches in thickness. Calculations to estimate the infiltration were performed using USEPA's Hydrologic Evaluation of Landfill Performance model. The model

evaluated two cover systems, both including 6 inches of vegetative cover and one with 18 inches of $1x10^{-5}$ cm/s clay, and one with 24 inches of $1x10^{-5}$ cm/s clay. The model indicated that there was no significant reduction in the infiltration for the cover with 24 inches of clay as compared to the cover with 18 inches of clay. Therefore, the 18 inch clay layer provides performance substantially equivalent to the 24 inch clay layer and is considered sufficient to meet the performance requirements the regulations.

4. A resident in the vicinity of the Landfill asked and commented: Regarding the retention pond, will it be water-tight or will water be able to filter through it?

EPA Response: Once the landfill is capped, the movement of contaminants will be halted. The contaminants are able to move by way of runoff and also infiltration, which is water passing through the wastes creating what is referred to as leachate. The leachate eventually reaches the aquifer and contaminates the groundwater. Therefore, in order to lower the contaminant levels in the groundwater, the landfill is capped so that water cannot infiltrate it. However, when it rains, it will be necessary to divert surface water away from the landfill. Because there is no surface water body, and the water cannot be discharged into a stream or a river, it will have to go to another sinkhole in the area that will serve as a recharge point to the underlying aquifer. The runoff diverted to the sinkhole will be non-contact runoff which will not contain landfill constituents.

5. A resident in the vicinity of the Landfill asked: Have you determined whether water migration in that area is horizontal or perpendicular?

EPA Response: It has been determined that the landfill is located in the recharge area of the aquifer; therefore it feeds the aquifer. This zone feeds the confined and unconfined aquifer, so there are both kinds of movement, vertical as well as horizontal.

6. A resident in the vicinity of the Landfill commented: Although the wastes are capped, the leaching will continue to occur, because the waste will continue to decompose. Even if the water does not filter through, the decomposition will continue, resulting in leachate with less liquid, because it will not receive any rainwater.

EPA Response: The rate of leachate generation will diminish over time once the caps are constructed over the disposal areas. By preventing the water from penetrating the wastes, the mechanism for leachate transport will be also be minimized. Nevertheless, groundwater sampling is part of the remedy selected in the ROD to closely monitor the ground water. The groundwater monitoring will demonstrate how the implemented remedy is functioning for the Site.

The Superfund law calls for evaluation of remedies like this one to be performed at least once every five years and the ROD calls for such evaluation.

7. A resident in the vicinity of the Landfill asked: What will happen to this project, if the United States Congress cuts funds allocated for environmental use?

EPA Response: It is expected that the PRPs will implement this remedy following negotiations with EPA. If not, the Remedial Design could be conducted using EPA funds. In order for the Remedial Action to funded by EPA, in accordance with the Superfund law, the Commonwealth of Puerto Rico must contribute up to 50% of the funding for construction of the remedy. At this time, the Commonwealth does not have funding to provide this matching share.

Part II - COMPREHENSIVE RESPONSE TO SPECIFIC WRITTEN COMMENTS

The following correspondence (see Attachment A) was received during the public comment period:

-January 24, 1996 letter from Donald J. Miller of Golder Associates.

-January 25, 1996 letter from Peter J. Herzberg of Pitney, Hardin, Kipp & Szuch.

-January 26, 1996 letter from Frank Coss of COTICAM ("Comite Timon Calidad Ambiental de Manati")

EPA also received a letter dated April 25, 1996 from Sheila D. Jones of Cutle & Stanfield representing the Municipality of Barceloneta. The letter responded to and commented upon the January 25, 1996 Peter J. Herzberg letter and said that in the 1970's, the Southeastern Disposal Area had begun to be used for disposal. The letter went on to discuss the definition and relevant case law regarding the definition of "site". This letter was not submitted during the public comment period, but EPA has reviewed the letter and intends to include it in the administrative record supporting this ROD.

1. The following technical comments were received by EPA from Golder Associates in a letter dated January 24, 1996, commenting on EPA's Proposed Plan for the Barceloneta Landfill, Barceloneta, Puerto Rico.

1. **Comment:** The commenter requests that specific reference be made to the May 1995 Abbreviated Risk Assessment.

EPA Response: The ROD references the Abbrreviated Risk Assessment that was utilized in the decision making process and this risk

assessment is the only risk assessment document that was utilized in the decision making process.

2. **Comment:** The commenter (a) states that a statement in the Proposed Plan is not consistent with the presumptive remedy guidance, (b) recommends the deletion of a sentence in the Proposed Plan regarding the reasonable maximum human exposure, and (c) recommends that EPA qualify a statement in the Proposed Plan regarding the risk potential if no action is taken as "EPA's belief" rather than as a conclusion.

EPA Response: Since the Proposed Plan has already been issued, and there is no reason to reissue it, the recommended modifications can not be made. However, EPA accepts the substance of the underlying technical comments presented and they are reflected in the ROD.

3. **Comment:** The commenter states that the parameter list for ground water sampling be limited to those volatiles and metals detected above MCLs in the RI and recommends that it is not necessary or appropriate to expand the list for this Site.

EPA Response: Initially, the wells will be sampled for a broad parameter list. This list was developed based on parameter list requirements of RCRA Subtitle D and Commonwealth regulations. After the first five years, the parameter list will be reviewed and those parameters not detected above standards will be omitted. EPA believes that the expanded list of parameters is warranted.

4. **Comment:** The commenter states that the reference in the Proposed Plan to a leachate control system is inappropriate.

EPA Response: This observation is correct and no reference to a leachate control system is in the ROD.

2. The following written comments were received by EPA from Peter J. Herzberg, Pitney, Hardin, Kipp & Szuch in a letter dated January 25, 1996, commenting on EPA's Proposed Plan for the Barceloneta Landfill, Barceloneta, Puerto Rico.

1. **Comment:** EPA has not properly included the Southeastern Disposal Area ("SDA") as part of the NPL listed site for the Barceloneta Landfill. As a result, EPA may not "bring it [the SDA] within the regulatory sphere of Superfund" to require remediation and does not have authority to issue a proposed remedial action plan for the SDA.

   The Barceloneta Landfill site was listed on the NPL based on the findings of the Hazard Ranking System ("HRS")

package which was prepared only for the areas known as Northern Disposal Area ("NDA") and Superfund Disposal Area ("SFDA"). The SDA did not exist in 1982. In addition, EPA and the EQB allowed the SDA to be opened after the listing of the Landfill. This operation is allowed to continue to this date, which is inconsistent with the mandates of CERCLA.

Furthermore, the SDA cannot be included just because it is within the boundaries of the property owned by the Municipality of Barceloneta. According to CERCLA, a facility is defined as an area where a hazardous substance has been deposited, stored, or disposed of or placed, or otherwise come to be located. Therefore, there is some dispute as to the extent of the property owned by the Municipality of Barceloneta that actually constitutes a facility. EPA guidance indicates that only the waste disposal areas of an installation are considered Superfund sites, even though the site name may suggest that the entire installation or property boundary is covered.

Also, legally mandated administrative procedures were not followed to include SDA as part of the NPL-listed site. By attempting to include the SDA as part of the NPL listed site, EPA has failed to comply with the notice and comment requirements for rule making under the Administrative Procedure Act, 5 U.S. C. §8553 (C).

EPA Response: This comment reflects a misunderstanding of the purposes of the NPL as stated in the NCP. The NPL status of the SDA does not affect EPA's authority to include it in the ROD for the Barceloneta Landfill or to issue orders to responsible parties to clean it up. A release is "within the regulatory sphere of Superfund" regardless of its NPL status. NPL listing is not a precondition to planning for remediation activities or to requiring remediation by responsible parties.

Section 425(b)(4) of the NCP states,

> [i]nclusion on the NPL is not a precondition to action . . . under CERCLA sections 106 or 122 or to action under CERCLA section 107 for recovery . . . of Fund-financed costs other than Fund-financed remedial construction costs.

40 C.F.R. § 300.425(b)(4). Further, "[r]emoval actions (including remedial planning activities, RI/FSs, and other actions taken pursuant to CERCLA section 104(b)) are not limited to NPL sites." 40 C.F.R. § 300.425(b)(1) [emphasis added].

The NPL is used primarily for informational purposes as a list of priority releases for long-term remedial evaluation and

response. See 40 C.F.R. § 300.425(b). NPL listing is one of a number of factors to guide allocation of Superfund resources among releases. 40 C.F.R. § 300.425(b)(2). EPA may pursue other appropriate authorities to address releases, including CERCLA enforcement actions. Id. The sole legal effect of NPL listing is that only NPL-listed releases are eligible for Fund-financed remedial action. 40 C.F.R. § 300.425(b)(1).

For information purposes EPA provides, below, a general explanation of issues that relate to the extent of the NPL site. This explanation is merely an attempt to clarify EPA's NPL listing process for the benefit of the commenter.

In support of its argument that failure to include a portion of the Barceloneta Landfill site on the NPL precludes Superfund jurisdiction, the commenter cites an EPA guidance document ("Superfund Facility (Site) Boundaries"). However, the substance of the guidance document does not support the commenter's conclusion. The guidance document articulates a policy that the geographic boundaries of a property do not define a site, but that it is the nature and extent of contamination which does. A site is not limited to those releases identified at the time of the listing. Portions of the text of that guidance which pertain to EPA policy regarding the areas included in a "site" follow:

> The National Priorities List does not describe releases in precise geographical terms; it would be neither feasible nor consistent with the limited purpose of the NPL (as the mere identification of releases), for it to do so.
>
> CERCLA section 105(a) (8) (B) directs the Environmental Protection Agency to list national priorities among the known "releases or threatened releases." Thus, the purpose of the NPL is merely to identify releases that are priorities for further evaluation. Although a CERCLA "facility" is broadly defined to include any area where a hazardous substance release has "come to be located" (CERCLA section 101(9)), the listing process itself is not intended to define or reflect the boundaries of such facilities or releases. Of course, HRS data upon which the NPL placement was based will, to some extent, describe which releases are at issue. That is, the NPL site would include all releases evaluated as part of that HRS analysis (emphasis added).
>
> When a site is listed, it is necessary to define the release (or releases) encompassed within the listing. The approach generally used is to delineate a geographical area (usually the are within the installation or plant boundaries) and define the site by reference to that area. As a legal matter, the site is not coexistensive

with that area, and the boundaries of the installation or plant are not the "boundaries" of the site. Rather, the site consists of all contaminated areas within the area used to define the site, and any other location to which contamination from that area has come to be located (emphasis added).

While geographic terms are often used to designate the site (e.g., the "Jones co. plant site") in terms of the property owned by the particular party, the site properly understood is not limited to that property (e.g., it may extend beyond the property due to contaminant migration), and conversely may not occupy the full extent of the property (e.g., where there are uncontaminated parts of the identified property, they may not be, strictly speaking, part of the "site"). The "site" is thus neither equal to nor confined by the boundaries of any specific property that may give the site its name, and the name itself should not be read to imply that the site is coexistensive with the entire area within the property boundary of the facility or plant. The precise nature and extent of the site are typically not known at the time of listing (emphasis added).

EPA regulations provide that the "nature and extent of the threat presented by a release" will be determined by an RI/FS as more information is developed on site contamination. During the RI/FS process, the release may be found to be larger or smaller than was originally thought, as more is learned about the source and the migration of the contamination.

However, this inquiry focuses on an evaluation of the threat posed; the boundaries of the release need not be defined. Moreover, it generally is impossible to discover the full extent of where the contamination "has come to be located" before all necessary studies and remedial work are completed at a site. Indeed, the boundaries of the contamination can be expected to change over time (emphasis added). Thus, in most cases, it will be impossible to describe the boundaries of a release with certainty.

For these reasons, the NPL need not be amended if further research into the extent of the contamination expands the apparent boundaries of the release...

Guidance Document Entitled, "Clarification of NPL Listing Process," dated August 3, 1995.

Also, in Washington State Department of Transportation v. EPA, 917 F.2d 1309 (D.C. Cir. 1990), the court held that, "[a] source not

mentioned in the listing package could later be treated as part of the Site if it is later found to be contributing to the listed contaminated."

Thus, in general there is no need for EPA to amend the NPL if subsequent investigation reveals more precise boundaries of the release. Further, because the extent of the NPL listing has no effect on any of the activities proposed in the ROD, there is no reason to reopen the rulemaking, since it would serve no useful purpose. Nor, apparently, is the commenter requesting such a reopening.

Nevertheless, there are many indications which suggest that the facts cited by the commenter are not correct regarding the extent of the NPL listing. Because of the questions regarding the operation of the Landfill, it cannot be conclusively stated that the HRS package was limited to the NDA and the SFDA. The HRS package mentions "the landfill" in general (described as a 20 acre area) and sinkholes and disposal areas, in plural, and it does not mention the specific number of disposal areas, never mind the NDA and the SFDA in particular. Therefore, if the SDA existed in 1982, it is possible that the NPL rulemaking considered the SDA in its evaluation.

Moreover, evidence that has come to light since the NPL rulemaking confirms this fact. First, there are questions concerning the operation of the Landfill between 1972 and 1982. While the commenter states that the SDA did not exist in 1982, the Municipality of Barceloneta, which operated the Landfill, asserts that disposal of waste occurred in the SDA prior to 1982, and as early as the late 1970's. Also, in an October 29, 1975 report by an inspector for the Junta de Calidad Ambiental (EQB) the Site is described as containing large amounts of industrial wastes and chemical products, and three different disposal areas are specifically mentioned. Consequently, we cannot conclude that the SDA was not receiving waste nor in existence prior to 1982, as the commenter asserts.

Any place where hazardous substances have come to be located constitute the full extent of releases subject to the NPL. Even though the full extent may have been discovered after the NPL listing determination, such releases are still part of the Site. Finally, further evaluation during the investigation of remedial options confirms the risks from the SDA, since the RI/FS revealed that all three disposal areas pose a risk at the Site. The entire landfill is likely the source of groundwater contamination. The commenter does not dispute this. Capping only the NDA and the SFDA areas will not effectively reduce the flow of contamination to groundwater. Therefore, it is appropriate for all three disposal areas to be remediated.

Furthermore, contrary to the commenter's assertion, EPA's position

of not objecting to a municipality continuing to operate part of a solid waste landfill at a CERCLA site is not inconsistent with the mandates of CERCLA because it is necessary that the Southeastern Disposal Area be filled up to surrounding grade so it can be capped. If it were not filled up and remained as a depression below grade and then capped below grade, rain water would pool in the depression and that would require the additional operation and maintenance of pumping that water out. In addition, the pooled water would facilitate the infiltration of water through the cap causing further groundwater contamination.

2. **Comment:** As the owner, the Municipality of Barceloneta should be responsible for closure of the SDA as a separate unit in accordance with Puerto Rican laws and regulations. The SDA was opened for waste disposal after RCRA was in effect, and although some members of the PRP Group may have continued to dispose of solid waste, such as office and cafeteria trash, none of the members of the PRP Group disposed of hazardous waste in the SDA. Furthermore, any hazardous waste from the PRP Group was disposed in accordance with RCRA regulations. In one court case, it was noted that closing or clean-up costs not related to hazardous substances should be the responsibility of the owner/operator (the Municipality of Barceloneta).

   The rationale to support why the SDA falls under Puerto Rican jurisdiction is as follows:

   1. the SDA was opened when approval was granted by the EPA, the EQB, and/or Puerto Rico Solid Waste Management Authority ("SWMA") and after the NDA and SFDA were listed on the NPL;

   2. EQB and/or SWMA continued to allow the Municipality of Barceloneta to dispose of wastes;

   3. the Municipality of Barceloneta has essentially admitted it is responsible for the closure of the SDA by hiring an environmental consultant to prepare a closure plan;

   4. the Municipality of Barceloneta is required under the local laws and regulations to close the SDA.

   5. the preferred remedy set forth in the PRAP for closure of the SDA is appropriate and consistent with Solid Waste Management Act and its regulations;

   6. there is no need to close the SDA under the Superfund program because EPA has concluded that

the Site "poses a relatively low long-term threat to public health and the environment."

7. as already noted, the SDA is not properly included in the NPL-listed Site because legally-mandated administrative procedures were not followed.

Additionally, because the private PRPs will seek reimbursement from the Superfund for costs associated with the closure of the SDA, EPA can avoid having to provide reimbursement for those costs if it does not include the SDA as part of the NPL-listed Site. Furthermore, Puerto Rico has been given federal grants for closure of landfills located in Puerto Rico, and SWMA has indicated that monies will not be available for the closure of the SDA because it is regulated under the Superfund program. By including the SDA in the Site, a significant source of funding for the closure of the SDA will be lost.

EPA Response: Many of the issues raised by the commenter are in dispute. It is known that several parties deposited solid waste which may have contained hazardous constituents. As stated above, EPA and the EQB have information which indicates that the entire Landfill (all three disposal areas) was used in the late 1970's (prior to RCRA) for disposal of wastes which may have included hazardous waste. The information, which includes aerial photographs, suggests that the NDA was partially filled prior to filling the SFDA and all areas were used simultaneously in the late 1970's.

The fact alleged by the PRP Group that their wastes were disposed in accordance with RCRA regulations is not a defense to CERCLA liability. It is also not relevant to the appropriateness of the proposed response action for the Site.

The statement that the Municipality of Barceloneta is obligated to close or finance the clean-up of the non-hazardous substances at the Landfill is also not relevant to the appropriateness of the proposed response action for the Site. The commenter's point focuses not on the proposed response action but on who should perform the action, an issue upon which the Proposed Plan is silent. Addressing the SDA is necessary to protect human health and the environment.

In response to the rationale to support the SDA falling under Puerto Rican jurisdiction:

1. The date of the commencement of disposal in the SDA has not been demonstrated to be subsequent to NPL listing, but regardless, EPA, EQB, and/or SWMA approval or subsequent approval is not relevant to the

appropriateness of the proposed response action for the Site.

2. The fact that EQB and/or SWMA's has allowed the continued operation is not relevant to the appropriateness of the proposed response action for the Site.

3. The fact that the Municipality may have been prudent in hiring an environmental consultant to prepare a closure plan is wholly irrelevant to CERCLA or the Site, and especially the appropriateness of the proposed response action for the Site.

4. The fact that the Municipality of Barceloneta may be required under the local laws and regulations to close the SDA is not relevant to CERCLA or the appropriateness of the proposed response action for the Site.

5. EPA agrees that the proposed response action for the SDA is consistent with Solid Waste Management Act and its regulations. They are ARARs.

6. The distinction being made as to whether to close the SDA under the Superfund program or the Commonwealth regulations is confused; the risk assessment supports the conclusion that the SDA must be closed, and CERCLA mandates that ARARs, including in this instance the Commonwealth landfill closure regulations, be satisfied. Landfill closure is governed by federal regulations, including RCRA, Subtitle D, and Puerto Rican regulations. The three cells, which reports indicate received similar wastes, will all be closed. It is not an instance where one or the other will be satisfied, but both.

7. Whether or not the SDA is properly included in the NPL-listed site HRS package was addressed previously. EPA did follow the correct procedures in listing the Site. The HRS package mentions "the landfill" in general (described as a 20 acre area) and sinkholes and disposal areas, in plural.

Lastly, the commenter's two points concerning the PRPs intention to seek reimbursement from the Superfund and the potential impact the proposed remedy may have on federal grant monies are not relevant. Again, while the EPA's selection of a remedy under the NCP does not include a cost-benefit analysis, such factors are considered when comparing different remedial approaches. EPA does not consider potential external financial implications in evaluating what is the appropriate remedy for a Site.

3. **Comment:** The PRAP is not practical to implement. EPA states that it "will require the coordinated closure of

all areas of the Site." First, it is not clear what EPA is suggesting by this statement. In addition, it is impractical to coordinate the closure of the three areas designated as the Site because EPA is proposing the immediate closure of two of the three areas followed by the closure of the SDA 2½ to 6 years later. The PRAP does not present a plan showing how the continuing disposal activity at SDA can be coordinated with closure of the two inactive areas. It is recommended that EPA's plan for coordinating the closure of the two NPL-listed areas along with the continuing operation of the SDA be included in the Proposed Plan.

Another point is that the PRAP would require mobilization, construction of landfill caps for the NDA and the SFDA, and then demobilization. Closure of the SDA, which would happen 2½ to 6 years later, would require remobilization, construction of a cap, and demobilization once EPA determines that the SDA should be closed. This is not a cost-effective approach to remediation, and it is not a logical approach for closure of landfills. A significant portion of the remedial costs are associated with mobilization and demobilization. This is arbitrary and capricious. In addition, subjecting the surrounding area twice to short-term disturbances, such as increased vehicular traffic and noise during the construction phase, is a burden with little resulting benefit since the NPL-listed portion of the Site presents a low risk.

A final point is that the PRAP stated that the alternatives are "easily implemented technically." However, the plan for continuing the operation of the SDA results in difficult implementability issues, such as access to the SDA during and after closure of the NDA. Currently, access to the SDA is through the middle of the NDA. Once closure of the NDA is complete, access to the SDA will have to be constructed and maintained, possibly on top of the NDA cap. Therefore, the cost of capping the NDA will be increased, which is not addressed in the Proposed Plan. It should not be the burden of the PRP Group to provide on-going access for waste disposal. Furthermore, the PRP Group will not be able to prevent damage to the NDA cap once it is constructed because they do not have control over the landfill.

It is suggested that closure of the NDA and SFDA be deferred until the SDA is no longer an active waste disposal facility. In the interim, site wide institutional controls could be implemented, such as site access restrictions.

EPA Response: The Feasibility Study recommends site-wide institutional controls along with a Subtitle D cover system for each of the three disposal areas. It is therefore necessary to continue filling the SDA with solid waste until it is at a level that can be successfully capped so that all rainwater can be collected in an area which is not contaminated. The Commonwealth has concurred with these decisions. The Municipality has agreed to fill the active cell and EPA, EQB and SWMA have agreed to allow the continued operation of the SDA until it is ready for closure, which has been estimated to be approximately eighteen months.

The commenter suggests that, because of logistical obstacles, only the site wide institutional controls be implemented until the SDA area is suitable for closure, and then we proceed with the closure. The design period associated with the closure of multiple disposal areas is routinely two years in length. This design would proceed after negotiations for design and construction have been concluded; these negotiations should last for 120 days. While all of this time is elapsing (two and one-quarter years, optimistically), the SDA will continue to be utilized.

3. The following written comment was received by EPA from Frank Coss, President, COTICAM ("Comite Timón Calidad Ambiental de Manatí") Oficina Central Manatí, commenting on the Proposed Plan for the Barceloneta Landfill dated January 26, 1996.

1. **Comment:** Another option to the preferred alternative is removal of the soil and restoration of the affected areas.

EPA Response: Removal of the affected soil would not be cost effective or practical due to the volume and heterogeneity of the waste in the Landfill. The preferred alternative will adequately contain the contamination within the landfill area. In addition, this remedy is consistent with EPA policy. EPA issued a directive titled, "Presumptive Remedy for CERCLA Municipal Landfill Sites" in September 1993 and that policy calls for containment of municipal landfills.

2. **Comment:** If the option of capping the landfill can guarantee that no problems or risks will be created now or in the future, then the preferred alternative is supported. However, restoration of the affected areas is preferred.

EPA Response: As noted above, removal of the affected soil and restoration of the affected areas would not be cost effective or practical because of the volume and heterogeneity of the waste in the Landfill. Therefore, the preferred alternative which includes capping the affected soil, thus minimizing contamination of the groundwater, was chosen rather than restoring the affected areas.

3. **Comment:** It is understood that a monitoring system is

required at the site. However, a contingency plan is suggested, such as more observation wells and extraction wells to recover, contain, and remove the possible contaminants.

EPA Response: The preferred alternatives include a comprehensive monitoring plan at the Site which should be sufficient to determine the effectiveness of the preferred alternatives. If problems are encountered, the alternatives will be reevaluated. At this time, it is expected that the selected alternatives will be protective of human health and the environment. Thus, further remediation such as groundwater extraction wells is not planned at this time.

4. **Comment:** It is expected that EPA will not forget Environmental Justice, and will apply it in this case and in any other case that is not related to this case. In addition, the COTICAM Oficina Central Manatí (Manatí Office) would like to receive more information concerning the rights and duties of communities that are in pursuit of illegal solid waste disposal. It seems that landfills are more abundant and grow larger in Puerto Rico. Currently, there are two in this jurisdiction. One is located at Road 167 at Bo. Cortés de Manatí. The other is located at mile 3½, road 672 in Bo. Palo Alto, Sector Hoyos y Calderas (Coto Sur) de Manatí.

EPA Response: The EQB has responsibility for regulating non-hazardous waste landfills and overseeing other solid waste regulations under the RCRA program. EPA and the local government coordinate landfill closures with the EQB. However, the EQB is responsible for the day-to-day solid waste requirements under RCRA. We will forward this information to EQB, and the COTICAM Oficina Central Manatí (Manatí Office) should contact EQB for more specific information regarding the communities rights and duties with respect to illegal solid waste disposal.

5. **Comment:** The COTICAM Oficina Central Manatí (Manatí Office) is concerned about protecting the groundwater in the vicinity of the landfills in the area. There are miles of tons of scrap iron and every other type of waste disposed in and around the sewer systems which has leaked in the past and discharged to the aquifer Aymamón. This contamination was discussed in the Planning Board's Management Plan for the Laguna Tortuguero.

   Reports exist which indicate that various wells in the Manatí area are contaminated with nitrates and other pollutants. It is a concern that these pollutants could be migrating via storm waters through the sewer system and from there to the potable waters.

   It is of great concern to the Manatí area that some action is taken to clean up the landfills (specificlaly

the Manatí and prevent the contamination of the groundwater. It has been stated that without action the groundwater could be completely contaminated within 10 years.

EPA Response: As stated above, EPA understands the concerns of the COTICAM Oficina Central Manatí (manatí Office). The Puerto Rico EQB has responsibility for regulating non-hazardous waste landfills and overseeing other solid waste regulations under the RCRA program. EPA and the local government coordinate landfill closures with the EQB. However, the EQB is responsible for the day-to-day solid waste requirements under RCRA. Again, we will forward this information to EQB, and the COTICAM Oficina Central Manatí (Manatí Office) should contact EQB for more specific information regarding these issues.

With regards to the Barceloneta Landfill, EPA determined that active remediation of the groundwater was unnecessary. The results of EPA's Abbreviated Risk Assessment indicated that the levels of contaminants present in the ground water pose a relatively low long-term threat to human health. However, if the Landfill is not capped,the continued release of contaminants into ground water could potentially result in a greater risk at some point in the future.