United States
Environmental Protection
Agency

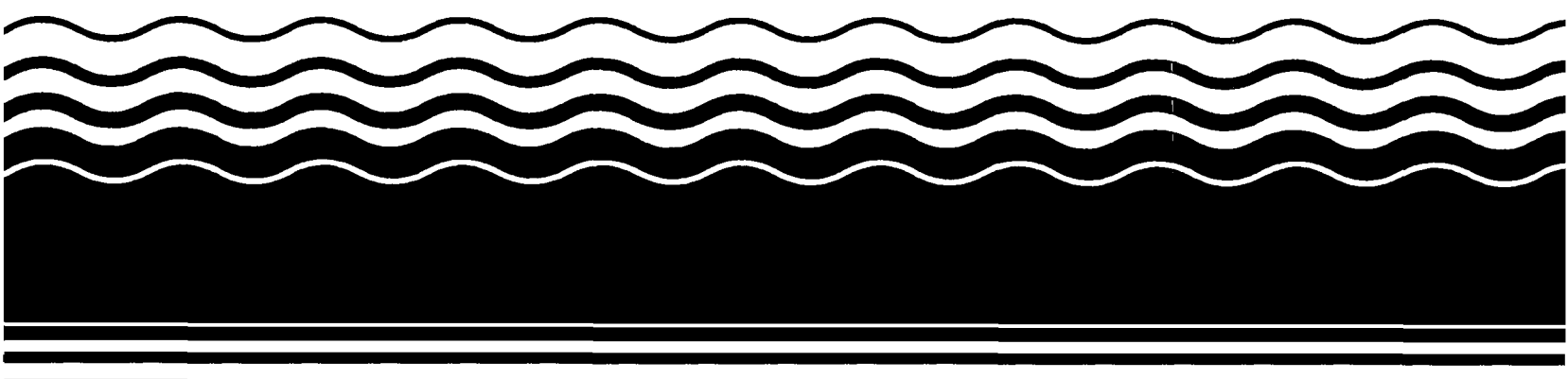
Office of
Emergency and
Remedial Response

EPA/ROD/R02-93/218
September 1993

EPA

Superfund Record of Decision:

Janssen, PR



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SUPERFUND RECORD OF DECISION
Janssen, PR
First Remedial Action

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09/30/93

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U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/800

14.

15. Supplementary Notes
PB94-963823

16. Abstract (Limit: 200 words)

The 25-acre Janssen site is a pharmaceutical manufacturing facility located in Gurabo, Puerto Rico. Land use in the area is predominantly light industrial, with some low-density rural areas and a residential community located two miles from the site. The site also borders the Mamey Creek, a tributary of the Gurabo River, which eventually flows into the Río Grande de Loíza River. An estimated 10,000 people who reside within three miles of the site use public drinking water supply wells from the Gurabo regional alluvial aquifer to obtain their drinking water supply. In addition, there are 86 wells located within three miles of the site which currently are used for agricultural, industrial, sanitary, and domestic purposes. The Janssen facility consists of a chemical and manufacturing building, a pharmaceutical building, an above-ground tank farm, a process wastewater treatment facility, a utilities building, an electrical substation, a cooling tower, a new quality assurance/quality control building, and two ground water production wells. In 1982, Janssen began manufacturing operations for pharmaceutical products and intermediates onsite, and used chemicals containing VOCs and other organics in these products. In 1989, Janssen discovered chloroform in the onsite ground water production wells and, subsequently, discontinued their use as a drinking water source. Later in 1989, Janssen voluntarily notified the

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Janssen, PR
First Remedial Action
Contaminated Media: soil, gw
Key Contaminants: VOCs (toluene), other organics

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 74
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R02-93/218
Janssen, PR
First Remedial Action

Abstract (Continued)

State, EPA, and other agencies that it had detected chloroform in two drinking water wells onsite at levels as high as 2,000 ug/l. After the release was discovered, Janssen conducted a site investigation, which included pumping a production well to reduce the further migration of the ground water volatile organics plume. In 1991, EPA required Janssen to conduct a RI/FS and to implement Early Action Activities to mitigate possible risks associated with existing chloroform contamination and reduce further migration of the ground water plume. Later in 1991, Janssen installed soil vapor extraction wells and, in 1992, conducted a trial test of the system. In 1993, pursuant to EPA approval, Janssen began implementing this system. It is believed that the onsite soil and ground water contamination is the direct result of a leakage from a fire trap at the Chemical Plant building. This ROD addresses an interim remedial action for the contaminated soil and ground water beneath the Chemical Plant building. The primary contaminants of concern affecting the soil and ground water are VOCs, including toluene; and other organics.

The selected remedial action for this site includes continuing the operation of a soil vapor extraction system to remove VOCs from soil; treating extracted soil vapors using granular activated carbon, with discharge of emissions to the atmosphere; implementing a system monitoring program, which includes collecting and analyzing soil vapors before and after they are treated; continuing extraction and onsite treatment of ground water from four recovery wells using air stripping to remove VOCs until a steam stripping unit can be installed to replace the air stripping unit; discharging the treated water offsite to a POTW, and then to Mamey Creek once the steam stripping unit is installed; monitoring soil, ground water, surface water, and air; monitoring and analyzing influent and effluent from the air stripping unit; and periodically collecting well head samples. The estimated present worth cost for this remedial action is $8,987,800, which includes an estimated annual O&M cost of $370,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS:

Ground water cleanup goals are based on Federal SDWA MCLGs and MCLs. Soil cleanup goals were not provided.

ROD FACT SHEET

SITE

Name:	Janssen Inc.
Location/State :	Gurabo, Puerto Rico
EPA Region:	II
HRS Score (date):	N/A

ROD

Date Signed:	September 30, 1993
Selected Remedies:	
Groundwater -	Pump and Treatment with Steam Air Stripper
Soils -	Soil Vapor Extraction System
Operating Unit Number:	OU-1
Capital cost:	$3,300,000
Construction Completion:	March 1995
O & M	$ 370,000
Present worth:	$ 8,987,800 (30 years)

LEAD

Remedial/Enforcement -	Enforcement
EPA/State/PRP -	EPA
Primary contact (phone)	Adalberto Bosque (809) 729-6951
Secondary contact (phone)	Melvin Hauptman (212) 264-7681
Main PRP(s) -	Janssen Inc.
PRP Contact (phone) -	Juan Merced (809) 789-5000

WASTE

Type:	Volatile organic compound
Medium :	Soil and Groundwater
Origin :	Leakage of a fire trap at the chemical building.
Est. quantity:	Unknown

Declaration for Record of Decision

SITE NAME AND LOCATION

Janssen, Inc. Site, Gurabo, Puerto Rico

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial action for the Janssen, Inc. Site (Site) in Gurabo, Puerto Rico, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the interim remedy for this Site.

The Puerto Rico Environmental Quality Board (EQB) concurs with the selected remedy. A letter of concurrence from EQB is appended to this document. The information supporting this interim remedial action decision is contained in the Administrative Record for the Site, the index of which is also appended.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED INTERIM REMEDY

The remedial alternative presented in this document is for an interim remedy for the Site. It focuses on groundwater contamination as well as soil contamination beneath the Janssen Chemical Plant Building.

EPA has separated the response actions at the Site into two different areas (the ground water and the soil). Currently, the soil is being addressed by the soil vapor extraction system that is being implemented pursuant to an EPA Administrative Order signed in 1991. This action should remove the compounds from the

soils beneath the Chemical Plant Building so that they will no longer leach into the ground water. In addition, Janssen is undertaking early actions to reduce the spread of the ground water plume, namely pumping the ground water. Janssen is currently installing a conventional air stripping system to treat the impacted ground water. The selected interim remedy presented in this ROD will continue to pump the impacted ground water to prevent it from spreading further, initially treat the ground water via conventional air stripping, and later on, treat the ground water via steam stripping, an innovative technology.

The major components of the selected interim remedy, discussed in this document as Alternative 3-IV for the ground water and Alternative 3 for the soils, include the following:

- Pumping of impacted ground water from four recovery wells at a combined flow rate of approximately 80 gallons per minute (gpm). The exact number and location of wells and their pumping rates will be determined during design.

- Treating the impacted ground water by steam stripping. Initially, a conventional air stripping unit will be installed to remove volatile organic compounds (VOCs) from the extracted ground water. The installation and operation of the conventional air stripping unit will be initiated immediately and the steam air stripping unit will replace it within approximately eighteen months.

- Discharging the treated water from the conventional air stripping unit to the Puerto Rico Aqueduct & Sewer Authority (PRASA) Gurabo Treatment Plant until it will be replaced by the steam stripping unit. At that time the treated water will be rerouted and discharged to Mamey Creek.

- Implementing a system monitoring program which includes the collection and monthly analysis of influent and effluent from the air stripping unit and periodic collection of well head samples.

In addition, Janssen, with oversight from EPA, will continue to operate and maintain the soils early action as follows:

- Operating a soil vapor extraction system to remove VOCs from soil until such time as no more VOCs can be effectively removed. Soil vapors will be treated by using granular activated carbon (GAC) before being emitted to the atmosphere. Emissions will be below the requirements established by the EQB.

- Implementing a system monitoring program which includes the collection and analysis of soil vapors before and after they are treated with GAC.

This selected interim remedial action differs from that in the Proposed Plan with respect to the discharge of the treated water from the ground water pump and treat system. The Proposed Plan originally called for the discharge to be to the PRASA Gurabo treatment plant. However, due to capacity restrictions, the treated groundwater will only be discharged on a temporary basis to the PRASA Gurabo treatment plant until the steam stripping treatment system is in place. At that time, the treated water will be discharged to Mamey Creek.

DECLARATION OF STATUTORY DETERMINATIONS

The selected interim 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 (ARARs) and is cost effective. This interim remedy utilizes permanent solutions and alternative innovative treatment technologies to the maximum extent practicable. This interim remedy satisfies the statutory preference for remedies that employ treatment that reduce the toxicity, mobility, or volume of contamination as their principal element for the groundwater and soil contamination. The final remedy for the Site will be selected based on the data obtained from the remedial investigation and feasibility study that is presently ongoing.

William J. Muszynski, P.E.
Acting Regional Administrator

9/30/93
Date

DECISION SUMMARY

JANSSEN, INC. SITE

GURABO, PUERTO RICO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

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I. Site Location and Description

The Janssen, Inc. facility is located on twenty-five (25) acres of land on Route 933, km. 0.1, Mamey Ward, Gurabo, Puerto Rico (Appendix A, Figure 1). Janssen, Inc., a Puerto Rico Corporation, is a wholly owned subsidiary of Janssen Pharmaceutical N.V. The latter is a Belgian Corporation, which is a wholly owned subsidiary of Johnson & Johnson. In January 1992, Janssen changed its name to OMB Pharmaceutical Partners (OMB). For the sake of simplicity in this ROD, Janssen rather than OMB, will be used to describe the company and the Site.

The facility, owned by Janssen, is located in a light industrial area and approximately two miles from a residential community. The Janssen facility includes a chemical and manufacturing building, a pharmaceutical building, an above-ground tank farm, a process waste water treatment facility, a utilities building, an electrical substation, a cooling tower, a new quality assurance/quality control building. Two ground water production wells also exist within the facility. The Janssen Site (facility) includes the facility and the associated groundwater contamination plume emanating from the facility.

The area of investigation as shown on Figure 2 (Appendix A), includes the Janssen Inc. and Johnson & Johnson plants, highway PR-30, Mamey Creek and a dairy farm north of the Site. The land use surrounding the Janssen facility includes low density rural, residential, light industrial operations, a church, and a dairy farm. The plant is bounded to the south and east by Mamey Creek, to the west by road PR-933, and to the north by highway PR-31.

The towns of Gurabo and Juncos, which are two main population centers in the area, are approximately 1.5 and 2.0 miles to the east and west, respectively (See Figure 3, Appendix A). The estimated population of these towns, according to the 1990 Census, is approximately 30,000 per town.

Mamey Creek, a tributary of the Gurabo River, is located approximately 154 feet downslope of one of the groundwater wells (W-2) showing the presence of VOCs at the Site and flows along the southeast boundary within forty (40) feet of the plant property. The surficial run-off flows toward Mamey Creek.

Groundwater wells at the Site are located within the Gurabo regional aquifer which is a source of potable water for the Gurabo municipality and surrounding areas. Public drinking water supply wells are located within three (3) miles of the Site . These wells are owned and operated by the Puerto Rico Aqueduct and Sewer Authority ("PRASA") and serve approximately 10,000 people.

II. Site History and Enforcement Activities

Pharmaceutical products and intermediates have been manufactured at the plant since February 1982. The pharmaceutical plant manufactures final products which include Vermox, Nizoral, Hismanal and Imodium. The chemical plant produces pharmaceutical intermediates for use by Janssen, Inc. Records of chemical usage at the plant indicate the use of chloroform, toluene, acetone, tetrahydrofuran, isopropanol, Methyl-Iso-Butyl-Ketone (MIBK), and methanol.

Until April 1989, groundwater productions wells at the Site were used for industrial purposes and as a source of drinking water for Janssen employees. Upon knowledge of the chloroform contamination, these wells were discontinued as a drinking water supply source and were immediately restricted to production use only.

In September 1989, Janssen voluntarily notified the Puerto Rico Environmental Quality Board (EQB), EPA and other agencies that chloroform was detected in two drinking water wells at the Site at levels as high as 2,000 parts per billion (ppb). Later that month, a Preliminary Assessment was conducted by EQB which recommended this Site for an investigation.

After the release was discovered, Janssen retained the services of Soil Tech Corporation to conduct an initial investigation of the Site. In addition, actions (such as pumping production well W-2) were taken to reduce the further migration of the ground water volatile organics plume.

On June 15, 1990 an Information Request letter was sent to Janssen to gather additional information about this matter. On October 23, 1990 a Notice Letter was submitted to Janssen and negotiations with Janssen were initiated.

On March 28, 1991 an Administrative Order on Consent was issued by EPA that required Janssen to conduct a Remedial Investigation and Feasibility Study (RI/FS). The order also required Janssen to implement Early Action Activities designed to mitigate possible risks associated with existing chloroform contamination and reduce further migration of the ground water plume.

Pursuant to that order, in May 1991, Janssen submitted the Summary Investigation (SI) Report which summarizes all the activities and data collection investigations performed at the facility. On July 31, 1991 Janssen submitted the Candidate Technology Memorandum (CTM) which initially identified potential remedial technologies that could be used at the Site. Soil vapor extraction wells were installed in July 1991 and a trial test of this system was conducted in July 1992. Start-up of the soil

vapor extraction system began on March 10, 1993 pursuant to EPA approval. In addition, the installation of extraction wells and a conventional air stripper was initiated . In February 1993, EPA approved the RI/FS work plan that was submitted by Janssen. Work on the RI/FS is underway. In May 1993, Janssen submitted the Focused Feasibility Study (FFS). An FFS is similar to an FS except that it only considers a limited number of technologies for particular areas of a site.

III. Highlights of Community Participation

The SI Report, FFS Report, Proposed Plan and other supporting documentation for the Site were released to the public for comment on June 8, 1993. These documents were made available to the public in both the Administrative Record and information repositories maintained at the EPA Docket Room in the Region II New York City Office, the EPA Caribbean Field Office, the Town of Gurabo Municipal Library located at Gurabo, Puerto Rico, and at the EQB Library. The notices of availability for these documents were published in the El Nuevo Dia Newspaper, the San Juan Star Newspaper, as well as in La Semana Newspaper on June 8, 1993. A public comment period was initially held from June 8, 1993 through July 7, 1993. However, due to a request for an extension to the public comment period, it was extended until August 9, 1993. On June 15, 1993 a public meeting was held at the Municipal Assembly Room, Gurabo where representatives from EPA presented the findings of the preliminary investigation and answered questions from the public about the Site and the remedial alternatives under consideration. On July 22, 1993 a second meeting was conducted with a group of approximately twenty local residents to further present the findings of the investigation, answer questions and describe the remedial alternatives evaluated. The notice for the extension of time was published in El Nuevo Dia Newspaper and the San Juan Star on July 22, 1993. Responses to the comments received during the comment period are included in the Responsiveness Summary, which is appended to this ROD.

IV. Scope and Role of Operable Unit or Response Action Within Site Strategy

EPA's decision to address the impacted ground water on an expedited basis should serve to prevent the migration of compounds found in the ground water and the potential threat to public health and the environment. This action is an interim action which will achieve significant risk reduction quickly while a final remedial solution for the ground water is being developed.

EPA has separated the response actions at the Site into two different areas. Those areas include groundwater impacted with

volatile organics above federal Maximum Contaminant Levels (MCLs) and the impacted soil which is located beneath the Chemical Plant Building. Currently, the soil is being addressed by the soil vapor extraction system that is being implemented pursuant to the Administrative Order. This action should serve to remove the compounds from the soils beneath the Chemical Plant Building so that they will no longer leach into the ground water. In addition, Janssen is undertaking early actions to reduce the spread of the ground water plume, namely pumping the ground water. Through the remedy selected in this ROD, the ground water will continue to be pumped to prevent it from spreading further, be treated via conventional air stripping and discharged to the Gurabo Publicly Owned Treatment Works (POTW), and later on be treated via steam stripping and discharged to Mamey Creek.

The ultimate goal of the EPA Superfund approach to groundwater remediation as stated in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP) is to return usable groundwater to its beneficial use within a time frame that is reasonable. The goal of this interim remedial action is to halt the spread of the groundwater contaminant plume and as such address a threat in the short term while a long term solution is being developed. The result of this interim remedial action will be monitored carefully to determine the feasibility of achieving the final goal of meeting MCLs and non-zero MCL Goals (MCLGs) in the groundwater. This interim remedial action will permit the further collection of data on the aquifer without delaying initial remediation measures.

EPA's Superfund Program uses EPA's Groundwater Protection Strategy as guidance when determining the appropriate remediation for contaminated groundwater at CERCLA sites. The Groundwater Protection Strategy establishes different degrees of protection for groundwaters based on their vulnerability, use, and value. For the aquifer at the Janssen Site, which is classified by EPA as a Class II aquifer, the final remediation goals will be Federal Safe Drinking Water Act MCLs and non-zero MCLGs. Class II aquifers include current and potential sources of drinking water and groundwater potentially available for drinking water, agriculture, or other beneficial use.

V. Summary of Site Characteristics

The objectives of Janssen's initial investigation were to determine the hydrogeologic character of the local aquifer and shallow soil system, including the direction and rate of ground water flow and the chemical quality; to confirm the presence and extent of compounds of concern in the unsaturated and saturated zones; to identify the sources of chloroform; and to gather sufficient quantitative and qualitative data to allow the implementation of additional response activities to prevent

significant migration of the ground water volatile organic compounds plume at the Site.

The area of investigation includes the Janssen and Johnson & Johnson Medical Plants (adjacent to Janssen), Highway PR-30, Mamey Creek and a dairy farm north of the Site.

During this investigation, soil borings, soil sampling, monitoring well installation, ground water sampling, water level measurements, aquifer hydraulic testing and identification of potable water supplies within three miles were conducted.

A. Site Geology and Hydrology

The geology in the vicinity of the Janssen facility consists of volcanic rocks with local intrusions of batholiths and dikes. These intrusive bodies are generally composed of granodiorites and diorites. The age of the volcanic rocks ranges from Early to Middle Cretaceous Periods, while the intrusive and metamorphic rocks belong to the late Cretaceous and Early Tertiary Periods.

The volcanic formation at the Site is known as Los Negros Formation. This formation is mainly composed of basalt and volcanic breccia locally altered by hydrothermal effects.

The unconsolidated deposits found in the area are of Holocene Age essentially composed of alluvium and colluvial material. The thickness of this mantle deposit varies from 60 to 80 feet, with maximum recorded thickness of more than 160 feet. Figure 4 (Appendix A) depicts the surficial geology in the vicinity of the Janssen facility.

The project is located on the hydrogeological unit of the Gurabo River, which is the main tributary to the Rio Grande de Loíza (Loíza River). The Gurabo River unit has a total catchment area of approximately 30.6 square miles. The basin is delineated to the north and east by the El Yunque Mountain Range, and to the south and west by the Cayey Mountain Range. The aquifer of this region is composed of an alluvial valley that extends from the town of Las Piedras to the southeast, to the town of Gurabo, where the Gurabo unit intercepts the Loíza River. The areal extent of this unit is shown on Figure 5 (Appendix A).

The geomorphological and hydrogeological conditions of the Gurabo River unit are independent of the Loíza River. The Gurabo River unit is composed mostly of sediments derived from plutonic and volcanic rocks, while the area downgradient from the intersection of the two rivers is composed mainly of tuffaceous sand, siltstone, breccia, and conglomerates.

The most productive aquifer of this hydrogeological unit is generally composed of the alluvial deposits overlying the

weathered rock. In areas where alluvial deposits are not found, the transmissivity of the volcanic or intrusive rock depends on the rock secondary porosity. The phreatic surface of this basin (Caguas, Gurabo, Juncos Aquifer) is found at an average depth of 25 to 30 feet below existing grade. The phreatic surface usually follows the same pattern of the topographic relief. In general, the ground water flows towards the Gurabo River which is the main surface water body in the area. Figure 6 (Appendix A) presents a general hydrogeological cross-section.

At the project site, the main aquifer unit is the surficial alluvial or colluvial deposits which overlay the weathered rock. The thickness of the unconsolidated unit is about 60 to 80 feet. The thickness of the weathered rock layer may range from 30 to 50 feet.

The elevation of the phreatic surface within the Site varies from 160 to 180 feet above mean sea level (30 to 40 feet below land surface). The ground water flow direction is to the north-northeast, following the existing topographic surface. The hydraulic gradient is approximately 0.013 under normal recharge and withdrawal conditions.

The aquifer system within the Site covers an area of approximately 0.25 km^2. The catch basin is limited to the north by Highway PR-30, to the south and west by a surficial volcanic formation, and to the south and east by Mamey Creek.

In addition to direct infiltration and recharge by precipitation, the aquifer is recharged through fractures and foliation of the bedrock. The hydraulic gradient of this system is about 0.13 and flows in the same direction as the shallow aquifer. The estimated saturated thickness of this recharge area is approximately 30 feet for a total flow section of 70,000 ft^2. The local aquifer is also recharged by Mamey Creek, which flows along the east and south limits of the Site. The average flow of this creek has been estimated to be approximately 96,000 gal/day. About 16 percent of this quantity infiltrates into the aquifer.

Water supplies for this area are derived from surface water sources (PRASA data, 1986). The total public water supplied to the Caguas-Juncos Valley was about 20 million gallons per day (mgd) in 1986. Additional sources of water in the study area are about 6.8 mgd imported from Guaynabo and Humacao, and about 2.5 mgd pumped from the alluvial aquifer.

Wells are the most important source of ground water data in this investigation due to their potential for contamination. A comprehensive well inventory program was performed throughout the area based on records of the U.S. Geological Survey (USGS) and Puerto Rico Department of Natural Resources (DNR). Figure 7

(Appendix A) lists and shows the location of wells in a radius of three (3) miles from the Site. The records indicate the presence of 86 wells. Wells were numbered from 1 through 86 for the purpose of the SI report. Of these wells, only 11.6 percent (10/86) are presently used as a source of potable drinking water by PRASA. The remaining wells are used for agricultural, industrial, and domestic purposes. The closest PRASA wells to the Site are the Hato Nuevo (Nos. 81, 83, and 84) and Juncos Wells (Nos. 30 through 35). These wells are located at about 1.7 and 2.0 miles north and west of the Site, respectively. The Gurabo River, which is about 0.3 miles north of the Site, forms a shallow hydraulic barrier between the Hato Nuevo Wells and the Site. This precludes the possibility of the plume reaching these wells. The Juncos wells are not within the ground water flow of the aquifer.

The only wells that are close to the Site are wells No. 19, 20, 22, 23, 58, and 61. Wells No. 19 and 20 belong to Johnson & Johnson, and No. 22 and 23 to Janssen, No. 58 to a Church, and No. 61 to a dairy farm. Wells No. 19, 20, 22, and 23 were previously used as a source of potable water and process water. Immediately upon knowledge of the chloroform presence in the water, Janssen ceased to use wells No. 22 and 23 as a source of potable water. Well No. 58 is used for sanitary purposes and Well No. 61 is used for livestock and irrigation. These wells have been sampled and results indicate only trace levels of contaminants at concentrations below the MCLs.

Most of the wells are located within the alluvium, which constitutes the main aquifer in the area. Well yields range from 20 to 450 gallons per minute (gpm). Low yields normally correspond to wells finished in the bedrock formation. Well depth is variable with maximum depths of about 400 feet. However, most wells are drilled according to depth-to-bedrock, with screens opened through most of the saturated thickness of the unconsolidated deposits.

B. Nature and Extent of Contamination

1. Groundwater

The ground water quality of the aquifer underlying and downgradient of the Site has been assessed as part of the preliminary work conducted and reported in the SI Report. One hundred twenty three (123) ground water samples were collected for chemical analysis.

All ground water samples obtained from the shallow and deep monitoring wells, as well as from production wells, were analyzed for the presence of chloroform, except for those samples collected during the February 27, 1990 sampling event. Ground

water samples collected during this sampling event were analyzed for the full scan of volatile organics in the Priority Pollutant list and other compounds used in the facility. Chloroform was the most frequently detected compound and had the highest detected concentration of 472 parts per million (ppm). Other detected compounds were acetone, MIBK, tetrahydrofuran, methylene chloride, and toluene. Of these, acetone and tetrahydrofuran showed the highest concentrations with 41.6 and 49.5 ppm, respectively.

Ground water samples collected from the existing monitoring well network from January to October 1990 indicate that the chloroform plume is centered at the Chemical Plant Building and that the mass of the plume is partially contained. Ground water samples taken at different depths within the aquifer indicate an increase in concentration with depth.

In addition to the ground water samples collected during the initial investigation, Janssen has conducted ground water sampling from March 1991 until present. Figures 8-10 (Appendix A) present the chloroform plume configuration corresponding to November 1991, July 1992, and March 1993. Samples collected during these sampling events were analyzed off-site in accordance with EPA's Contract Laboratory Program (CLP) protocols. Samples were analyzed for only those VOCs listed on the CLP Target Compound List and additional compounds used at the Site (methanol, tetrahydrofuran, and isopropanol) which are not in this test. From the analyzed compounds only chloroform, acetone, MIBK, methylene chloride, tetrahydrofuran and toluene were detected. The analytical results have been included in the monthly reports submitted to EPA.

Analyses of samples collected from Janssen production wells (Appendix B, Tables 1 through 7) to date, as well as monitoring wells at the Site, revealed the following VOCs at the following maximum concentrations in parts per million (ppm):

Chloroform	472
Methylene Chloride	29
Tetrahydrofuran	110
Acetone	120
Toluene	36
Chlorobenzene	8
Methyl-Iso-Butyl Ketone (MIBK)	17
Methanol	22
Isopropanol	11

2. Soils and Sediments

As part of the work conducted and reported in the SI Report, 57 soil samples and 3 sediment samples were collected for chemical

analyses. The sediment samples were obtained from three sampling points along Mamey Creek.

Soil samples were collected within the Chemical Plant Building and its surroundings during various sampling events. Sample collection depth ranged from 4 to 27 feet below existing ground level. All samples corresponding to boreholes beyond the perimeter of the Chemical Plant Building did not show the presence of volatile organic compounds. Soil samples taken within the Chemical Plant Building, specifically in the process area, showed concentrations of chloroform, methylene chloride, toluene, acetone, MIBK, tetrahyrofuran, isopropanol, chlorobenzene, and methanol.

Sediment samples obtained from Mamey Creek to determine the potential of sediments to contain chloroform as a result of storm water runoff from the industrial facility or discharge from the aquifer showed non-detectable concentrations.

The analyses of soil samples collected at the Site (Appendix C, Tables 8 through 15) indicated that there were measurable concentrations of the following VOCs in the soil samples collected under the Chemical Plant Building with the following concentrations in ppm:

Methanol	0.09
Isopropanol	0.17
Chlorobenzene	131
Chloroform	465
Methylene Chloride	36
Toluene	8,250
Acetone	1,670
Methyl-Iso-Butyl Ketone (MIBK)	194
Tetrahydrofuran	249

VI. Summary of Site Risks

Ground water samples collected at the Site revealed the presence of some VOCs far above the Federal Safe Drinking Water Act MCLs and MCLGs. These compounds included chloroform, methylene chloride, acetone, toluene and chlorobenzene. Several of the compounds, including chloroform and methylene chloride, are known to cause cancer in laboratory animals and are suspected to be human carcinogens. In addition, contaminants present in the soil beneath the Chemical Plant Building continue to act as a source of ground water contamination.

Ground water samples collected by Janssen from facility wells indicate that the compounds of concern, notably chloroform, are currently spreading both vertically and horizontally within the

upper alluvial aquifer and have likely reached the bedrock. Downgradient well samples also indicate that the chloroform plume is presently migrating to the north and northeast of the facility. Two private water supply wells (Well no. 58 and 61, mentioned previously) are located in close proximity and downgradient of the existing plume(s). To date, these have shown only trace levels of contaminants at concentrations below the MCLs, but in the absence of measures to prevent further plume migration, these wells could become more significantly impacted.

Actual or threatened releases of hazardous substances from this Site, if not addressed by the selected remedy or one of the other active measures considered, may present an imminent and substantial endangerment to human health, welfare and the environment.

VII. Description of Alternatives

The Superfund law requires that any remedy selected for a site must be protective of human health, welfare, and the environment, cost-effective, and in accordance with statutory requirements. Permanent solutions to contamination are to be achieved wherever possible, and there is a bias for treating wastes and applying innovative technologies. The remedial alternatives considered for the Site are summarized below.

The time to implement includes the actual construction time and the time needed to design and negotiate with Janssen for implementation.

ALTERNATIVES FOR THE IMPACTED GROUND WATER

Alternative 1 - No Action

CERCLA requires that the "No Action" alternative be considered at every site to provide a baseline of comparison among alternatives. The No Action alternative assumes no additional actions will be taken beyond the current activities at the Site. All wells that are currently pumping are assumed to continue to pump at their current rates. The costs for the No Action alternative are as follows (they do not include the costs of maintaining the current pumping system):

Capital Cost	$0
Annual O&M	$0
10-year Present Worth	$0
30-year Present Worth	$0

Alternative 2 - Deed Restrictions with Monitoring

This alternative involves deed restrictions being registered to limit the land use activities at the entire affected area as well as periodic ground water monitoring to track the movement and concentration of the VOCs. Ground water use restrictions would be recommended to be put in effect in the affected area to prevent the use of impacted ground water. These institutional controls would alert future property owners of potential Site related risks. Deed and ground water restrictions would be implemented by state and local officials. As the owners of record, the deed restrictions would have to be filed by Janssen and nearby well owners. Annual sampling of eighteen (18) monitoring well clusters and six (6) production wells would provide an assessment of the extent and mobility of the VOCs. Presently, of the eighteen clusters proposed for sampling, eleven are installed. The installed clusters consist of one, two, or three monitoring wells for a total of 19 wells. The remaining seven clusters would be installed as follows: five (5) clusters, consisting of three (3) monitoring wells each, would be installed within the extent of the chloroform plume; two (2) clusters would be located downgradient of chloroform plume; and an additional deep monitoring well would be installed adjacent to existing shallow monitoring well JW-6. A combined total of 41 monitoring wells would be available for sampling at the completion of the proposed wells. Each monitoring and production well would be sampled and analyzed for the presence of VOCs. Annual status reports would be prepared.

The costs for this alternative are as follows:

Capital Cost	$ 469,000
Annual O&M	$ 64,750
10-year Present Worth	$ 969,000
30-year Present Worth	$1,464,400

Alternative 3 - Ground Water Extraction, Treatment and Discharge System

This alternative was evaluated considering different treatment and discharge options. The number of extraction wells and total pumping rates were maintained constant at four wells and 80 gallons per minute (gpm), respectively. Alternative 3-I is evaluated assuming that the water pumped is treated in a conventional air stripping unit and discharged to the Gurabo

Publicly Owned Treatment Works (POTW). Alternative 3-II is evaluated assuming treatment of water in a steam stripping unit with discharge to the Gurabo POTW. Alternative 3-III is similar to Alternative 3-II but considers the reinjection of treated water to the aquifer by the use of recharge wells. Alternative 3-IV is similar to Alternative 3-II in its use of a steam stripping unit but treated water is discharged into Mamey Creek.

Deed restrictions and well construction controls will be recommended to be implemented in order to restrict the installation of water supply wells and limit the use of ground water in the area during the implementation phase for all of the alternatives within Alternative 3, i.e., 3-I, 3-II, 3-III, and 3-IV. These restrictions will also alert future property owners of potential site related risks. System monitoring includes collecting and analyzing monthly influent and effluent samples from the tower and periodically collecting wellhead samples.

Alternative 3-I Four Extraction Wells and Conventional Air Stripping with Discharge to Gurabo POTW

Impacted ground water will be pumped from four recovery wells at a combined flow rate of 80 gpm. This water will be piped to a conventional air stripping treatment system. It is estimated, based on previous ground water modeling, that 80 gpm of ground water may be pumped from the four wells at the same time without causing a drastic reduction of aquifer capacity. However, the exact number and location of wells and their pumping rates will be determined during design.

The water will be pumped from the wells to a holding tank and from the holding tank to a conventional air stripping unit. From the stripping unit, treated water will be pumped to the existing fire protection tank, from where the overflow of the tank will discharge to a sanitary sump pit where water will be pumped to the Gurabo POTW.

The air stripping system is capable of treating up to 150 gpm of water having the projected influent concentrations and will comply with the quality criteria for discharge to the Gurabo POTW.

It is expected that the recovery wells would be existing well W-2R and new wells JE-1, JE-2, and JE-3. Each well will be pumping at a rate of approximately 20 gpm. Well W-2R is located near the center portion of the plume. Wells JE-1 and JE-2 would be located at the downgradient boundary of the plume to prevent off Site migration of the plume. Well JE-3 would be located north of Well W-2R, closer to the center of the plume to remove the high chloroform concentrations from the aquifer. However, the exact number and location of wells and their pumping rates will be

determined during design.

At this time, (because this is an early action designed to prevent further plume migration), it is difficult to predict the ultimate concentration to which chemical compounds in the aquifer may be reduced with Alternative 3-I. The costs of this alternative are as follows:

Capital Cost	$ 525,000
Annual O&M	$ 229,000
10-year Present Worth	$2,293,300
30-year Present Worth	$4,045,300

This alternative can be initiated as soon as the ROD is signed. It does not require negotiations with Janssen because Janssen has consented to this action within the Administrative Order.

Alternative 3-II - Four Extraction Wells and Steam Stripping Unit with Discharge to Gurabo POTW

This alternative is a modification of Alternative 3-I. As in Alternative 3-I, impacted ground water will be pumped from four recovery wells at a combined flow rate of 80 gpm. The difference is that the extracted ground water will be treated with a steam stripping unit instead of a conventional air stripping unit. However, the exact number and location of wells and their pumping rates will be determined during design. The treated ground water will then be discharged into the Gurabo POTW where it will eventually discharge into the Gurabo River. Such discharge is downstream of the water filtration plant presently under construction. The benefit of the steam stripping unit over conventional air stripping is that it can achieve lower effluent concentrations for all compounds found in the ground water.

This technology which is an innovative technology uses a high-efficiency countercurrent stripping developed by the Dow Chemical Company. A carrier gas, in this case steam, is purged through the impacted water with the volatile components being transferred from the water into the gas phase. This treatment unit can achieve effluent concentration limits below MCLs.

Once in the steam stripping unit the impacted ground water is heated to the tower's operating temperature by injecting steam at the bottom of the tower. Under these conditions of temperature and reduced pressure, the VOCs are stripped from the water and exit the top of the stripping tower along with the steam. The overheated stream flows to a water-cooled condenser where it is condensed and pumped to a gravity separator. The organic phase from the gravity separator is pumped to and stored in a solvent

storage tank for later treatment at an off-site facility. The aqueous phase is rerouted to the system for subsequent treatment.

Treated ground water will be stored in the existing 250,000 gallon fire protection tank. The tank's overflow will flow to an existing sanitary sump pit where it will be pumped through a 3-inch diameter pipeline to the Gurabo POTW.

At this time, (because this is an early action designed to prevent further plume migration), it is difficult to predict the ultimate concentrations to which chemical compounds in the aquifer may be reduced with Alternative 3-II. However, as this system is totally enclosed, it can be operated on a continuous basis until effluent contaminant concentrations are below MCLs and MCLGs. The costs for this alternative are as follows:

Capital Cost	$2,925,000
Annual O&M	$ 365,000
10-year Present Worth	$5,547,300
30-year Present Worth	$8,543,600

The time to implement this alternative is approximately eighteen months.

Alternative 3-III - Four Extraction Wells and Steam Stripping Unit with Reinjection Wells

This alternative consists of the pumpage from wells JE-1, J-E2, JE-3 and W-2R as outlined in Alternatives 3-I and 3-II and the treatment with the steam stripping unit as in Alternative 3-II. The main difference between this and Alternative 3-II is in the disposal of the treated effluent. The treated effluent would be reinjected into the aquifer by means of reinjection wells.

Because the treated water is to be injected into the ground, some modifications would have to be made to the treatment system described under Alternative 3-II. The injection quality criteria for this alternative would be MCLs or MCLGs which is more stringent than the discharge quality criteria for the Gurabo POTW. Second, the effluent from the steam stripping unit would flow from the fire protection storage tank into twelve (12) reinjection wells located north of the Site to reinject the treated water into the aquifer. The reinjection of the treated water downgradient would provide a hydraulic barrier to reduce plume migration. Each well would have an estimated injection capacity of 10 gpm. Eight wells would be operating at any time with the other four (4) wells serving as back-up wells. Reinjection would recharge the aquifer with treated ground water.

At this time (because this is an early action designed to prevent further migration) it is difficult to predict the ultimate concentration to which compounds in the aquifer may be reduced with alternative 3-III. However, as this system is totally enclosed, it can be operated on a continuous basis until effluent contaminant concentrations are below MCLs and MCLGs. The costs of this alternative are as follows:

Capital Cost	$3,330,000
Annual O&M	$ 270,000
10-year Present Worth	$5,414,900
30-year Present Worth	$7,480,600

The time to implement this alternative is approximately two years.

Alternative 3-IV- Four Extraction Wells and Steam Stripping Unit with Discharge to Mamey Creek

This alternative is a modification of Alternative 3-II. As in Alternative 3-II, impacted ground water will be pumped from four recovery wells at a combined flow rate of 80 gpm. However, the exact number and location of wells and their pumping rates will be determined during design. The water will flow from the wells to the steam stripping unit and then it will be discharged to Mamey Creek which is a tributary of the Gurabo River located at about 1,500 meters downgradient of the Site. Because the water is to be discharged to an existing surface body of water, the discharge will have to meet National Pollutant Discharge Elimination System (NPDES) discharge requirements.

Discharging the treated water to Mamey Creek must be carefully considered since this creek is a tributary of the Gurabo River which will be a source of potable drinking water for the Gurabo-Juncos community through the use of a water filtration plant presently under construction at about 2 kilometers from the Site.

At this time (because this is an early action designed to prevent further migration) it is difficult to predict the ultimate concentration to which compounds in the aquifer may be reduced with Alternative 3-IV. However, as this system is totally enclosed, it can be operated on a continuous basis until effluent contaminant concentrations are below MCLs and MCLGs.The costs of this alternative are as follows:

Capital Cost	$3,050,000
Annual O&M	$ 270,000
10-year Present Worth	$5,134,900
30-year Present Worth	$7,200,600

The time to implement this alternative is approximately two and one-half years.

ALTERNATIVES FOR SOURCE CONTROL (SOIL)

Alternative 1- No Action

The "No Action" alternative for soils would result in no effort to prevent the further leaching of compounds from the soils to the ground water. This alternative would result in the continued leaching of chemical compounds into the aquifer for an unknown period of time, affecting the quality of the ground water at the Site. The costs for the No Action alternative are as follows:

Capital Cost	$ 0
Annual O&M	$ 0
10-year Present Worth	$ 0
30-year Present Worth	$ 0

Alternative 2 - Excavation and Disposal

This alternative involves the excavation and removal of soil containing concentrations of chloroform and other volatile organic compounds.

Excavation of the impacted soil, followed by removal to an engineered disposal facility is a feasible alternative. However, there are no local disposal options for hazardous materials in Puerto Rico. Therefore, the estimated in-situ volume of 120,000 cubic feet which at the time of excavation could increase to 156,000 cubic feet (loose volume) would have to be shipped to a secure, permitted Resource Conservation and Recovery Act (RCRA) landfill facility in the continental United States.

Furthermore, because the soils are located beneath the Chemical Plant Building and excavation depths are expected to reach 30 feet, significant implementability problems exist for this

alternative. The selection of this option would require the dismantling of the Chemical Plant Building, construction of a replacement structure, and soil removal and disposal. The costs of this alternative are as follows:

Capital Cost	$62,036,000
Annual O&M	0
10-year Present Worth	$62,036,000
30-year Present Worth	$62,036,000

The time to implement this alternative is approximately five years.

Alternative 3 - Soil Vapor Extraction

The Soil Vapor Extraction (SVE) alternative removes volatile organic compounds from the unsaturated zone as vapors, without excavation. SVE is accomplished in-situ (in place), by installing vents of various designs consisting of gravel packs extending to the surface, slotted or unslotted well casings installed with or without gravel pack, or any other configuration that allows gases to move from the soil. Passive systems consist of vents that are open to the atmosphere and do not require energy for extraction of gases. Active systems make use of negative pressure or vacuum pumps to accelerate the removal of vapors from the soil.

With SVE, the vapors are either discharged to the atmosphere or treated before discharging, depending on vapor concentrations and regulatory requirements.

The limitations of the SVE are associated with soil characteristics that impede the movements of vapors to the extraction well, emissions of volatiles, and explosion hazards. Soils with limited pore space would require the use of more closely spaced wells and possibly higher capacity pumps. The air emissions may be controlled by using granular activated carbon (GAC) at the discharge point. Explosion hazards associated with vapors can be overcome by using intrinsically safe equipment, and by ensuring that adequate volumes of air are moved through the system to keep vapor concentrations below the lower explosion limit (LEL).

The SVE system requires minimal disruption of the Chemical Plant operations. The system is very simple to operate and the removal has been proven to be very effective for most volatile organics. The costs of this alternative are as follows:

Capital Cost	$ 250,000
Annual O&M	$ 100,000
10-year Present Worth	$1,022,200
30-year Present Worth	$1,787,200

The time to implement this alternative is immediate because it is covered under the existing Administrative Order.

VIII. Summary of Comparative Analysis of Alternatives

EPA has developed nine criteria (OSWER Directive 9355.3-01), codified in the NCP §300.430(e) and (f), to evaluate potential alternatives to ensure all important considerations are factored into remedy selection. This analysis is comprised of an individual assessment of the alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs, that is, relative advantages and disadvantages, among them.

The nine evaluation criteria against which the alternatives are evaluated are as follows:

Threshold Criteria - The first two criteria must be satisfied in order for an alternative to be eligible for selection.

1. o **Overall Protection of Human Health and the Environment** addresses whether or not a remedial alternative 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. o **Compliance with ARARs** addresses whether or not a remedial alternative would meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or satisfy the criteria for invoking a waiver as set forth in Section 121(d)(4) of CERCLA.

Primary Balancing Criteria - The next five "primary balancing criteria" are to be used to weigh trade-offs among the different hazardous waste management strategies.

3. o **Long-Term Effectiveness and Permanence** refers to the ability of a remedial alternative to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

4. o **Reduction of Toxicity, Mobility, or Volume** evaluates the anticipated performance of the treatment technologies a remedial alternative may employ, or how successfully particular treatment methods could reduce the harmfulness or volume of contaminants, or their potential to move in the environment.

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

6. o **Implementability** evaluates the technical and administrative feasibility of a remedial alternative, including the availability of materials and services needed to implement a particular option.

7. o **Cost** considers estimated capital and operation and maintenance costs, and net present worth cost of the alternatives.

Modifying Criteria - The next two criteria are regarded as "modifying criteria", and are to be taken into account after the above criteria have been evaluated. They are generally to be focused upon after public comments are received.

8. o **State Acceptance** indicates whether, based on its review of the SI Report and the Proposed Plan, the Commonwealth of Puerto Rico concurs with, opposes, or has no comment on the preferred alternatives at the present time.

9. o **Community Acceptance** refers to the public's general response to the alternatives described in the Proposed Plan.

The following is a summary of the comparison of each alternative's strengths and weakness with respect to the nine evaluation criteria.

GROUND WATER

1. Overall Protection of Human Health and the Environment

Concentrations of the compounds in ground water underlying and downgradient of the Site exceed federal or Commonwealth MCLs and MCLGs for chloroform, methylene chloride, tetrahydrofuran, acetone, toluene and chlorobenzene. Ground water Alternatives 1 and 2 are not protective of human health and the environment

because they do not control the migration of compounds at the Site. Since they do not meet this threshold criterion, these alternatives will not be discussed further. Alternatives 3-I through 3-IV for the ground water medium would provide overall protection consistent with the scope of this interim action by controlling the ground water plume through the extraction and treatment of the impacted water.

2. Compliance with ARARs

The ground water underlying the Site is a potable water supply source, therefore, federal MCLs and non-zero MCLGs are ARARs. In addition, the Puerto Rico MCLs are relevant and appropriate for the cleanup of the aquifer. Alternatives 3-I through 3-IV will comply with these ARARs consistent with the limited scope of this action. However, the goal of this interim remedial action is not to restore the aquifer to the MCLs but to prevent the spread of the contaminated ground water.

Discharge of treated water for Alternatives 3-I and 3-II to the Gurabo POTW will comply with the Puerto Rico Pretreatment Standards as per Act No. 9, Regulation 4282, which is applicable.

PRDNR Law 136 calls for beneficial use of the waters of Puerto Rico, thus avoiding waste. This is not an ARAR, but rather a "To Be Considered" (TBC) criterion. Alternatives 3-III and 3-IV would also provide a beneficial use of the water while recharging the aquifer with treated ground water or discharging to Mamey Creek which will enable some of the ground water to recharge the aquifer.

Direct discharge of the treated water by reinjection or to the Mamey Creek under Alternatives 3-III and 3-IV will comply with NPDES requirements.

Ground water reinjection under Alternative 3-III will comply with the substantive requirements of the Underground Injection Control Regulations pursuant to the Commonwealth Act No. 9 and the Federal Underground Injection Control Regulations, whichever are more stringent.

3. Long-Term Effectiveness

Alternatives 3-III through 3-IV would all be effective in the long-term for controlling plume migration. Alternatives 3-I and 3-II would not be effective in the long-term because PRASA has not agreed to accept the treated water on a long-term basis. The implementation of Alternative 3-III would provide the most reliable long-term effectiveness, since it includes the reinjection of the treated water downgradient of the Site causing a hydraulic barrier and reducing further off-site migration of

the plume.

4. Reduction of Toxicity, Mobility or Volume Through Treatment

Alternatives 3-I through 3-IV would reduce the toxicity, mobility and volume permanently through extraction and treatment of impacted ground water. The reinjection of the treated water (Alternative 3-III) downgradient would provide a hydraulic barrier to reduce the plume migration. Also, the reinjection of treated water would reduce concentrations by dilution.

5. Short-Term Effectiveness

Alternatives 3-I through 3-IV are not expected to cause any short-term adverse impacts to the community or the environment during the construction of the treatment systems. However, Alternative 3-I may be implemented almost immediately while the other options will require longer implementation schedules. Alternative 3-III would have the longest implementation time because the design of a reinjection system is very complicated.

6. Implementability

Deed restrictions and well construction controls for Alternative 3-I through 3-IV would be obtained with the cooperation of regulatory agencies although they may be somewhat difficult to enforce. All alternatives are technically feasible as the necessary equipment, services and materials are available for construction. Conventional air stripping units are readily available but steam strippers require design and construction. Steam stripping is an innovative technology but has been successfully demonstrated to treat groundwater at high concentrations. Conventional air stripping is a common and demonstrated technology that has been used to treat ground water at many sites. Alternatives 3-I and 3-II are not implementable for a long term remedy (but Alternative 3-I is implementable on a short term basis) as PRASA has indicated that it will not accept this water on anything but a temporary basis (and Alternative 3-II requires a steam stripper to be built first). An agreement for the discharge of the treated water using the conventional air stripper for treatment has been completed between PRASA and Janssen. An agreement would have to be reached with PRDNR and EQB to discharge the treated water to Mamey Creek or reinjection into the aquifer but these are considered to be implementable.

7. Cost

Alternative 3-I is the least costly with a Capital Cost of $525,000, Annual O&M of $229,000, a 10-year present worth of

$2,293,300 and a 30-year present worth of $4,045,300. Alternative 3-II has a Capital Cost of $2,925,000, Annual O&M of $365,000, a 10-year present worth of $5,747,300 and a 30-year present worth $8,543,600. Alternative 3-III has a Capital Cost of $3,330,000, Annual O&M Cost of $270,000, 10-year present worth of $5,414,900 and a 30-year present worth of $7,480,600. Alternative 3-IV has a Capital Cost of $3,050,000, Annual O&M Cost of $270,000, a 10-year present worth of $5,134,900 and a 30-year present worth of $7,200,600.

8. State Acceptance

The concurrence letter from the EQB is attached to this Record of Decision as Appendix C.

9. Community Acceptance

All comments are addressed in the Responsiveness Summary, which is appended to this Record of Decision as Appendix D.

SOILS

1. Overall Protection of Human Health and the Environment

The "No Action" alternative requires no change to the existing conditions at the Site and as such would not provide overall protection of human health and the environment; therefore, it was eliminated from further consideration and will not be discussed further. Alternatives 2 and 3 would provide overall protection of human health and the environment. Alternative 2 would provide the best overall protection because it would remove the impacted soils from the Site. Alternative 3 would also provide protection although it would take more time to reduce the compounds from the soils.

2. Compliance with ARARs

There are no chemical-specific ARARs for contaminated soils. The SVE system as described in Alternative 3 would be maintained until no more VOCs could be effectively removed. It is anticipated that any action-specific ARARs associated with soil treatment can be met by each alternative. However, Alternative 2 would require that the soil be tested using the Toxicity Characteristic Leaching Procedure (TCLP) (and, potentially treated) to ensure that the soils comply with the RCRA Land Disposal Restrictions before the soils could be disposed of off-

site.

3. Long-Term Effectiveness and Permanence

Alternatives 2 and 3 are both protective in the long term; however, Alternative 3 will require some operational time to ensure that VOCs have been reduced such that they will no longer act as a source of contamination to the ground water.

4. Reduction of Toxicity, Mobility or Volume

Alternative 3 would be effective in reducing the toxicity, mobility or volume of compounds and uses treatment in doing so. Alternative 2 would generate a large volume of soils that would have to be disposed of in an approved facility in the continental United States. Alternative 2 (unless treatment is deemed necessary) would not reduce the toxicity of the compounds but would reduce the mobility since the contaminants would no longer be present at the Site. Alternative 3 also generates small volumes of Granular Activated Carbon that would have to be disposed of or treated.

5. Short-Term Effectiveness

Alternative 2 is protective in the short-term by removing impacted soils. However, the work to be performed before removing soils includes the demolition of the Chemical Plant Building, and the subsequent removal of the impacted soils which would cause short-term impacts to the operations of the facility and perhaps to workers. Alternative 3 would take longer to achieve the goal of preventing further migration of compounds from the soil to the ground water because the system has to be operated for some period of time before the compounds are removed.

6. Implementability

Alternative 2 would require the demolition of the Chemical Plant Building. This will upset operations at the facility because a new Chemical Plant Building would have to be built before the old one could be torn down. Otherwise, facility operations would come to a halt. This presents some significant problems for the facility. Furthermore, excavation depths would be expected to reach 30 feet, which presents a significant implementation problem for this alternative. Alternative 3 is much more implementable, requiring only the installation of SVE wells, vacuum pumps, and GAC treatment units for air emissions. All materials, services, and equipment to implement this alternative are readily available.

7. Cost

Alternative 2 has a Capital Cost of $62,036,000, no O&M and the 10-year and 30-year present worth is $62,036,000. Alternative 3 has a Capital Cost of $250,000, Annual O&M of $100,000, the 10-year present worth of $1,022,200 and a 30-year present worth of $1,787,200.

8. State Acceptance

The concurrence letter from the EQB is attached to this Record of Decision as Appendix C.

9. Community Acceptance

All comments are addressed in the Responsiveness Summary, which is appended to this Record of Decision as Appendix D.

IX. Description of the Selected Remedy

Based on the results of the SI report, the detailed evaluation of all comments submitted by interested parties during the public comment period, and after careful consideration of all reasonable alternatives, EPA selects Alternative 3-IV as an interim alternative for the ground water medium and to continue with Alternative 3 for the soils, as the choices for addressing the contamination problem at the Janssen Site. However, it should be noted that these alternatives have been selected as part of a short term early action. It should also be noted that since the construction of the steam unit would take approximately twelve to eighteen months, a conventional air stripping unit will be utilized as part of this early action. Treated water from the conventional air stripping unit will be discharged to the PRASA Gurabo POTW until the construction of the steam stripping unit. At that time the treated water will be rerouted and discharged to Mamey Creek. The final remedial action for this Site will be selected as soon as the on-going Remedial Investigation and Feasibility Study is completed. Specifically, the selected interim alternatives for the ground water will involve the following:

- Pumping of impacted ground water from four recovery wells at a combined flow rate of approximately 80 gallons per minute (gpm). The exact number and location of wells and their pumping rates will be determined during design.

- Treating the impacted ground water by steam stripping. Initially, a conventional air stripping unit will be installed to remove volatile organic compounds (VOCs)

from the extracted ground water. The installation and operation of the conventional air stripping unit will be initiated immediately and the steam air stripping unit will replace it within approximately eighteen months.

- Discharging the treated water from the conventional air stripping unit to the Puerto Rico Aqueduct & Sewer Authority (PRASA) Gurabo Treatment Plant until it will be replaced by the steam stripping unit. At that time the treated water will be rerouted and discharged to Mamey Creek.

- Implementing a system monitoring program which includes the collection and monthly analysis of influent and effluent from the air stripping unit and periodic collection of well head samples.

In addition, Janssen, with oversight from EPA, will continue to operate and maintain the soils early action as follows:

- Operating a soil vapor extraction system to remove VOCs from soil until such time as no more VOCs can be effectively removed. Soil vapors will be treated by using granular activated carbon (GAC) before being emitted to the atmosphere. Emissions will be below the requirements established by the EQB.

- Implementing a system monitoring program which includes the collection and analysis of soil vapors before and after they are treated with GAC.

The ultimate goal of the EPA Superfund Program's approach to groundwater remediation as stated in the NCP is to return usable groundwater to its beneficial use within a reasonable time frame. Therefore, for the Janssen aquifer which is classified as a Class II aquifer, the final remediation goal will be the MCLs and MCLGs. However, it should be noted that this action is an interim action which will achieve significant risk reduction quickly while a final remedial action for the groundwater is being developed.

EPA believes that the selected interim remedial Alternative 3-IV for the ground water, and the implementation of the soil early action provides the best balance amongst the alternatives according to the evaluation criteria. Ground water Alternative 3-IV, an innovative technology, will provide a high level of protection of human health and the environment. It will reduce the toxicity, mobility and volume permanently through the extraction and treatment of the impacted ground water. In addition, by pumping and treating contaminated ground water first through the use of a conventional air stripper, and then through

the use of steam stripping, the plume can be contained immediately. The utilization of four wells to contain the plume and extract the impacted ground water is an active approach to the problem. The potable water filtration plant which PRASA is constructing is upstream from the discharge point of the Gurabo POTW.

With respect to the soils early action, Alternative 3 will provide overall protection because it should reduce the presence of VOCs at the Site through in-situ treatment such that it will no longer act as a source of contamination to the ground water. It also would be more practical to implement rather than soil removal and disposal because the Chemical Plant Building would not have to be dismantled and another one built. Furthermore, the selected alternative will generate less volume of waste.

X. Statutory Determinations

EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. CERCLA also requires that the selected remedial action for the Site comply with applicable or relevant and appropriate environmental standards established under federal and State environmental laws, unless a waiver is invoked. The selected remedy must also be cost-effective and utilize permanent treatment technologies or resource recovery technologies to the maximum extent practicable. The statute also contains a preference for remedies that include treatment as a principal element. The following sections discuss how the selected remedy for contaminated groundwater and the soil beneath the Chemical Plant Building at the Site meets these statutory requirements.

1. Protection of Human Health and the Environment

The selected interim remedy protects human health and the environment by containing the contaminated groundwater plume and by reducing levels of contaminants in the groundwater through extraction and treatment as well as through deed restrictions. Alternative 3-IV will provide overall protection by reducing the toxicity, mobility and volume of contamination through treatment of the contaminated water to meet federal and state ARARs.

With respect to the contaminated soil remediation, Alternative 3 will provide overall protection because it should reduce the presence of VOC's at the Site through in-situ treatment such that it will no longer act as a source of contamination to the ground water.

2. Compliance with ARARS

The selected remedy will achieve compliance with chemical

specific ARARs related to the groundwater at the Site within the scope of this limited interim remedial action. The relevant and appropriate requirements include the MCLs promulgated pursuant to the Safe Drinking Water Act. Contaminants of concern at the Site have Federal and/or Commonwealth MCLs and MCLGs. In addition, the discharge to Mamey Creek will have to meet NPDES requirements. There are no chemical specific cleanup standards for contaminated soils.

At the present time it is expected that air emissions from the conventional and the steam stripping tower will not be a problem. Air emissions will be monitored and if necessary controls will be implemented.

3. Cost Effectiveness

EPA believes the selected remedy is cost-effective in mitigating the principal risk posed by contaminated ground water and soil beneath the Chemical Plant Building within a reasonable period of time. Section 300.430(f) (1)(ii) (D) of the NCP requires EPA to evaluate cost-effectiveness by comparing all the alternatives which meet the threshold criteria of protection of human health and the environment and compliance with ARARs, against the three balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness) to determine overall effectiveness and then comparing overall effectiveness to cost to ensure that the remedy is cost-effective. The selected remedy meets these criteria and provides for overall effectiveness in proportion to its cost. The selected ground water remedy has an estimated capital cost of $3,050,000, annual O&M of $270,000, and 30-year present worth of $7,200,600. The selected soil remediation has a capital cost of $250,000, annual O&M of $100,000 and 30-year present worth of
$1,787,200.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Even though this is an interim remedial action, by treating both the ground water and the contaminated soils, EPA has determined that the selected interim remedy utilizes permanent solutions and alternative (innovative) treatment technologies to the maximum extent practicable. Although SVE is not as permanent as removing the contaminated soils from beneath the Chemical Plant Building, it will achieve levels in the soil that should prevent further contamination to the ground water. The final remedy for the Site

will be selected based on the data obtained from the remedial investigation that is presently ongoing.

5. Preference for Treatment as a Principal Element

The selected interim remedy satisfies the statutory preference for remedies that employ treatment that reduce the toxicity, mobility, or volume of contamination as their principal element for the groundwater and soil contamination. The selected remedy includes the installation and operation of a ground water treatment system for contaminant recovery. The selected remedy for the contaminated soils, the principal threat at the Site, includes the operation of the SVE system.

XI. Documentation of Significant Changes

The Proposed Plan for the Janssen, Inc. Site was released for public comment on June 8, 1993. For remediation of the groundwater the Proposed Plan recommended Alternative 3-II; the use of a steam air stripping unit with discharge of the treated groundwater to the Gurabo POTW. Under this alternative, a conventional air stripping unit would be installed to remove VOCs from the extracted ground water until a steam stripping unit is constructed. Once the steam stripping unit was installed, the treated water would be discharged to the PRASA Gurabo treatment plant. The 30-year present worth cost of this alternative is $8,543,600.

Upon review of the comments received during the comment period, in particular PRASA's comments, EPA has decided to select Alternative 3-IV for the groundwater. According to PRASA, they would be willing to temporarily accept the treated water at their treatment plant. However, due to capacity problems, they would not be able to accept this water over the life of the remediation. PRASA commented in favor of Alternative 3-IV over Alternative 3-II.

The difference between the proposed alternative and the selected alternative is that under the selected alternative, the treated water will be sent to the PRASA Gurabo treatment plant until the construction of the steam air stripping unit is completed. At that time the treated water will be rerouted to Mamey Creek. The 30-year present worth cost of this alternative is $7,200,000. No changes were made to the soil remediation alternative as presented in the Proposed Plan.

FIGURES

JANSSEN INC. SITE
GURABO, PUERTO RICO

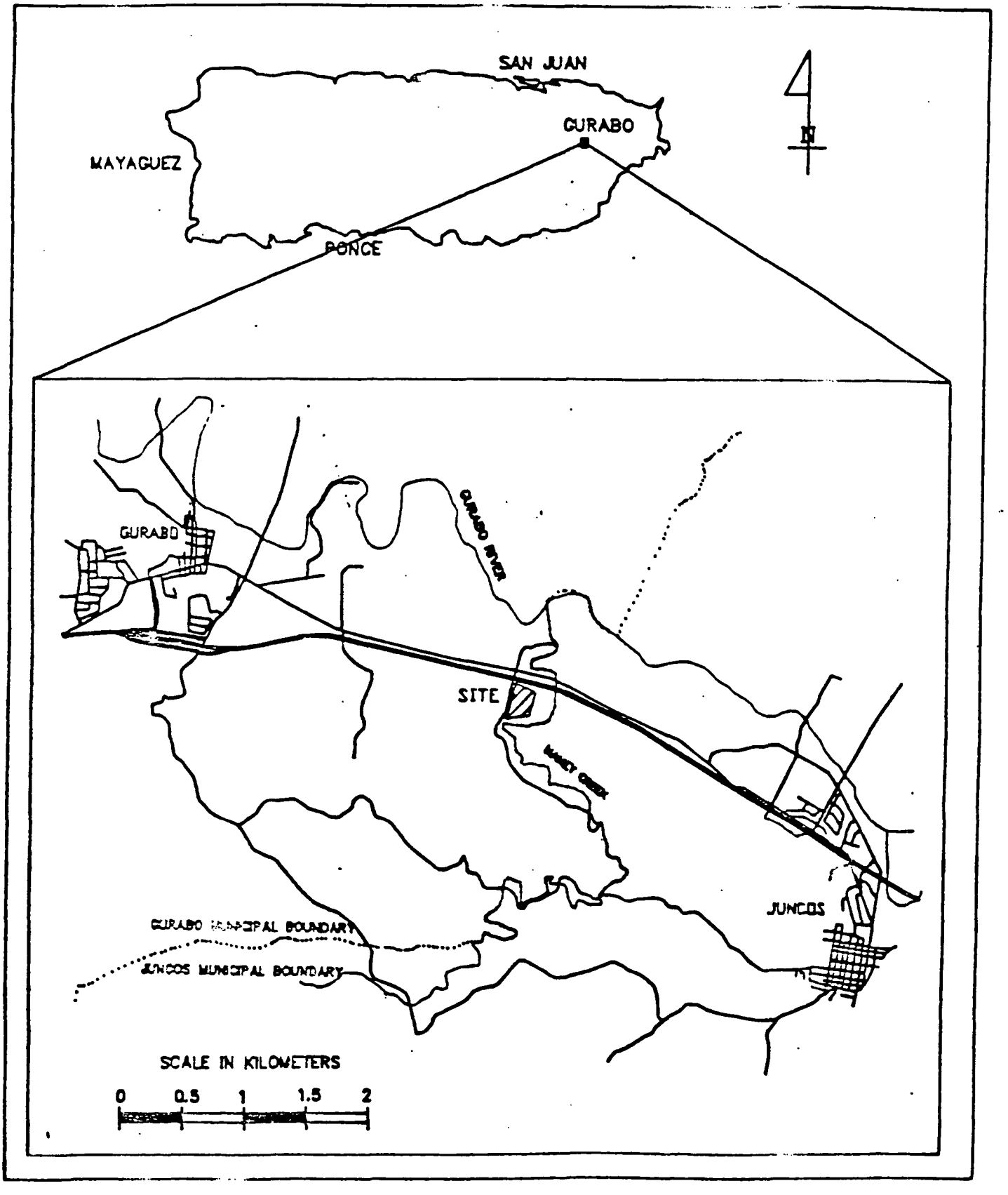
APPENDIX A

JANSSEN SITE

Gurabo, Puerto Rico

Site Location

Figure No. 1

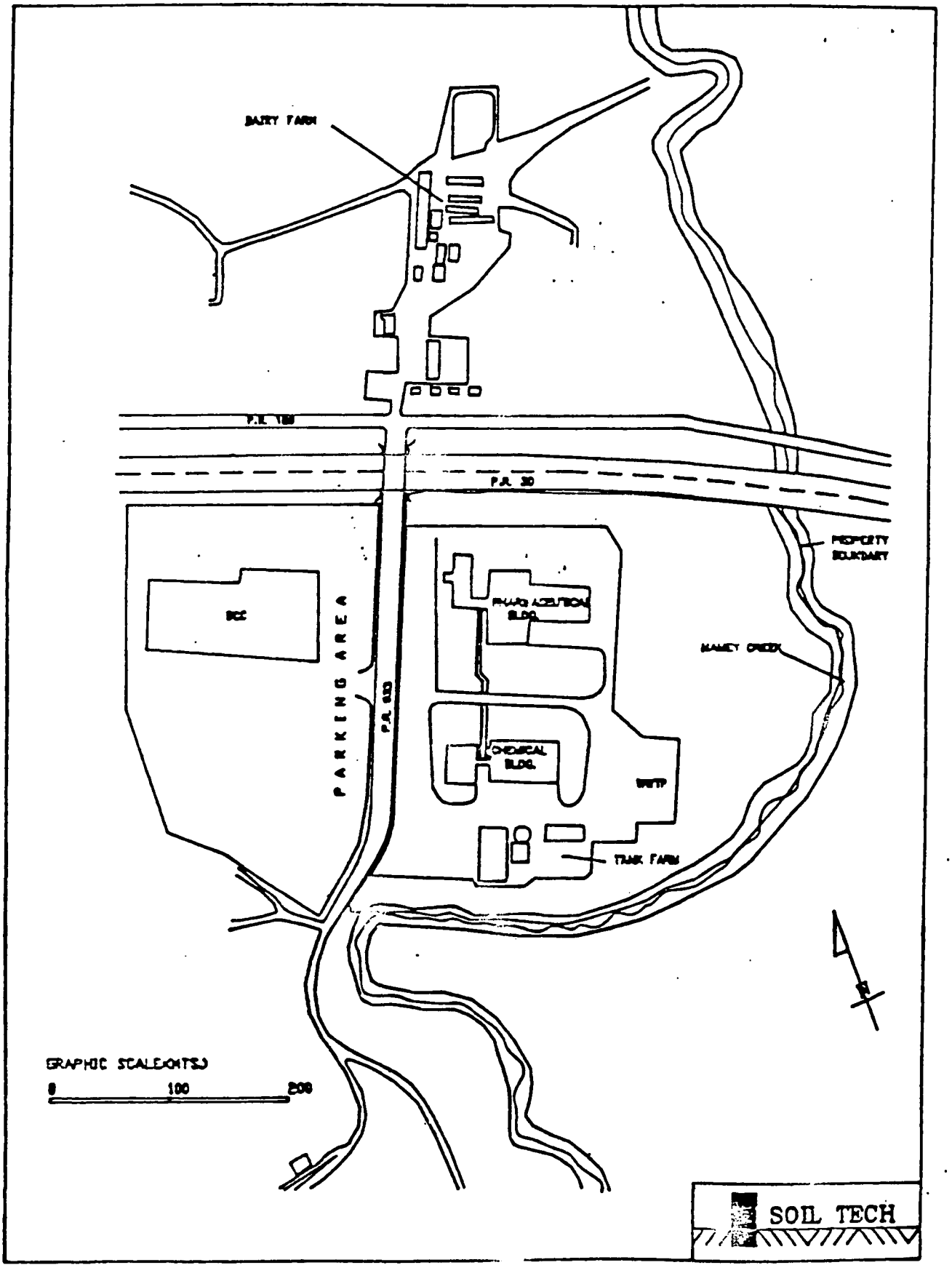


JANSSEN SITE

Gurabo, Puerto Rico

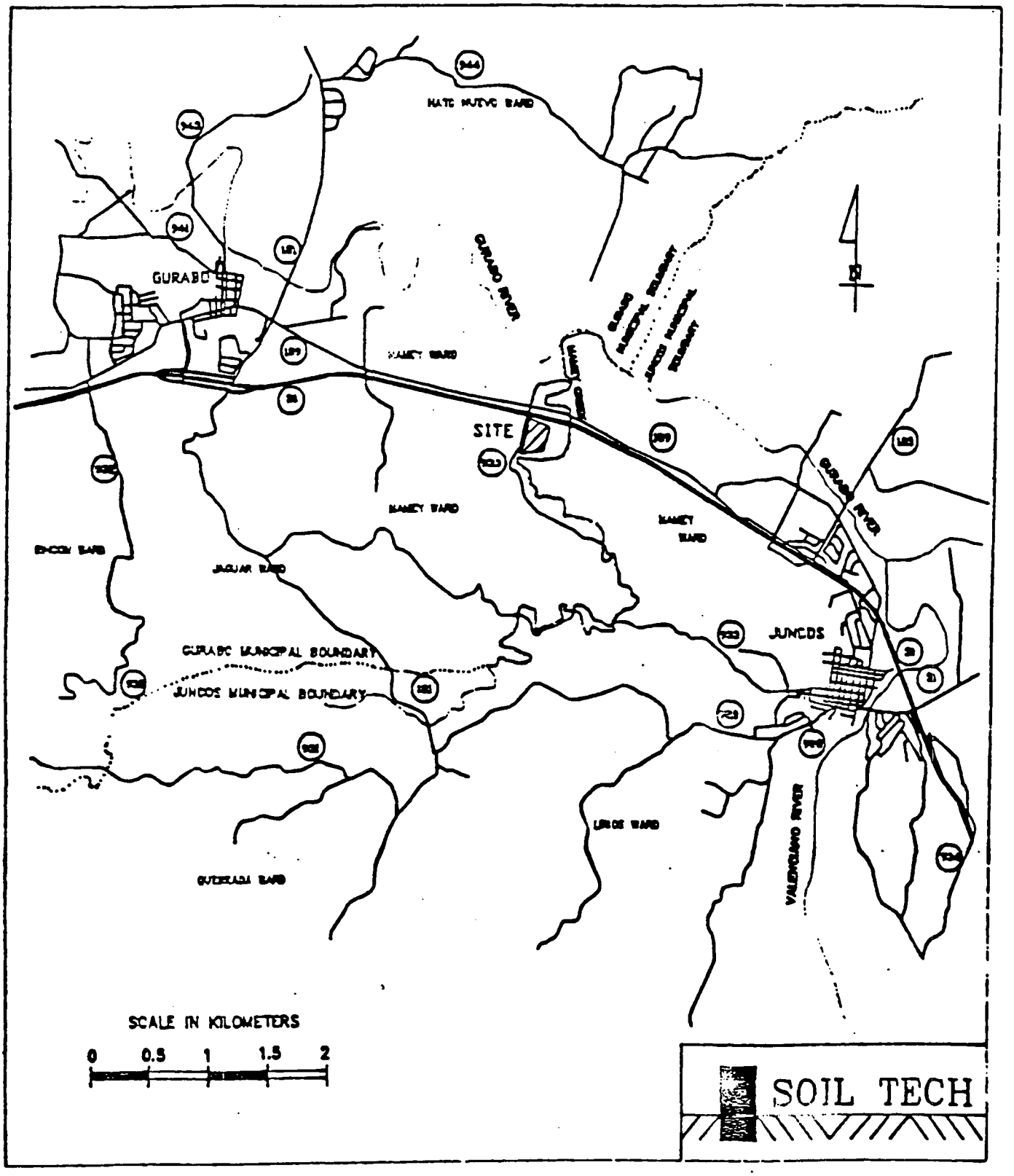
Study Area (1989)

Figure No. 2



JANSSEN SITE
Gurabo, Puerto Rico

General Area
Figure No. 3

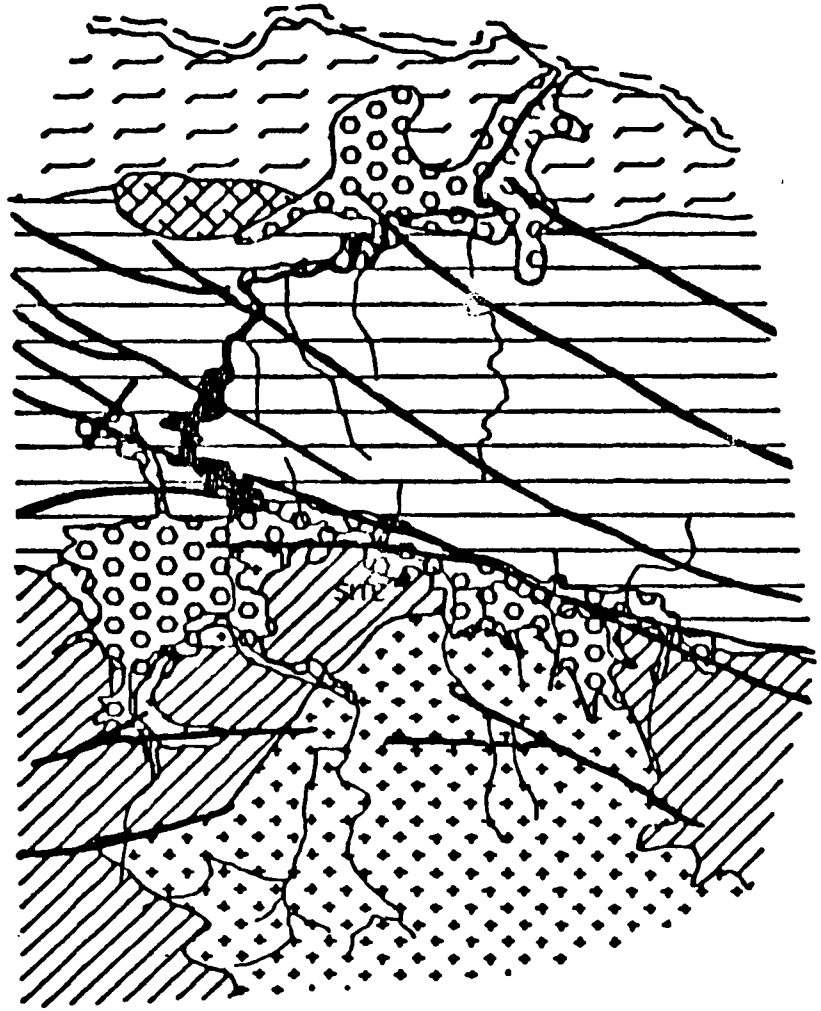


JANSSEN SITE

Gurabo, Puerto Rico

Surficial Geology

Figure No. 4



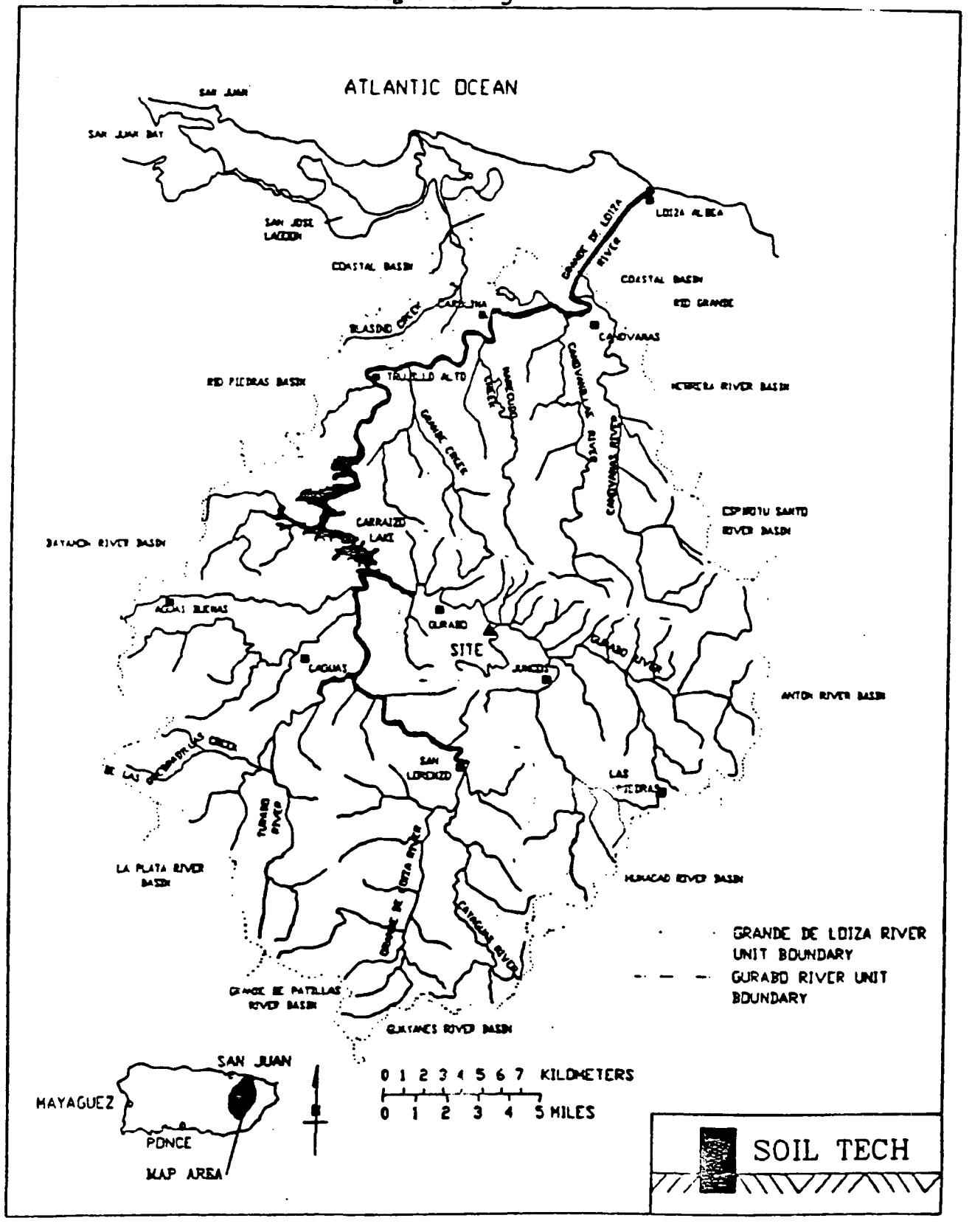
SYMBOLS:

- PLEISTOCENIC DEPOSITS - SEA SHORE SANDS, DUNES AND SWAMP DEPOSITS.
- PLEISTOCENIC DEPOSITS OF ALLUVIAL SEDIMENTS - PREVAILS SANDS, SILTS, CLAYS AND GRAVELS.
- SILTS AND SANDS, CONGLOMERATES, LAVA, AND PALESCENUS AND ESCENUS TUFFS.
- TUFFACEOUS SANDS, SILTS, BRECCIA, CONGLOMERATES, LAVA AND TUFFS, SUPERIOR CRETACEOUS AGE.
- LAVA, LAVA-BRECCIA, TUFF, AND TUFFACEOUS BRECCIA, INFERIOR CRETACEOUS AGE.
- PLUTONIC ROCKS - GRANODIURITE AND QUARTZDIURITE.
- REGIONAL FAULTS
- SURFICIAL WATER FEATURES

SOIL TECH

JANSSEN SITE
Gurabo, Puerto Rico

Gurabo River Basin
Figure No. 5

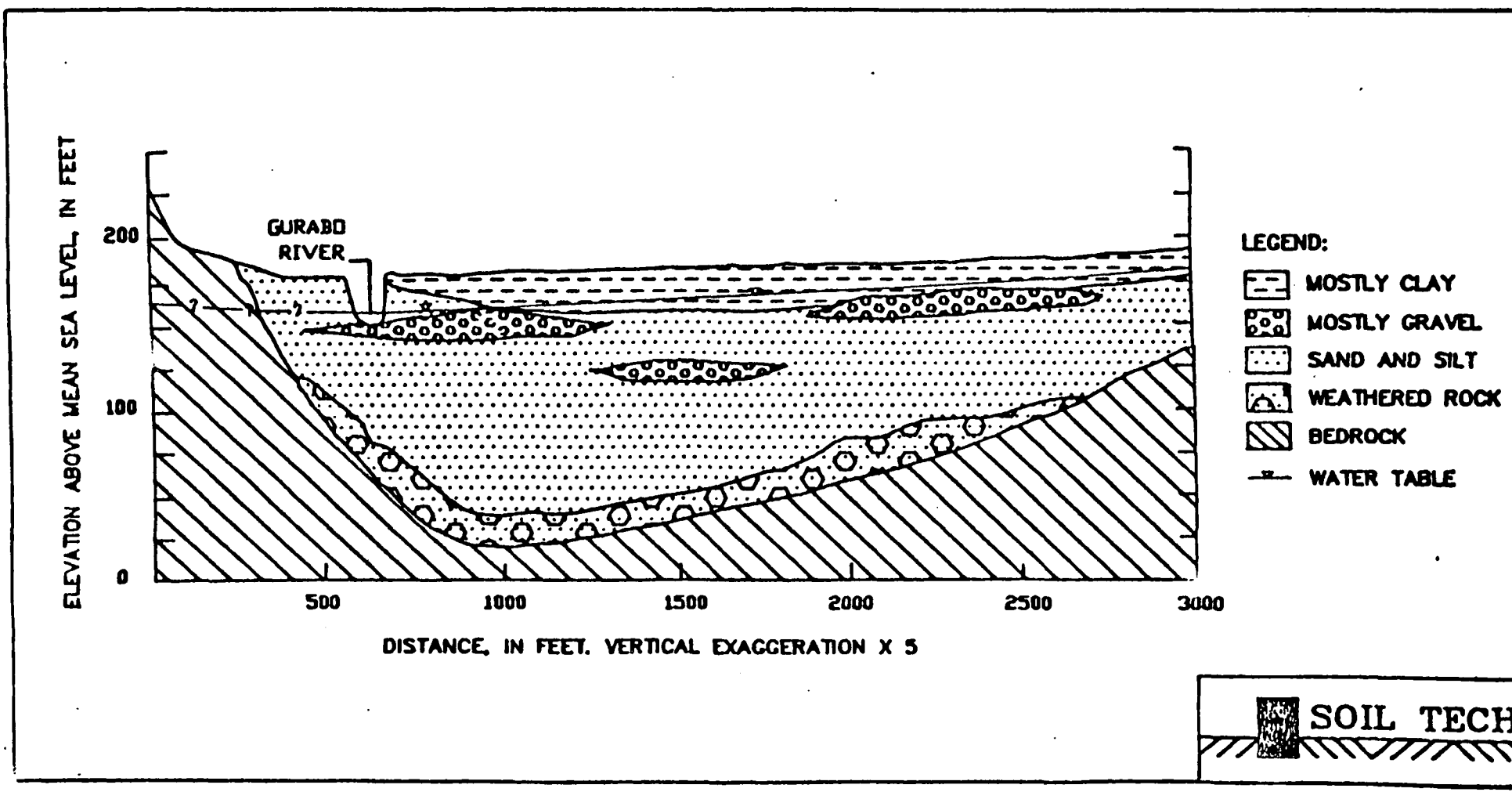


JANSSEN SITE

Gurabo, Puerto Rico

General Hydrogeological Cross Section

Figure No. 6

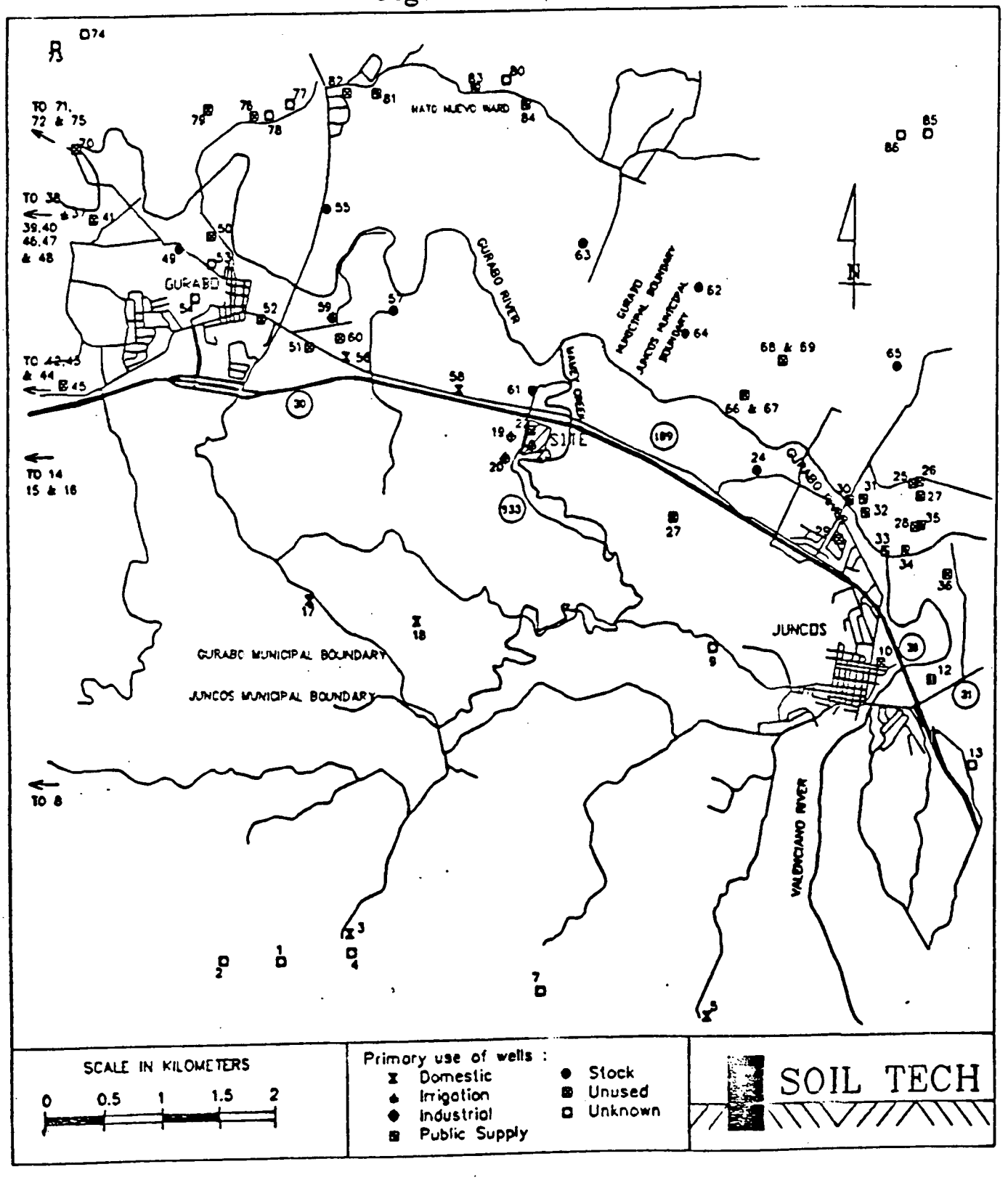


JANSSEN SITE

Gurabo, Puerto Rico

Well Inventory

Figure No. 7



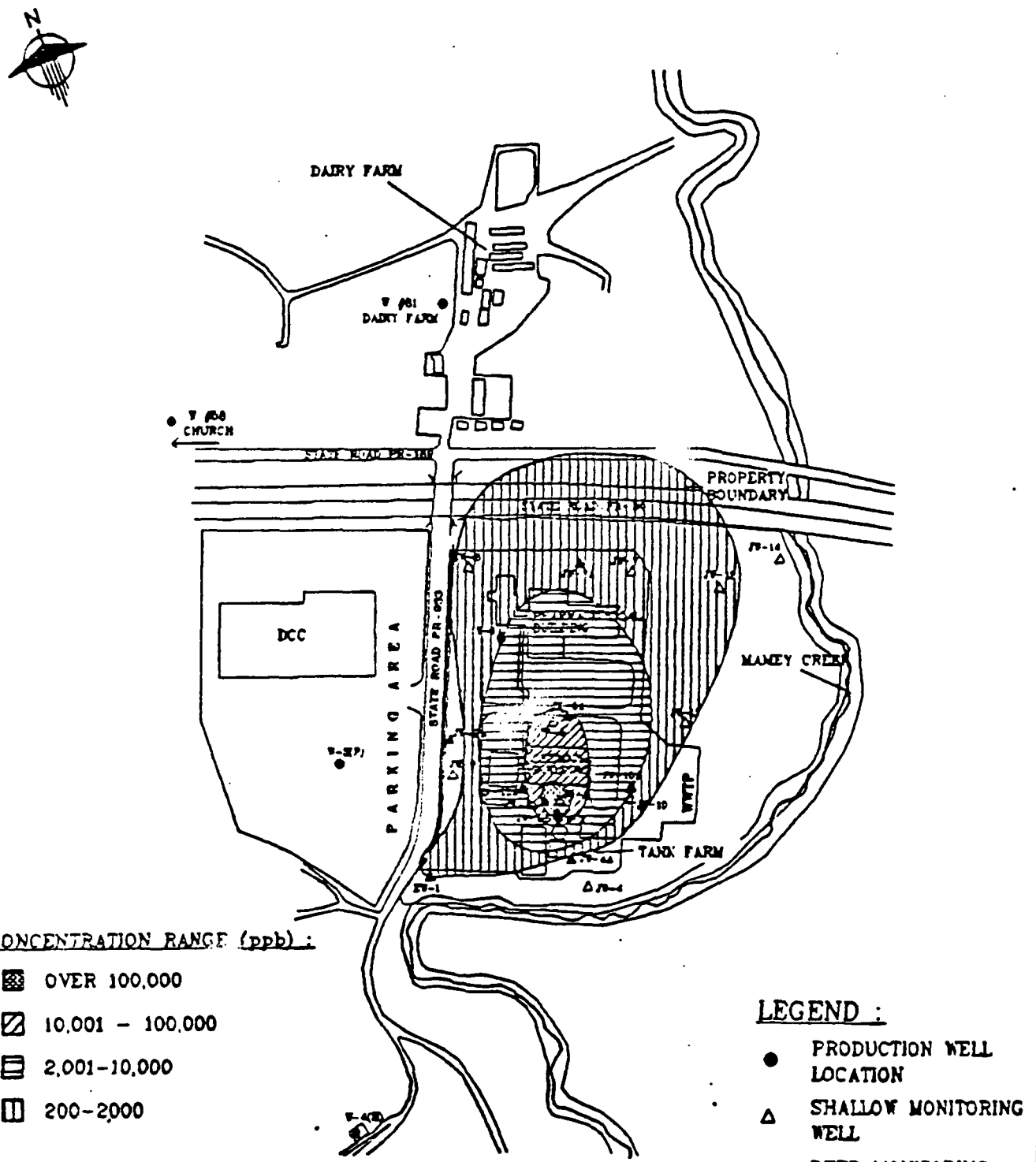


FIGURE 8 CHLOROFORM PLUME CONFIGURATION
NOVEMBER 1991, OMB GURABO, PUERTO RICO

SOIL TECH

SCALE : G.S.	DWG. BY : OLH	FILE : FIGURE 5	JOB NO.: 89525-93

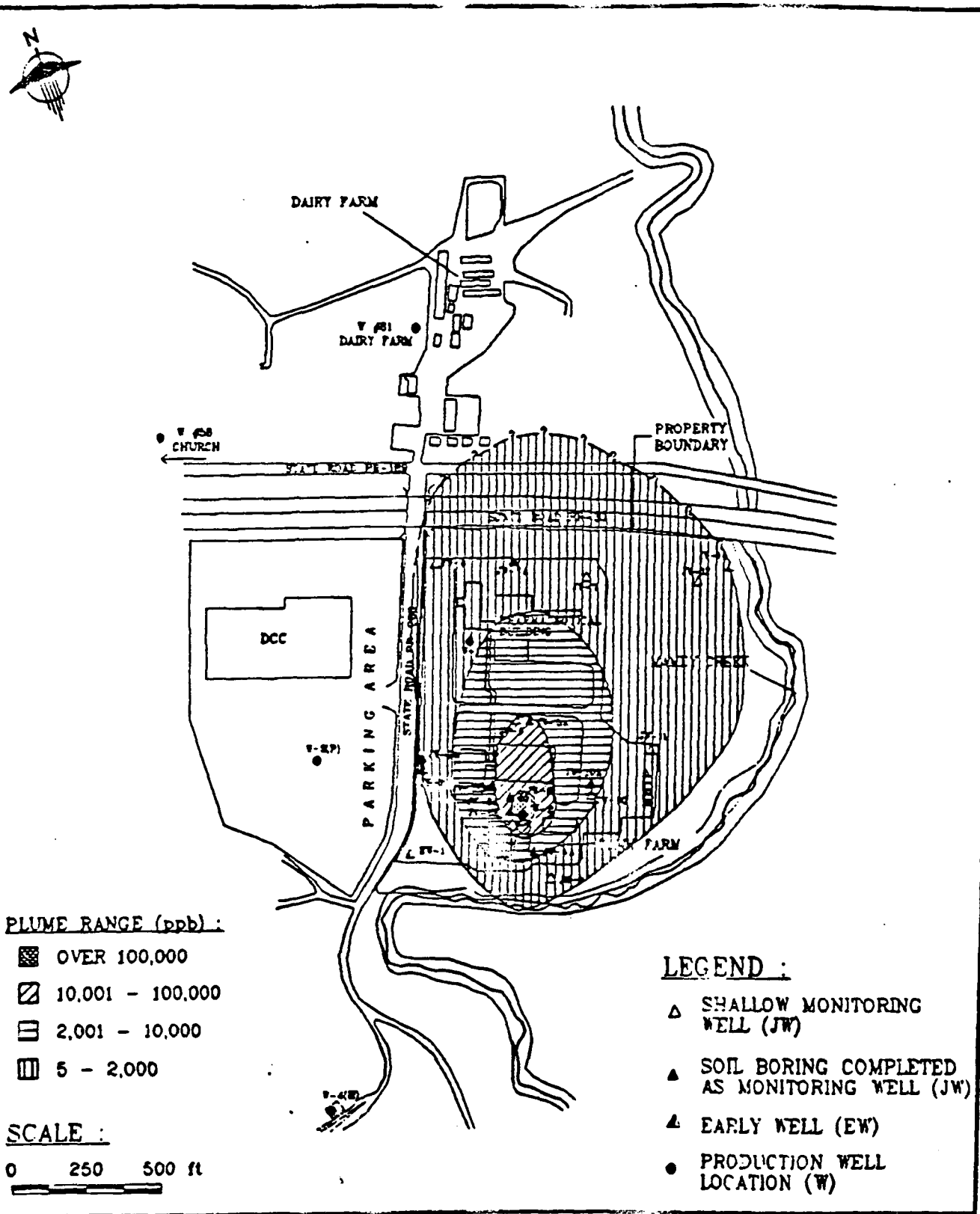
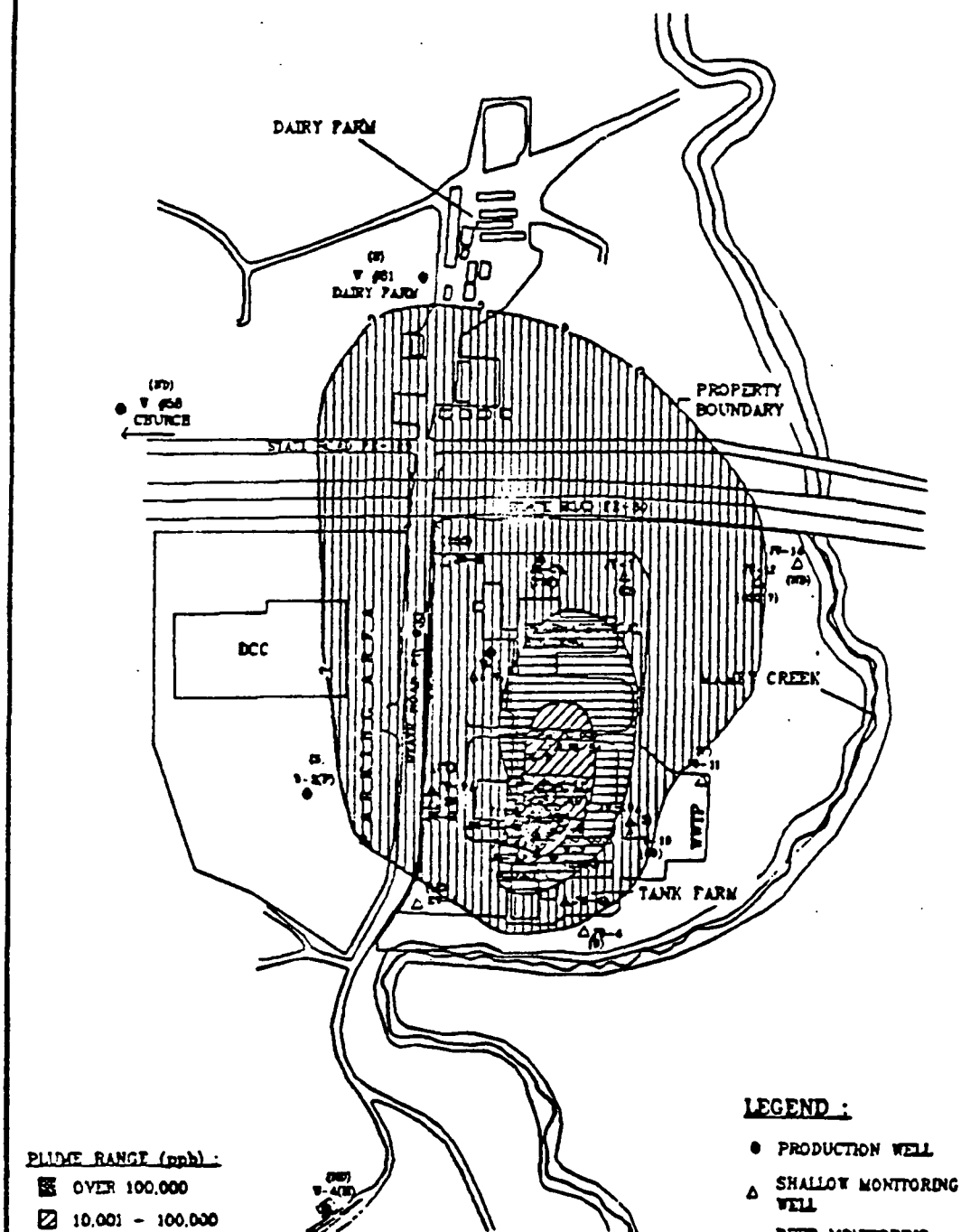


FIGURE 9 CHLOROFORM PLUME CONFIGURATION OF JULY, 1992 OMB GURABO, PUERTO RICO

SOIL TECH

SCALE : G.S.	DWG. BY : OLH	FILE : FIGURE 6	JOB. NO.: 89525-93



PLUME RANGE (ppb) :

- OVER 100,000
- 10,001 - 100,000
- 2,001 - 10,000
- 5 - 2,000

SCALE :

0 250 500 ft

LEGEND :

- PRODUCTION WELL
- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- (#) CHLOROFORM CONCENTRATION (ug/l)

NOTE: WELLS JW-12 AND W-1 WERE NOT CONSIDERED

FIGURE 10 CHLOROFORM PLUME CONFIGURATION OF MARCH, 1993
OMB GUABO, PUERTO RICO

SOIL TECH

DATE : 05/11/93	SCALE : G.S.	DWG BY : OLH	FILE : 5 ug/l	DOB. NO.: 89525-92

TABLES

JANSSEN INC. SITE
GURABO, PUERTO RICO

APPENDIX B

TABLE 1

SUMMARY GROUND WATER SAMPLES ANALYSIS RESULTS
CHLOROFORM PARAMETER
OMB SITE
GURABO, PUERTO RICO

Chloroform Concentration (ug/l)															
Date	JW-4	JW-4A	JW-5	JW-5A	JW-6	JW-7	JW-7A	JW-8	JW-8A	JW-8B	JW-9	JW-9A	JW-10	JW-10A	JW-11
Jan/10/90	3	NC	13,500	NC	1	69	NC	361,000	21,000	NC	6	NC	704	NC	24
Feb/27/90	5	NC	12,300	NC	3	7	NC	397,000	205,000	NC	3	NC	79	NC	18
May/24/90	5	NC	16,800	1,380	7	23	NC	148,000	219,000	NC	5	2	740	9	32
Oct/17/90	4	24	12,900	4,900	ND	10	102	110,000	119,000	276,000	2	1	74	2	3
Mar/27/91	2	3	7,890	7,960	ND	6	243	472,000	35,300	48,200	5	13	143	ND	10
Apr/08/91	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
May/07/91	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
June/07/91	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
July/91	5u	8	15,000D 15,000E	6,000	5u	7	260D 260E	200,000D 240,000E	740	230,000D 260,000E	10u	5J	140	10u	9
Aug/91	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sept/91	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Qualifiers:

- NC = Not constructed
- NS = Not sampled
- ND = Not detectable
- BMDL = Below Minimum Detection Limit
- E = Compound whose concentration exceeds the calibration range.
- u = Compound was analyzed but not detected.
- B = Reported Value below CRDL but above IDL.
- J = Indicates an estimated value.
- D = Duplicate sample.

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TABLE 1 (CONT.)

SUMMARY GROUND WATER SAMPLES ANALYSIS RESULTS
CHLOROFORM PARAMETER
OMB SITE
GURABO, PUERTO RICO

Chloroform Concentration (ug/l)										
Date	JW-12	JW-13A	JW-14	EW-1	W-1	W-2	W-3P	W-4H	W-C	W-D
Jan/10/90	10	NC	NC	NC	NS	NS	NS	NS	NS	NS
Feb/27/90	3,570	NC	NC	NC	NS	NS	NS	NS	NS	NS
May/24/90	105	NC	NC	7	518	5,960	2	BMDL	NS	NS
Oct/17/90	ND	330	NC	ND	50	5,450	1	ND	NS	NS
Mar/27/91	1,230	3,170	NC	ND	1	5,020	20	32	NS	NS
Apr/08/91	NS	NS	NC	ND	NS	NS	NS	29	NS	NS
May/07/91	NS	NS	NC	ND	NS	NS	NS	ND	NS	NS
June/07/91	1,000B	NS	NC	5u	NS	6,200D 2,300B	NS	5u	NS	NS
July/91	5u	430	NC	5u	5u	3,900	6	5u	10u	NS
Aug/91	1,100	NS	NS	5u	NS	1,000	NS	5u	NS	5u
Sept/91	13	NS	NS	5u	NS	5,400	NS	5u	NS	NS

Qualifiers:

NC = Not constructed
NS = Not sampled
ND = Not detectable
BMDL = Below Minimum Detection Limit
E = Compound whose concentration exceeds the calibration range.
u = Compound was analyzed but not detected.
B = Reported Value below CRDL but above IDL.
J = Indicates an estimated value.
D = Duplicate sample.

W-C = Church Well
W-D = Dairy Farm Well

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TABLE 2

SUMMARY GROUND WATER SAMPLES ANALYSIS RESULTS
TOLUENE PARAMETER
OMB SITE
GURABO, PUERTO RICO

Toluene Concentration (ug/l)															
Date	JW-4	JW-4A	JW-5	JW-5A	JW-6	JW-7	JW-7A	JW-8	JW-8A	JW-8B	JW-9	JW-9A	JW-10	JW-10A	JW-11
Feb/90	ND	NC	ND	NC	NS	BMDL	NC	BMDL	ND	NC	NS	NC	ND	NC	NS
Mar/91	NS	ND	NS	NS	NS	NS	NS	NS	ND	NS	NS	ND	NS	ND	NS
July/91	5u	5u	250u	250u	5u	5u	5u	36,000D 4,400	2,100J	10,500u 1,200J	2J	3J	5u	5u	5u

Qualifiers:

- NC = Not constructed
- NS = Not sampled
- ND = Not detectable
- BMDL = Below Minimum Detection Limit
- E = *Compound whose concentration exceeds the calibration range.*
- u = Compound was analyzed but not detected.
- B = Reported Value below CRDL but above IDL.
- J = Indicates an estimated value.
- D = Duplicate sample.

TABLE 2 (CONT.)

SUMMARY GROUND WATER SAMPLES ANALYSIS RESULTS
TOLUENE PARAMETER
OMB SITE
GURABO, PUERTO RICO

Toluene Concentration (ug/l)										
Date	JW-12	JW-12A	JW-13A	EW-1	W-1	W-2	W-3P	W-4H	W-C	W-D
Feb/90	NS	NC	NC	NC	NS	NS	NS	NS	NS	NS
Mar/91	NS	NC	NS	NS	NS	NS	NS	NS	NS	NS
July/91	5u	NC	254	5u	5u	130u	5u	5u	5u	NS
Aug/91	504	NC	NS	5u	NS	50u	NS	5u	NS	5u
Sept/91	5u	NC	NS	5u	NS	250u	NS	5u	NS	NS

Qualifiers:

NC = Not constructed
NS = Not sampled
ND = Not detectable
BMDL = Below Minimum Detection Limit
E = Compound whose concentration exceeds the calibration range.
u = Compound was analyzed but not detected.
B = Reported Value below CRDL but above IDL.
J = Indicates an estimated value.
D = Duplicate sample.

W-C = Church Well
W-D = Dairy Farm Well

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TABLE 3

QUARTERLY SAMPLING
ANALYTICAL RESULTS
GROUND WATER SAMPLES
June 28, 1991

JANSSEN SITE
GURABO, PUERTO RICO

	Concentration µg/l									
	A7737	A7738	A7739	A7740	A7741	A7743	A7744	A7745	A7747	A7748
Compounds	JW-6	JW-7	JW-7A	JW-11	JW-12	JW-5	JW-5A	W-2	JW-10	JW-10A
Methylene Chloride	5u	5u	5u	5u	5u	250u	250u	130u	5u	5u
Acetone	10u	10u	10u	10u	10u	500u	500u	250u	10u	16
Chloroform	5u	7	260E	9	5u	15,000E	6,000	3,900	140	10u
MIBK	10u	10u	10u	10u	10u	500u	500u	250u	10u	10u
Toluene	5u	5u	5u	5u	5u	250u	250u	130u	5u	5u
Tetrahydrofuran	10u	10u	10u	19	10u	23,100E	6,300	310	10u	10u
Carbon Disulfide	5u	5u	5u	5u	5u	500u	500u	250u	5u	10u

1/ Two unknown compounds 2/ Silanol and Methane found. 3/ Unknown and Methane 4/ Methane

u: Compound was analyzed but not detected.
J: Indicates an estimated value.
E: Compound whose concentration exceed the calibration range.

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TABLE 3 (CONT.)

QUARTERLY SAMPLING ANALYTICAL RESULTS GROUND WATER SAMPLES June 28, 1991

JANSSEN SITE GURABO, PUERTO RICO

	Concentration µg/l												
	A7749	A7751	A7752	A7753	A7754	A7755	A7756	A7757	A7758	A7759	A7760	A7761	A7763
Compounds	W-1[1/]	JW-8	JW-8A	JW-8B	Well #58	JW-13	JW-9[2/]	JW-9A[3/]	W-3(P)	EW-1[3/]	JW-4[4/]	JW-4A	W-4(II)
Methylene Chloride	5u	7,100	13,000	12,000	5u	254	6	8	4J	6	5u	2J	5u
Acetone	10u	42,000	34,000	17,000	10u	51	21	32	10u	10u	10u	10u	10u
Chloroform	5u	240,000E	74,000	260,000E	10u	430	10u	5J	6	5u	5u	8	5u
MIBK	10u	7,300	5,000u	5000u	10u	50u	10u	10u	10u	10u	10u	10u	10u
Toluene	5u	4,400	2,100J	1,200J	5u	25u	2J	3J	5u	5u	5u	5u	5u
Tetrahydrofuran	10u	25,700	46,000	41,400	10u	340	10u	10u	10u	10u	10u	10u	10u
Carbon Disulfide	5u	5,000u	5,000u	5,000u	10u	50u	5J	10u	5u	5u	12	5u	5u

1/ Two unknown compounds 2/ Silanol and Methane found. 3/ Unknown and Methane 4/ Methane

u: Compound was analyzed but not detected.
J: Indicates an estimated value.
E: Compound whose concentration exceed the calibration range.

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TABLE 4

ANALYTICAL RESULTS (ug/l)
QUARTERLY SAMPLING
(MARCH, 1992)
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

	SAMPLE IDENTIFICATION											
Compound	B0262	B0254	B0240	B0241	B0242	B0245	B0243	B0260	B0261	B0252	B0258	B0257
	JW-4	JW-4A	JW-5	JW-5A	JW-6	JW-7	JW-7A	JW-8	JW-8A	JW-8B	JW-9	JW-9A
Methylene Chloride	4BJ	2BJ	1000u	110BJ	15BJ	10J	3BJ	2200J	31000	8000	10u	2BJ
Acetone	1800E	150	1000u	1400	1100E	570B	180	91000	120000	19000B	2800E	1100E
Chloroform	67	20	16000	6600	340	290	250E	320000	200000	74000	8J	20
Benzene	10u	10u	120J	500u	50u	50u	10u	25000u	20000u	5000u	10u	10u
Toluene	6BJ	10u	210BJ	110BJ	15BJ	9BJ	4BJ	12000J	9100BJ	1300BJ	2BJ	2BJ
Chlorobenzene	2J	10u	230J	65J	50u	50u	10u	2700J	20000u	5000u	10u	10u
Ethylbenzene	10u	10u	1000u	500u	50u	50u	10u	4900J	20000u	5000u	10u	10u
Tetrahydrofuran	10u	10u	22000E	5500	50u	10u	10u	48000	102000	25000	10u	10u
Hexane	18J	6J	ND	310J	34J	62J	13J	ND	ND	ND	26J	60J
Methanol	ND	ND	ND	ND	ND	ND	ND	9000	6000	390	ND	ND

Methanol Reporting Limit: 20 ug/l Method 8015

Qualifiers:

ND = Not detectable
BMDL = Below Minimum Detection Limit
E = Compound whose concentration exceeds the calibration range.
U = Compound was analyzed but not detected.
J = Indicates an estimated value.
BJ = Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the date user to take appropriate action.

TABLE 4 (CONT.)

ANALYTICAL RESULTS (ug/l)
QUARTERLY SAMPLING
(MARCH, 1992)
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

	SAMPLE IDENTIFICATION											
Compound	BO247	BO249	BO253	BO248	BO251	BO255	BO246	BO239	BO264	BO265	BO263	BO266
	JW-10	JW-10A	JW-11	JW-12	JW-12A	JW-13	W-1	W-2	W-3(P)	W-4(H)	EW-1	W-58
Methylene Chloride	7BJ	33J	10u	100u	10u	15J	10u	500u	2BJ	10u	25B	10u
Acetone	1500E	1200B	770BE	870	720BE	320	9J	500u	10u	12B	850BE	7BJ
Chloroform	210	100u	20	1300	10u	360	10u	3800	5	10u	450E	10u
Benzene	25u	100u	10u	100u	10u	25u	10u	500u	10u	10u	10u	10u
Toluene	5BJ	18BJ	2BJ	17BJ	2BJ	4BJ	2BJ	92BJ	2BJ	2BJ	47B	10u
Chlorobenzene	25u	100u	10uJ	100u	10u	25u	10u	500u	10u	10u	10u	10u
Ethylbenzene	25u	22J	10u	100u	10u	25u	10u	500u	10u	10u	10u	10u
Tetrahydrofuran	25u	100u	245E	100u	10u	25u	10u	400J	10u	10u	10u	10u
Hexane	13J	101J	31J	78J	40J	13J	ND	ND	ND	ND	10J	ND
Methanol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Methanol Reporting Unit: 20 ug/l Method 8015

Qualifiers:

ND	=	Not detectable
BMDL	=	Below Minimum Detection Limit
E	=	Compound whose concentration exceeds the calibration range.
U	=	Compound was analyzed but not detected.
J	=	Indicates an estimated value.
BJ	=	Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the date user to take appropriate action.

TABLE 5

ANALYTICAL RESULTS (ug/l)
GROUND WATER QUARTERLY SAMPLING
(JULY, 1992)
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

Compound	SAMPLE IDENTIFICATION (LAB UD/SAMPLE ID)											
	B1637	B1628	B1627	B1626	B1641	CB-1622	CB-1623	B1619	B1620	B1621	B1645	B1646
	JW-4	JW-4A	JW-5	JW-5A	JW-6	JW-7	JW-7A	JW-8	JW-8A	JW-8B	JW-9	JW-9A
Methylene Chloride	1J	10u	270BJ	120BJ	1J	38BJ	14BJ	6300J	29000	2700	10u	10u
Acetone	170	31	1000u	500u	14	1200	180	36000	230000E	2500u	78	130
Chloroform	5J	15	15000	4600	190	46J	300	210000E	300000E	38000	3	95
Benzene	5J	10u	1000u	500u	10u	100u	25u	1000u	10000u	2500u	10u	10u
Toluene	6J	1J	1000u	500u	3J	100u	25u	3600J	11000	220J	10u	2J
Chlorobenzene	4	10u	180J	500u	2J	100u	25u	2200J	1600J	180J	10u	10u
Ethylbenzene	10u	10u	1000u	500u	10u	100u	25u	1000u	10000u	2500u	10u	10u
Tetrahydrofuran	10u	10u	22000	2800	10u	100u	25u	19000	77000	5900	10u	10u
Hexane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methanol	60	30	30	100	120	ND	ND	5200	22000	700	140	70
MIBK	10u	10u	1000u	500u	10u	100u	25u	1000u	17000	2500u	10u	10u

Methanol Reporting Limit: 20 ug/l Method 8015

Qualifiers:

ND	=	Not detectable
BMDL	=	Below Minimum Detection Limit
E	=	Compound whose concentration exceeds the calibration range.
u	=	Compound was analyzed but not detected.
J	=	Indicates an estimated value.
BJ	=	Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the date user to take appropriate action.

TABLE 5 (CONT.)

GROUND WATER ANALYTICAL RESULTS (ug/l)
QUARTERLY SAMPLING
(JULY, 1992)
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

Compound	SAMPLE IDENTIFICATION (LAB ID/SAMPLE ID)												
	B1625	B1640	B1639	B1624	B1638	B1629	B1643	B1630	B1642	B1644	B1636	B1635	B1634
	W-10	JW-10A	JW-11	JW-12	JW-12A	JW-13	W-1	W-2	W-3(P)	W-4(H)	EW-1	W-58	W-61
Methylene Chloride	3BJ	3BJ	28BJ	3BJ	4BJ	15J	2BJ	17BJ	4BJ	3BJ	4BJ	4BJ	4BJ
Acetone	6J	79	600E	410E	150	19	10u	25u	10u	10u	15	10u	10u
Chloroform	190	10u	13	170	35	150	10u	160E	10u	10u	10u	10u	10u
Benzene	10u	10u	50u	10u	10u	10u	10u	25u	10u	10u	10u	10u	10u
Toluene	10u	10u	50u	10u	10u	10u	10u	25u	10u	10u	10u	10u	10u
Chlorobenzene	10u	10u	50u	10u	10u	10u	10u	2J	10u	10u	10u	10u	10u
Ethylbenzene	10u	10u	50u	10u	10u	10u	10u	25u	10u	10u	10u	10u	10u
Tetrahydrofuran	10u	10u	49J	10u	10u	10u	33	210	10u	10u	10u	10u	10u
Hexane	ND	ND	ND	ND	ND	10u	ND	ND	ND	ND	ND	ND	ND
Methanol	370	ND	ND	ND	ND	300	ND	ND	ND	ND	ND	ND	ND
MIBK	10u	10u	50u	10u	10u	10u	10u	25u	10u	10u	10u	10u	10u

Methanol Reporting Unit: 20 ug/l Method 8015

Qualifiers:

ND	=	Not detectable
BMDL	=	Below Minimum Detection Limit
E	=	Compound whose concentration exceeds the calibration range.
u	=	Compound was analyzed but not detected.
J	=	Indicates an estimated value.
BJ	=	Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the date

TABLE 6

ANALYTICAL RESULTS (ug/l)
QUARTERLY GROUND WATER SAMPLING
NOVEMBER 1992
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

SAMPLE IDENTIFICATION (LAB ID/SAMPLE ID)											
Compound	JW-4	JW-4A	JW-5	JW-5A	JW-6	JW-7	JW-7A	JW-8	JW-8A	JW-8B	JW-9
VOLATILE ORGANIC COMPOUNDS											
Methylene Chloride	2 BJ	5 BJ	1,400 B	43 BJ	79 B	6 BJ	20 BJ	13,000 B	57,000 B	10,000 B	12 B
Acetone	10 U	4 J	420 BJ	100 U	33 B	7 J	25 B	79,000	250,000 B	11,000 B	4 J
Chloroform	10 U	2 J	16,000	2,100 E	830 E	97	400	270,000 E	340,000	100,000	3 J
Toluene	10 U	10 U	1,000 U	100 U	61	10 U	25 U	6,700 J	12,000 J	10,000 U	10 U
Tetrahydrofuran	10 U	10 U	24,000 E	1,900	14	10 U	25 U	36,000	110,000	23,000	4 J
Xylene	10 U	10 U	1,000 U	100 U	1 J	10 U	25 U	10,000 U	20,000 U	10,000 U	10 U
Ethylbenzene	10 U	10 U	1,000 U	100 U	10 U	10 U	25 U	10,000 U	20,000 U	10,000 U	10 U
Chlorobenzene	10 U	10 U	240 J	10 J	10 U	10 U	25 U	2,200 J	20,000 U	10,000 U	10 U
Methanol	20 U	20 U	20 U	20 U	66	20 U	20 U	20 U	20 U	20 U	120
Isopropyl Alcohol	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U

Qualifier:

- ND = Not detectable
- NS = Not sampled
- BMDL = Below Minimum Detection Limit
- E = Compound whose concentration exceeds the calibration range.
- U = Compound was analyzed but not detected.
- J = Indicates an estimated value.
- B = Analyte is found in the associated blank as well as in the sample. It indicates probable/possible blank contamination and warns the user on the data to take appropriate action.
- D = Duplicate

TABLE 6 (CONT.)
ANALYTICAL RESULTS (ug/l)
QUARTERLY GROUND WATER SAMPLING
NOVEMBER 1992
OMB PHARMACEUTICAL PARTNERS
GURABO, PUERTO RICO

SAMPLE IDENTIFICATION (LAB ID/SAMPLE ID)													
Compound	JW-10	JW-10A	JW-11	JW-12	JW-12A	JW-13	W-1	W-2	W-3P	W-4H	W-58	W-61	EW-1
VOLATILE ORGANIC COMPOUNDS													
Methylene Chloride	3 BJ	9 BJ	4 BJ	3 BJ	2 BJ	1 BJ	5 BJ	97 BJ	6 BJ	3 BJ	6 BJ	4 BJ	11 B
Acetone	10 U	10 U	40	10 U	10 U	10 U	10 U	820 B	5 J	9 J	10 U	3 J	4 J
Chloroform	87	10 U	14	2 J	6 J	85	10 U	1,200	3 J	10 U	7 J	2 J	10 U
Toluene	3 J	10 U	2 J	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U
Tetrahydrofuran	10 U	10 U	60	10 U	10 U	10 U	10 U	260	10 U	10 U	10 U	10 U	10 U
Xylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U
Methanol	20 U	20 U	30	34	20 U	20 U	20 U	20 U	20 U	22	20 U	20 U	10 U
Isopropyl Alcohol	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	10 U

Qualifiers:

N/A = Not analyzed
ND = Not detectable
NS = Not sampled
BMDL = Below Minimum Detection Limit
E = Compound whose concentration exceeds the calibration range.
U = Compound was analyzed but not detected.
J = Indicates an estimated value.
B = Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the user on the data to take appropriate action.
D = Duplicate

TABLE 7

QUARTERLY GROUND WATER SAMPLING ANALYSIS RESULTS (ug/l)
MARCH 1993
OMB SITE
GURABO, PUERTO RICO

Compounds	Sample Identification													
	JW-7A	JW-8	JW-8(D)	JW-8A	JW-8B	JW-9	JW-9A	JW-10	JW-10A	JW-11	JW-12	JW-13	JW-14	EW-1
Methylene Chloride	4BJ	10,000B	3,700BJ	27,000B	2,100BJ	6BJ	7BJ	2BJ	3BJ	5BJ	30B	3BJ	3BJ	5BJ
Acetone	10u	39,000B	12,000	130,000BE	2,100J	10u	10u	10u	8BJ	10u	25u	10	5J	10u
Chloroform	230E	100,000	92,000B	160,000BE	40,000	16	27	88	3BJ	12	430	210E	10u	10u
MIBK	10u	2,400J	1,300J	13,000	2,500u	10u	10u	10u	10u	10u	25u	10u	10u	10u
Toluene	1BJ	4,500BJ	1,900BJ	8,200B	530J	3J	4J	2J	2BJ	3BJ	3BJ	4J	2BJ	10u
Chlorobenzene	10u	10,000u	1,000J	1,500J	2,500u	10u	10u	10u	10u	10u	25u	4J	10u	10u
Tetrahydrofuran	10u	21,000	5,000u	82,000E	11,000	10u	10u	10u	10u	78	25u	10u	10u	10u
Methanol	20u	730	1,200	15,000	170	20u	38	20	47	30	20u	900	35	28
Isopropanol	20u	580	410	11,000	20u	20u	20u	20u	20u	20u	20u	20u	20u	20u
Benzene	10u	10,000u	5,000u	2,500u	2,500u	8J	5BJ	10u	10u	10u	25u	10u	10u	7BJ
Hexane	14J	NA	NA	740BJ	NA	7J	18J	3J	5BJ	8J	14J	21J	6J	18BJ

Well Legend:

W	=	Production Well
JW#	=	Shallow Monitoring Well
EW	=	Early Warning Well
JW#A	=	Deep Monitoring Well
(D)	=	Duplicate
(D)	=	Duplicate

Qualifiers:

NA	=	Not Available
ND	=	Not Detected
NS	=	Not Sampled
BMDL	=	Below Minimum Detection Limit
B	=	Compound whose concentration exceeds the calibration range.
u	=	Compound was analyzed but not detected.
J	=	Indicated an estimated value.
B	=	Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the user on the date to take appropriate action.
DL	=	Sample diluted because exceeds calibration range.

NOTE: **Analytical results not validated.**

JCA/lvl/janssen/43275.wpf

TABLE 7 (CONT.)

QUARTERLY GROUND WATER SAMPLING ANALYSIS RESULTS (ug/l)
MARCH 1993
OMB SITE
GURABO, PUERTO RICO

Compounds	Sample Identification													
	W-1	W-2	W-3P	W-4H	W-5B	W-6I	W-6I(D)	JW-4	JW-4A	JW-5DL	JW-5(D)	JW-5A	JW-6	JW-7
Methylene Chloride	10B	310BJ	7BJ	6BJ	9BJ	5BJ	5BJ	6BJ	5BJ	710BDJ	980BJ	250BJ	3BJ	2BJ
Acetone	10u	500u	10u	10u	10u	10u	10u	10u	10u	2,000u	6,200	1,000u	10u	10u
Chloroform	10u	3,900	3J	10u	10u	2J	2J	6J	2J	24,000BD	25,000	17,000	240E	62
MIBK	10u	500u	10u	10u	10u	10u	10u	10u	10u	1,000u	2,500u	1,000u	10u	10u
Toluene	3BJ	130BJ	1J	1J	3BJ	1J	10u	2BJ	1BJ	460BDJ	500J	150J	3J	2J
Chlorobenzene	10u	500u	10u	10u	10u	10u	10u	10u	10u	2,000u	2,500u	1,000u	2J	10u
Tetrahydrofuran	10u	1,000	10u	10u	10u	74	62	10u	10u	32,000	43,000	17,000	10u	10u
Methanol	20u	147	20u	27	30	22	20u	49	37	NA	60	20u	210	20u
Isopropanol	20u	20u	20u	20u	20u	20u	20u	20u	20u	NA	20u	20u	20u	20u
Benzene	10u	NA	6J	7BJ	10u	6BJ	6BJ	10u	10u	2,000u	2,500u	1,000u	10u	10u
Hexane	NA	NA	4J	4BJ	3J	4BJ	4BJ	13J	6J	NA	NA	NA	14J	59J

Well Legend:

W	=	Production Well
JW#	=	Shallow Monitoring Well
EW	=	Early Warning Well
JW-#A	=	Deep Monitoring Well
(D)	=	Duplicate

Qualifiers:

NA	=	Not Available
ND	=	Not Detectable
NS	=	Not Sampled
BMDL	=	Below Minimum Detection Limit
E	=	Compound whose concentration exceeds the calibration range.
u	=	Compound was analyzed but not detected.
J	=	Indicated an estimated value.
B	=	Analyte is found in the associates blank as well as in the sample. It indicates probable/possible blank contamination and warns the user on the date to take appropriate action.
DL	=	Sample diluted because exceeds calibration range.

NOTE: Analytical results not validated.

JCA/lvl/janssen/43275.wpf

TABLES

JANSSEN INC. SITE
GURABO, PUERTO RICO

APPENDIX C

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES
SHALLOW SOIL BORINGS
TABLE 8

Sample Point	Depth feet	Date	Time	Chloroform[1/]
J-2-1	5 - 7	89-10-09	1454	ND
J-2-2	10 - 12	89-10-09	1504	ND
J-2-3	15 - 17	89-10-09	1515	ND
J-2-4	20 - 22	89-10-09	1617	ND
J-3-1[2/]	0 - 2	89-10-10	0925	ND
J-3-2	5 - 7	89-10-10	1000	ND
J-3-3	10 - 12	89-10-10	1005	ND
J-3-4	15 - 17	89-10-10	1050	ND
J-5-2	5 - 7	89-10-16	1130	ND
J-5-3	10 - 12	89-10-16	1137	ND
J-5-4	15 - 17	89-10-16	1209	ND
J-5-5	20 - 22	89-10-16	1219	ND
J-8-2	5 - 7	89-11-06	1003	ND
J-8-3	10 - 12	89-11-06	1009	ND
J-8-4	15 - 17	89-11-06	1021	ND
J-8-5	20 - 22	89-11-06	1056	ND

1/ MDL = Minimum Detection Limit = 50 µg/Kg.
2/ Drilled with a hand auger.

SOIL SAMPLES
TABLE 8 (CONT.)

Sample Points	Depth feet	Date (yy/mm/dd)	Time	Chloroform
J-10-1	5 - 7	89-11-07	1327	ND
J-10-2	10 - 12	89-11-07	1336	ND
J-10-3	15 - 17	89-11-07	1348	ND
J-11-1	0 - 2	89-11-01	1355	ND
J-11-2	5 - 7	89-11-01	1402	ND
J-11-3	10 - 12	89-11-01	1411	ND
J-11-5[3']	20 - 22	89-11-01	1444	ND

3' Sample J-11-4 was a rock fragment.

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
March 3, 1990

TABLE 9

Sampling Points	ST-1-1	ST-1-2	ST-1-3	ST-1-4	ST-1-5	ST-1-6
Depth (feet) 1/	0-2	2-4	4-6	6-8	8-10	10-12
Compounds						
Methanol	ND	ND	ND	ND	ND	ND
Isopropanol	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND
Methylene Chloride	498	447	493	480	449	574
Toluene	BMDL	ND	ND	974	ND	ND
Acetone	131,000	14,700	69,700	379,000	240,000	59,900
MIBK	2,230	ND	BMDL	8,090	2,600	BMDL
Tetrahydrofuran	11,300	BMDL	2,160	16,170	5,990	4,100

BMDL = Below Minimum Detection Limit
ND = Non-Detectable
1/ = Measured from slab elevation

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 22, 1990

TABLE 10

Sampling Points	Strench 1-2	Strench 3-4	Strench 5-6	Strench 7-8
Compounds				
Methanol	95.8	ND	BMDL	BMDL
Isopropanol	74.7	58.9	173	151
Chlorobenzene	241	131,000	ND	BMDL
Chloroform	24.8	141,000	ND	465,000
Methylene Chloride	ND	35,700	11.8	ND
Toluene	28,300	1,210,000	BMDL	8,250,000
Acetone	416,000	ND	82,900	BMDL
MIBK	49,200	194,000	BMDL	BMDL
Tetrahydrofuran	4,270	ND	4,860	ND

ND = Non-Detectable
BMDL = Below Minimum Detection Limit

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 30, 1990

TABLE 11

Sampling Points	1-A	1-B	1-C	1-D	1-E
Depth (feet)[1/]	0-1	1-2	2-3	3-4	4-5
Compounds					
Methanol	ND	ND	ND	ND	ND
Isopropanol	ND	ND	BMDL	BMDL	BMDL
Chlorobenzene	24.6	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Methylene Chloride	39.7	1,800	462	3,790	1,810
Toluene	12.6	ND	ND	ND	ND
Acetone	BMDL	BMDL	5,840	13,600	6,390
MIBK	28.4	ND	1,470	3,440	BMDL
Tetrahydrofuran	20,400	21,200	27,600	35,300	16,600

ND = Non-Detectable
BMDL = Below Minimum Detection Limit
1/ Measured from slab elevation.

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 30, 1990

TABLE 12

Sampling Points	2-A	2-B	2-C
Depth (feet)[1/]	4-5	5-6	6-7
Compounds			
Methanol	ND	ND	ND
Isopropanol	ND	ND	ND
Chlorobenzene	ND	ND	ND
Chloroform	ND	ND	ND
Methylene Chloride	114	ND	ND
Toluene	ND	BMDL	ND
Acetone	BMDL	92.1	279
MIBK	ND	11.2	ND
Tetrahydrofuran	1,270	312	1,030

ND = Non-Detectable
BMDL = Below Minimum Detection Limit
1/ Measured from slab elevation.

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 30, 1990

TABLE 13

Sampling Points	3-A	3-B	3-C	3-D	3-E
Depth (feet)[1/]	4-5	5-6	6-7	7-8	8-9
Compounds					
Methanol	ND	ND	BMDL	ND	ND
Isopropanol	ND	ND	BMDL	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Methylene Chloride	10,800	1,310	ND	ND	ND
Toluene	ND	ND	ND	ND	ND
Acetone	579,000	210,000	459,000	99,700	23,200
MIBK	ND	BMDL	6,460	BMDL	BMDL
Tetrahydrofuran	65,800	17,000	36,300	7,200	7,850

ND = Non-detectable
BMDL = Below minimum detection limit
1/ Measured from slab elevation

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 30, 1990

TABLE 14

Sampling Points	4-A	4-B	4-C	4-D	4-E
Depth (feet)[1/]	4-5	5-6	6-7	7-8	8-9
Compounds					
Methanol	BMDL	BMDL	BMDL	BMDL	ND
Isopropanol	74.8	BMDL	BMDL	BMDL	BMDL
Chlorobenzene	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	12,500	ND	ND
Toluene	ND	ND	ND	ND	ND
Acetone	586,000	618,000	1,670,000	1,040,000	505,000
MIBK	11,900	13,100	13,700	BMDL	ND
Tetrahydrofuran	151,000	166,000	249,000	205,000	62,800

ND = Non-detectable
BMDL = Below minimum detection limit
1/ Measured from slab elevation

JANSSEN SITE
Gurabo, Puerto Rico

SOIL SAMPLES CONCENTRATIONS (ug/Kg)
SHALLOW SOIL BORINGS
July 30, 1990

TABLE 15

Sampling Points	5-A	5-B	5-C	5-D	5-E
Depth (feet) 1/	4-5	5-6	6-7	7-8	8-9
Compounds					
Methanol	ND	ND	ND	ND	ND
Isopropanol	BMDL	BMDL	BMDL	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	4,160	4,360	1,280
Toluene	ND	ND	ND	ND	ND
Acetone	28,400	146,000	244,000	71,000	24,700
MIBK	3,650	ND	ND	BMDL	ND
Tetrahydrofuran	47,600	28,000	68,800	33,200	9,620

ND = Non-Detectable
BMDL = Below Minimum Detection Limit
1/ Measured from slab elevation

COMMONWEALTH OF PUERTO RICO
LETTER OF CONCURRENCE

JANSSEN INC. SITE
GURABO, PUERTO RICO

APPENDIX D

COMMONWEALTH OF PUERTO RICO / OFFICE OF THE GOVERNOR
ENVIRONMENTAL QUALITY BOARD
SUPERFUND PROGRAM

September 23, 1993

Mr. George Pavlou
Director
Emergency and Remedial Response Div.
U.S. Environmental Protection Agency
26th Federal Plaza, Room 747
New York, New York 10278

RE: ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL QUALITY BOARD
CONCURRENCE LETTER
RECORD OF DECISION/
RESPONSIVENESS SUMMARY
JANSSEN, INC. SITE, GURABO, P.R.

Dear Mr. Pavlou:

The Superfund Program of the Environmental Quality Board (EQB) in coordination with the Environmental Protection Agency (EPA), Caribbean Office, has been participating and reviewing the above-mentioned documents.

Pursuant to public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan, Environmental Protection Agency (EPA) policy and guidance on Community Relations, a document referred as "Declaration for Interim Record of Decision/Responsiveness Summary" was submitted for support and comments.

The Puerto Rico Environmental Quality Board concurs with the selected alternative while still promoting early actions remediation activities under the Superfund Accelerated Cleanup Model (SACM) Program and innovative technologies implementation, sponsored by the Superfund Innovative Technology Evaluation (Site) Program.

The "Declaration for Interim Record of Decision", which is a decision document, resumes the selected interim remedial actions for the Janssen, Inc. Site, Gurabo, Puerto Rico.

The "Responsiveness Summary" is a response document to public comments arised from the Public Meeting celebrated on June 8, 1993 and it is part of the Record of Decision (ROD) package.

The final selected alternative must comply with the Federal and State Regulations and all applicable ARAR's in such a way that significantly reduce the potential threat to public health and the environment.

After the comments review, in particular the Puerto Rico Aqueduct and Sewer Authority (PRASA)'s comments, EPA decided to reevaluate the previous selected alternative presented on the "Superfund Proposed Plan" (Alternative 3 II). According to this revision, EPA decided to select Alternative 3 IV for the groundwater remmediation process. No changes were proposed for the soil remediation Alternative 3.

Under the selected alternative (i.e. Alternative 3 IV) the treated water will be sent to PRASA Gurabo Treatment Plant until the construction of the Steam Air Stripping unit is completed. subsequently the treated waters will be rerouted to Mamey Creek and subjected to a National Pollutant Discharge Elimination System (NPDES) permit.

If you have any question regarding this matter please contact Eng. Francisco Claudio Ríos, Director. Air Quality Area, at phone numbers (809) 767-8071 or 767-8056.

Cordially,

Héctor Rússe Martínez
Chairman

VR/inj

xc: Mr. Melvin Hauptman
Eng. Carl-Axel P. Soderberg
Eng. Adalberto Bosque
Eng. Francisco Claudio