November 1986 EPA-700/8-87-005

Hazardous Waste Ground-Water Task Force

Evaluation of Proteccion Tecnica Ecologica (Proteco) Penuelas, Puerto Rico

EPA UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

COMMONWEALTH OF PUERTO RICO ENVIRONMENTAL QUALITY BOARD

Environmental Quality Board

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
HAZARDOUS WASTE GROUNDWATER TASK FORCE

EPA-700/8-87-005

GROUNDWATER MONITORING EVALUATION
Proteccion Tecnica Ecologica (Proteco)
Penuelas, Puerto Rico

November 1986

Ton H. Moy
Project Coordinator
U.S. Environmenal Protection Agency
Region II

November 14, 1986

Update of the Hazardous Waste Ground-water Task Force
Evaluation of Proteccion Tecnica Ecologica

The United States Environmental Protection Agency's Hazardous Waste Ground-water Task Force (HWGTF) and the Commonwealth of Puerto Rico Environmental Quality Board (EQB) conducted an evaluation of the compliance of Proteccion Tecnica Ecologica, Inc. (Proteco) with the interim status and ground-water monitoring requirements of the Resource Conservation and Recovery Act (RCRA), as adopted by the Commonwealth of Puerto Rico. Proteco is one of the 58 facilities to be evaluated by the HWGWTF. The HWGWTF effort came about in light of concerns over the extent to which operators of hazardous waste treatment, storage, and disposal facilities are complying with state and federal ground-water monitoring regulations. Proteco's on-site field inspection was conducted over a period of November 14-23, 1985.

A previous evaluation of the ground-water monitoring system at Proteco in 1983 conducted by an EPA contractor and the subsequent sampling inspection at the facility conducted by the EPA Region II Environmental Services Division (ESD) in 1984 raised questions regarding possible contamination of ground water at the site and the adequacy of the interim status ground-water monitoring system. These inspections resulted in the issuance of a complaint against the owner/operator of the site for a number of violations of the interim status requirements. In August 1985, EPA Region II and Proteco held a settlement conference to address these issues. A Section 3013 Order on consent was issued on October 8, 1985.

The 3013 order required: an evaluation of the geological and hydrogeological conditions of the facility property sufficient to design an adequate ground-water monitoring system, development and implementation of ground-water monitoring and surface water monitoring plans, and sampling and analysis of the soil surrounding each storage and disposal unit. At the time of the Ground-Water Task Force visit to Proteco, the company had completed part of the initial phase of the hydrogeologic investigation. The soil and surface water assesment had not begun.

Subsequent to the Task Force inspection, a Phase 1A Hydrogeologic Work Plan at Proteco was submitted to the EPA on February 10, 1986. After extensive meetings with Proteco and the hydrogeologic consultants for the facility, a revised Phase 1A was submitted to the EPA on April 4, 1986. EPA approved the Phase 1A work plan in mid-April 1986, and field operations began in early June 1986 and concluded at the end of September 1986. A final draft report of the 3013 phased hydrogeological investigation was submitted to the EPA on September 30, 1986; it is currently under review.

Phased soil sampling work plans were submitted to the EPA between January and June, 1986. A letter was sent to the facility on October 2, 1986 requesting additional modifications to the plan. If the modifications are adequate, field work is expected to begin in mid-November, 1986.

In response to the requirement that all ground-water monitoring facilities certify compliance with the applicable ground-water monitoring requirements or lose interim status on November 8, 1985, the operator of the Proteco

facility certified compliance for two of the regulated land disposal units and submitted closure plans for the remainder of the land disposal units. Proteco had previously submitted a Part B application for the facility.

The site investigation conducted in mid-November 1985 revealed a multitude of violations of RCRA and Commonwealth hazardous waste regulations. The more serious of them included violations of previous EQB and EPA Orders; mismanagement of incompatible hazardous wastes; violations of aisle space; violations of groundwater monitoring requirements; unsafe containers; violations of closure and post-closure plan requirements; and the unlawful placing of liquid hazardous wastes into the landfill.

Proteco was notified of these violations by letter dated February 14, 1986, and the regional office decided that judicial enforcement was the appropriate response. A civil referral was sent to EPA headquarters on March 31, 1986. The case then was referred to the U.S. Department of Justice on May 9, 1986. Meetings have been held with Proteco to discuss settlement of the violations. A complaint was issued on October 29, 1986, asking for a substantial penalty and correction of the violations. Proteco has submitted to EPA Region II revisions to the closure and post-closure plans for the waste management units, the training plan, inspection plan, and the plan to improve the existing container storage area.

ACKNOWLEDGEMENTS

It is a pleasure to acknowledge the assistance of the following Task Force personnel who provided information and technical guidance: Charles Anderson, Randy Breeden, Joseph Cosentino, Roger Ennis, John Gorman, Fred Haber, and Andrew Praschak, and the RCRA employees of the Commonwealth of Puerto Rico Environmental Quality Board. In addition, we wish to thank the personnel of Proteco in assisting us during the period of November 14-23, 1985.

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INTRODUCTION

Concerns have recently been raised about whether commercial hazardous waste treatment, storage and disposal facilities (TSDFs) are complying with the ground-water monitoring requirements promulgated under the Resource Conservation and Recovery Act (RCRA)*. In question is the ability of existing or proposed ground-water monitoring systems to detect contaminant releases from waste management units. To evaluate these systems and determine the current compliance status, the Administrator of the Environmental Protection Agency (EPA) established a Hazardous Waste Ground-Water Task Force (Task Force). The Task Force is comprised of personnel from the EPA Office of Solid Waste and Emergency Responce (OSWER), Natonal Enforcement Investigations Center (NEIC), Regional offices and State regulatory agencies. The Task Force is conducting in-depth onsite investigations of commercial TSDFs with the following objectives:

- Determine compliance with interim status ground-water monitoring requirements of 40 CFR Part 265 as promulgated under RCRA or the State equivalent (where the State has received RCRA authorization);
- Evaluate the ground-water monitoring program described in the facility's RCRA Part B permit application for compliance with 40 CFR §270.14(c);
- Determine if the ground water at the facility contains hazardus waste constituents;
- Provide information to assist the Agency in determining if the TSDF meets EPA ground-water monitoring requirements for waste management facilities receiving waste from facilities being remediate pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA);
- Identity significant ground water management, technical and compliance problems and take enforcement or other administrative actions to correct these problems.

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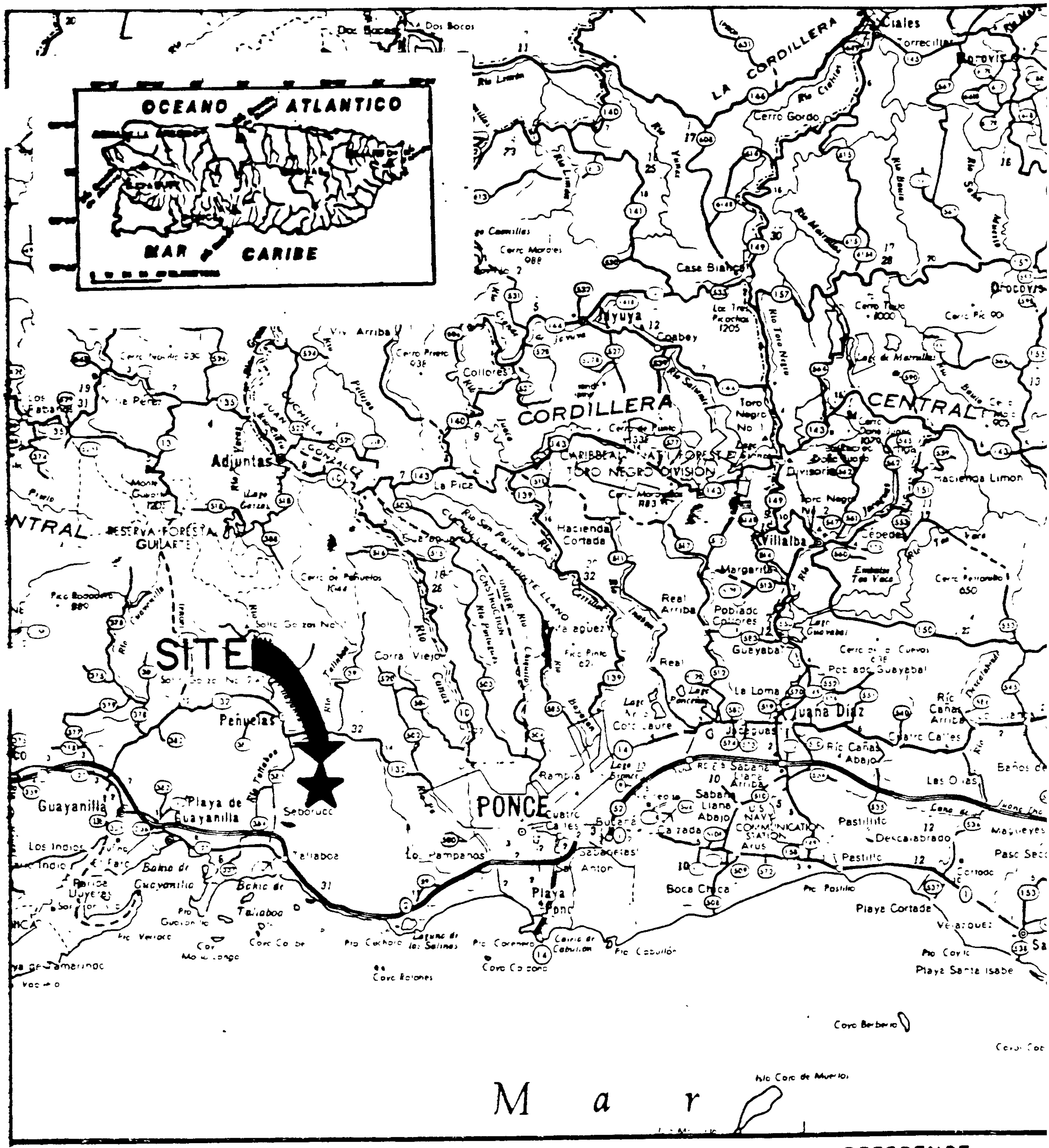
* Regulations promulgated under RCRA address hazardous waste management facility operations, including groundwater monitoring, to ensure that hazardous waste constituents are not released to the environment.

** EPA policy, stated in May 6, 1985 memorandum from Jack McGraw on "Procedures for Planning and Implementing Off-site Response", requires that TSFDs receiving CERCLA waste be in compliance with applicable RCRA groundwater monitoring requirements.



LOCATION MAP

SCALE

0 4.6 9.2 13.8 MILES

REFERENCE:

PUERTO RICO ROAD MAP DATED 1979.

The unit numbers refer to those used on the facility drawing can be found under Ground-water Sampling and Analysis.

Proteco certified LOIS compliance with the applicable ground-water monitoring requirements for two regulated units (units #13 and #16) at the facility.

Summary of Findings and Conclusions

The findings and conclusions presented in this report reflect conditions existing at the facility in November 1985. Relevent actions taken by EPA Region II, the Commonwealth and Proteco in the period subsequent to this investigation are included.

Task Force personnel investigated the interim status groundwater monitoring and hazardous waste management programs at the Proteco facility for the period between November 1980 and November 1985. The investigation indicated the monitoring and waste management programs were inadequate and did not comply with the applicable requirements.

The groundwater monitoring program proposed in Proteco's 1983 Part B permit application and subsequent revisions up to the time of the inspection were inadequate.

The results of the chemical analyses of groundwater samples collected at Proteco indicate that the groundwater in the uppermost aquifer is highly saline and specific conductance values range from 40,000-50,000 micromhos. Inorganic constituents were detected in the ground water from all 15 wells sampled, several inorganic constituents including barium and chromium, exceed federal drinking water standards. However, it is recommended that the new wells that were installed as part of the 3013 Order be sampled for inorganic parameters in order to develop a representative data base of background water chemistry. Organic data from eleven wells was either non-detect or rejected during the QA/QC process. Four of the wells yielded samples showing levels of volatile organics. Specific constituents include chloroform (3.8 -16 micrograms per liter,) bromodichloromethane (2.9-9.5 micrograms per liter), and 2-butonone (1100 micrograms per liter). The data from three of the wells which tested positive for organics is questionable since these wells were not adequately developed. As a result of QA/QC considerations, the data collected for semi-volatiles was rejected. A good portion of the pesticide, PCB, and herbicide data also was discarded due to QA/QC considerations. Additional sampling for organic constituents is necessary. After the 3013 hydrogeologic study at the facility is completed and the hydraulic parameters defined on a site-wide basis, it is recommended that the remaining data on organic compounds generated by the Task Force be reviewed. A ground survey was conducted by EPA personnel and no drinking water, irrigation, or stock wells were noted within a mile and one-half radius of the facility.

Under EPA policy, if an off-site TSDF is to be used for land disposal of waste from a Superfund-cleanup of a CERCLA site, that site must be in compliance with the applicable technical requirements of RCRA. Interim status facilities must have an adequate groundwater monitoring system data to detect the release of hazardous waste or hazardous waste constituents from the regulated units into the groundwater, and if there is a release, to assess its scope and extent. The groundwater monitoring program at Proteco is inadequate for this purpose and, as such, has not complied with Federal and Commonwealth requirements.

Also, in some instances, correct procedures described in the plan were not carried out in practice. In other instances, incorrect procedures were described, but correct procedures were being practiced.

EPA Sample Data Analysis

Inorganic constituents detected in Task Force samples include aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, colbalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, tin, vanadium and zinc. However, no conclusions regarding releases of of inorganic constituents at the facility can be made at this time since not only do elevated levels of many of these constituents frequently occur in saline environments, but also the complexity of the marine depositional environment at the facility, the thirty to fifty foot sequence of unsaturated clays and the similarity in concentration of inorganic constituents in many wells throughout the facility require a more representative site-wide data base of background water chemistry be developed. It is recommended that the new wells installed at the facility as part of the 3013 Order be sampled for inorganic parameters in order to help establish this data base.

Organic data from eleven wells was either non-detected or rejected during the QA/QC process. Four of the groundwater wells yielded samples showing levels of volatile organics. Specific constituents include 2-butanone, chloroform and bromodichloromethane. QA/QC problems associated with analysis of for several other volatile organics and semi-volatile compounds, and the need to specify other tentatively identified compounds, require that further sampling at the facility be conducted. In addition, after the 3013 hydrogeologic study of the facility is completed and the hydraulic parameters defined on a site-wide basis, it is recommended that the data on organic compounds generated by the Task Force be reevaluated.

RCRA Inspection

Observation of current waste management practices and review of records maintained at Proteco have identified numerous deficiencies. These included: inadequate waste analysis plan, failure to conduct waste analysis, inspection schedule, training program, fire control equipments, communication system, aisle space, written contingency plan, groundwater monitoring system, closure/post closure plans, run-on and run-off control in waste management units, unlined impoundments, and placing of hazardous liquid wastes in landfill. Prior to the inspection, two methods were used to treat the hazardous wastes accepted to render the wastes less hazardous, non-hazardous, or more amendable to disposal. The primary method used was stabilization/fixation. This treatment procedure renders a waste to a concrete-like solid material by reacting cement kiln dust, water, and waste to form a solid. This solid was then disposed of in one of the on-site landfills. The facility also employed neutralization processes to adjust the pH of a waste to an acceptable level by combining acidic and alkaline materials.

TECHNICAL REPORT

INVESTIGATION METHODS

The Task Force investigation of the Proteco facility consisted of:

- Reviewing and evaluating records and documents from EPA Region II, Environmental Quality Board and Proteco;
- Conducting an onsite facility inspection November 14 through November 23, 1985;
- Evaluating onsite and offsite analytical laboratories; and
- Sampling and analyzing data from selected ground-water monitoring wells.

RECORDS/DOCUMENTS REVIEW

Records and documents from EPA Region II and the EQB office, compiled by an EPA contractor, were reviewed prior to and during the onsite inspection. Additional EQB records were copied and reviewed by Task Force personnel concurrently with the onsite inspection. Onsite facility records were reviewed to verify informationcurrenly in Government files and supplement Government information where necessary. Selected documents requiring in-depth evaluation were copied by the Task Force during the inspection. Records were reviewed to obtain information on facility operations, construction details of waste management units and the ground-water monitoring program.

Specific documents and records that were reviewed included the ground-water sampling and analysis plan(s), outline of the facility ground-water sampling, monitoring well construction data and logs, site geologic reports, site operations plans, facility permits, waste management unit design and operation reports, selected personnel position descriptions and qualifications and operating records showing the general types, quantities and locations of wastes disposed of at the facility.

FACILITY INSPECTION

The facility inspection conducted in November 1985 included identifying waste management units (past and present), waste management operations, pollution control practices, and surface drainage routes, and verifying the location of ground-water monitoring wells.

Company representatives were interviewed to identify records and documents of interest, discuss the contents of the documents, and explain (1) facility operations (past and present), (2) site hydrogeology, (3) the ground-water monitoring system, (4) the ground-water sampling and analysis plan, and (5) laboratory procedures for obtaining data on ground-water quality. Because ground-water samples were analyzed by offsite laboratories, personnel from these facilities were also interviewed regarding sample handling, analysis and document control.

FACILITY DESCRIPTION

A. General Information

Proteccion Tecnica Ecologica (Proteco), Inc. formerly known as Servicios Carbareon, Inc. operates the facility located at approximatelly 18°01'05" latitude and 66°41'03" longitude on the Southern Coast of Puerto Rico near the City of Ponce. The operating company Proteco is owned by Resource Management, Inc.

Facility Address: Proteccion Tecnica Ecologica, Inc.
Road 385, Km 3.5
Penuelas, Puerto Rico 00724

Mailing Address: Proteccion Tecnica Ecologica, Inc.
Firm Delivery
Ponce, Puerto Rico 00731

Telephone Number: (809) 836-2058

RCRA Contact: Dr. Jorge J. Fernandez
President

Facility Owner: Compania Ganadera Del Sur, Inc.

Facility I.D. Numbere: PRD 091 018 622

Type of Operation: Treatment, storage, disposal, transportation and generation of hazardous and nonhazardous waste.

B. Description of Facility Operations

A general description of the facility operations will be given here. A more detailed descripton of each waste management unit can be found under RCRA Inspection.

The Proteco site occupies approximatly 35 acres in a small valley with high topographical relief at an elevation ranging between 260 and 400 feet above sea level. The facility is located about 2.5 miles southeast of Penuelas, Puerto Rico, 2 miles north of Tallaboa Bay in the Caribbean, and 1.5 miles east of the lower Tallaboa River valley. Surface runofff leaves the site in a small drainage ditch that travels towards the lower Tallaboa River valley.

The activities conducted at the Proteco hazardous waste management facility include the treatment, storage and disposal of hazardous waste and the treatment and disposal of non-hazardous waste. The hazardous wastes received and accepted at the facility are generated from many diverse manufacturing operations located in the Commonwealth of Puerto Rico. The hazardous waste is transported from these generators to the facility primarily by the Proteco transportation staff. Appendix A lists many of

13	Rainwater Basin (LB)
15	Tank Storage
15A	Tank Storage Area
16	Immobilization Facility (TI 3)
17	Neutralization Impoundments (LF)
19	Temporary Drum Storage Area

C. Solid Waste Management Units (SWMUs) Identified

Solid waste management unit includes any discernable waste management unit from which hazardous constituents may migrate, irrespective of whether the unit was intended for the management of solid or hazardous wastes. The following types of units are therefore included in the definition of SWMUs: landfills, surface impoundments, waste piles, land treatment units, incinerators, injection wells, tanks (including 90 day accumulation tanks), container storage areas and transfer stations. In addition to these types of units, certain areas associated with production processes at facilities which have become contaminated as a result of routine, systematic and deliberate releases of wastes, or hazardoius constituents from wastes, are also considered to be solid waste management units. A product may become a waste if it is abandoned or discarded.

The classification of units (i.e., regulated or SWMUs) was based on the dates these units became inactive, as provided by Proteco. However, no documentation was available to verify these dates. The SWMUs identified at this site include:

Unit Number	Description
1	Drum Burial Landfill (Cavidad IC)
2	Drum Burial Landfill (G.E.)
3	Drum Burial Landfill (Roche)
5	Drum Burial Landfill (Searle)
6	Sanitary Landfill (SL)
8	Drum Burial Landfill (Loctite)
14	Land Treatment Area (AC2)
-	Empty Drum Storage Area
-	Parking Lot/Shop/Office Area

Ground-Water Monitoring During Interim Status

The RCRA ground-water monitoring system at the Proteco facility has evolved gradually from 1981 as a result of a series of hydrogeological studies at the site.

Preliminary soil sampling was conducted at the site as early as 1976 by Jaca Sierra Rivera Testing Laboratories; however, the first major hydrogeological investigation of the site was conducted by Geraghty and Miller, Inc., in 1980-1981. A series of 10 borings were drilled and a RCRA ground-water monitoring system consisting of 2 shallow wells and 2 deep wells was developed (see Figure 2).

Ertec Atlantic, Inc., (an EPA contractor) conducted a site inspection and technical review of the facility on January 23, 1983 in order to assess the facility's ground-water monitoring program for compliance with the requirements of Subpart F -- Ground-Water Monitoring (40 CFR 265.90 - 265.94) -- of the Resource Conservation and Recovery Act (RCRA). A summary of the deficiencies noted by Ertec in 1983 is listed below:

1. 265.91(a)(1) The presumed upgradient well 4W has not been shown to be either upgradient or capable of yielding ground-water samples that are representative of background ground-water quality unaffected by the facility.

2. 265.91(a)(2) The number and location of downgradient monitoring wells 1W, 2W and 9W do not ensure that they are capable of immediately detecting any statistically significant amounts of hazardous waste or hazardous waste consitituents that migrate from the waste-management area to the uppermost aquifer.

3. 265.92(a)(1) Sample collection procedures are not adequately described in the sampling and analysis plan.

4. 265.92(a)(2) The sampling and analysis plan does not include the techniques and procedures to be used for sample preservation and shipment.

5. 265.92(a)(3) Analytical procedures are not addressed in the sampling and analysis plan.

6. 265.92(c)(2) Four replicate measurements were not obtained for each of the indicator parameters listed in 265.92(b)(3) for each sample taken from the presumed upgradient well.

7. 265.92(e) Ground-water elevations at each monitoring well were not determined each time a sample was taken.

8. 265.93(a) An outline of a ground-water quality assessment program has not been prepared.

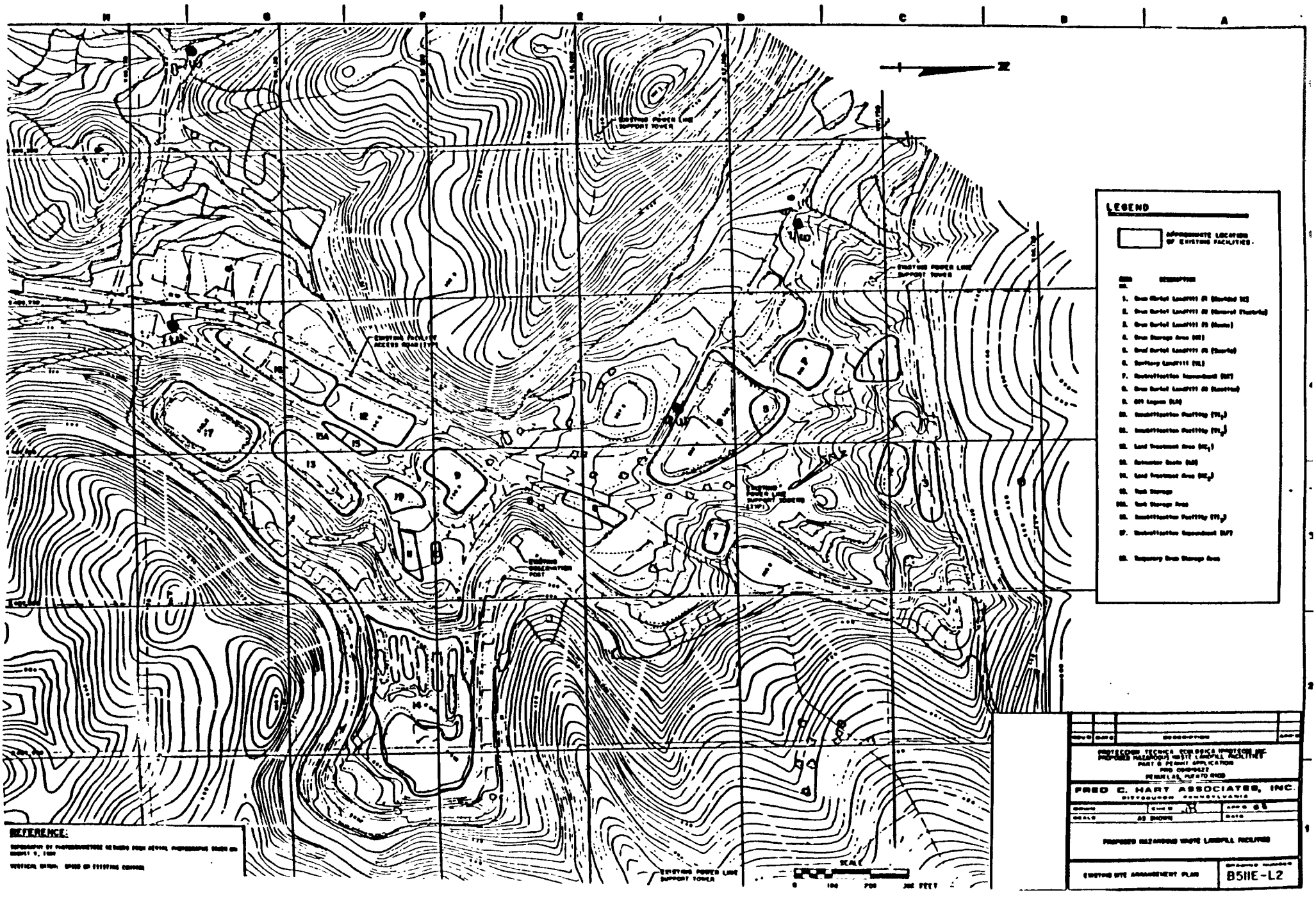


Figure 2 1981 RCRA ground-water monitoring system.

9. 265.94(a)(1) Records were not kept of the analyses required in 265.92(c) and the associated ground-water surface elevations required in 265.92(e).

10. 265.94(a)(2)(i) Concentrations or values of the parameters listed in 265.92(b)(1) for each ground-water monitoring well were not submitted to the Regional Administrator within 15 days after completion of each quarterly analysis.

In 1982-1983 Geraghty and Miller, Inc., in conjunction with Mario Soriano, Proteco hydrogeologist, conducted an expanded hydrogeologic investigation and monitoring well installation program. Eleven shallow and deep borings were drilled during this phase of the study. A RCRA monitoring well system consisting of 4 deep wells, two of which were part of the original RCRA monitoring system, was developed and incorporated in the 1983 Part B submittal (see Figure 3).

This system resulted in a different approach to monitoring ground water at the facility, although in each case the concept of monitoring the facility as one large waste management area was maintained. Results from the drilling program indicated that the shallow water zone was discontinuous; therefore the company designated the deeper water zone as the uppermost aquifer and discontinued monitoring the shallow zone. A deep well (11W) was designated as an upgradient well and an additional well (12W) was designated as a downgradient well.

The 1983 well monitoring system and sampling program was reviewed by ERTEC and an NOD was issued to the company in June, 1984.

The technical NOD addressed several of the 270.14(c) requirements which are applicable to facilities during interim status. In addition, many of the requirements for 264 ground-water permits should have been addressed by a facility during interim status. Many of the deficiencies indicated in the Ertec interim status review mentioned earlier had not been corrected in the Part B (1983) submittal. These include: the failure of the facility to produce data proving that the upgradient well is located upgradient of the units which require ground water monitoring, the failure of the facility to correct the inadequacies in the sampling and analysis plan, etc. Specifically, the 270.14(c) deficiencies include:

(1) 270.14(c)(1) The failure to provide a map indicating the location and identification of each monitoring well.

(2) The failure to submit a description of the design and construction of each well (e.g., depths of screen and casing, depths at which water was encountered, boring logs, etc.).

(3) 270.14(c)(2) The failure of Proteco to describe the hydraulic properties (e.g., hydraulic gradients, ground-water flow rate and direction) of the uppermost aquifer and to provide supporting data used to identify this information.

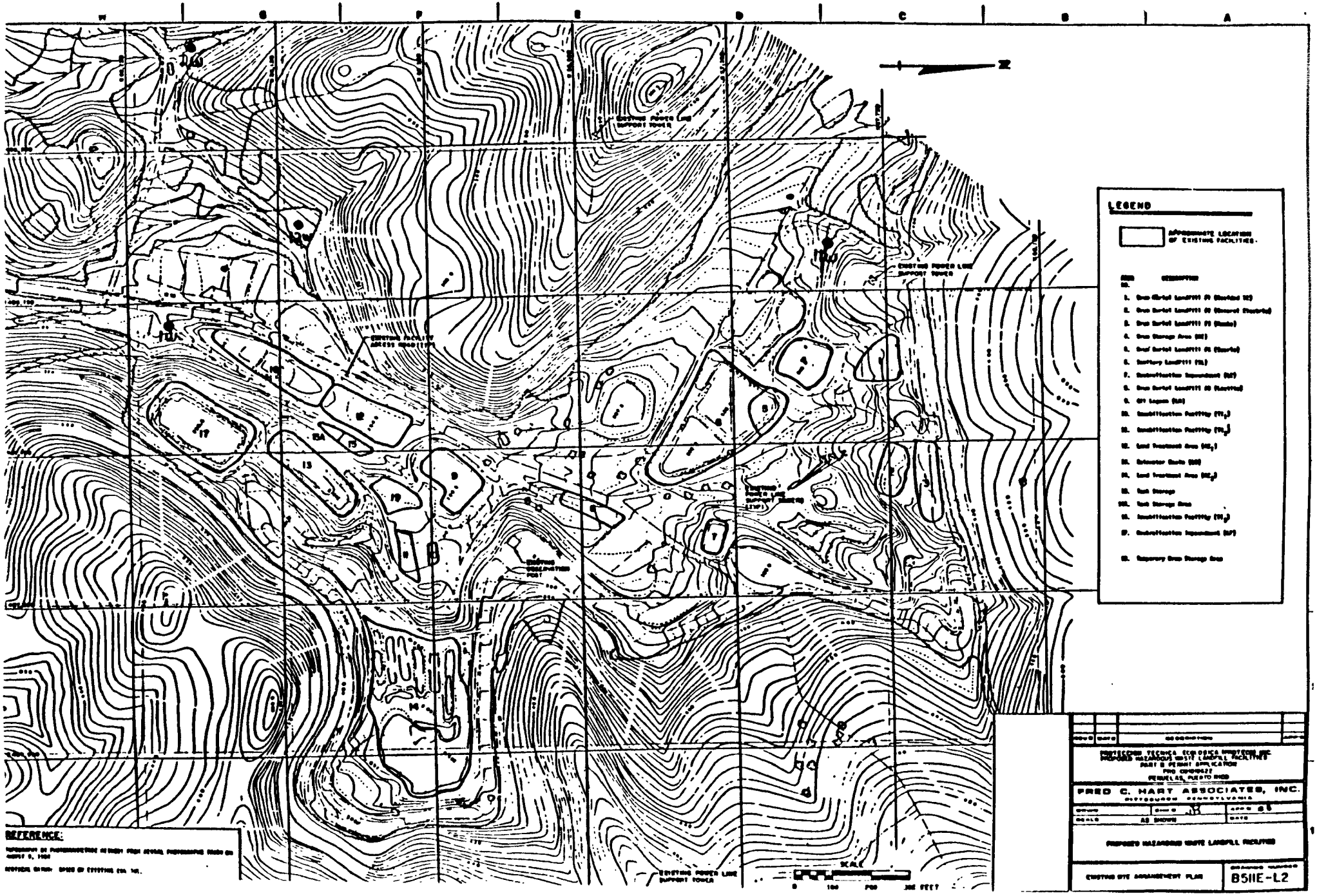


Figure 3 1983 RCRA ground-water monitoring system.

On March 21-22, 1984, the Region II Environmental Services Division (ESD) conducted a sampling survey at Proteco. ESD staff were accompanied by EQB personnel. The survey was conducted at the request of the Region II Solid Waste Branch in order to verify site conditions, ground-water monitoring data and unit closures. The areas of concern included a waste oil lagoon, a non-hazardous waste landfarm, a lindane storage tank area and the ground-water monitoring wells.

The Ocotober 11, 1984, ESD report on this sampling effort states:

> The results indicate significant metals contamination of the soil in the drum storage area and significant organics contamination in the oil lagoon and non-hazardous landfarm. The designated RCRA monitoring wells were relatively free of organics contamination. However, well depths and locations in light of hydrogeologic conditions at the site make this data questionable at best.

3013 ORDER

Ertec's review of the ground-water monitoring system at Proteco and the ESD sampling inspection at the facility raised significant questions regarding possible contamination at the site and the adequacy of the interim status well detection system. Environmental issues included the following areas:

(1) Five drum burial areas and 3 immobilization facilities were constructed without any synthetic or compacted natural material.

(2) Three unlined surface impoundments were constructed without any synthetic or compacted natural materials.

(3) ESD soil sampling at a hazardous waste storage area for 55 gallon drums indicated both organic and metal hazardous wastes.

(4) The EPA evaluation of the ground-water monitoring system installed by Proteco concluded that the system was not capable of detecting migration of hazardous waste constituents, as required by Subpart F of 40 CFR Part 265.

(5) Surface water at the facility discharges into a drainage channel which ultimately enters the lower Tallaboa River basin.

In August, 1985, the USEPA and the Proteco facility held a settlement conference to address these issues. A formal agreement was reached on October 8, 1985, when a 3013 Order was signed by the Regional Administrator.

The 3013 was designed to provide a multiphased approach for the assessment of ground water, surface water, and soils at the Proteco facility. Work plans were to be submitted to the EPA for approval prior to implementation,

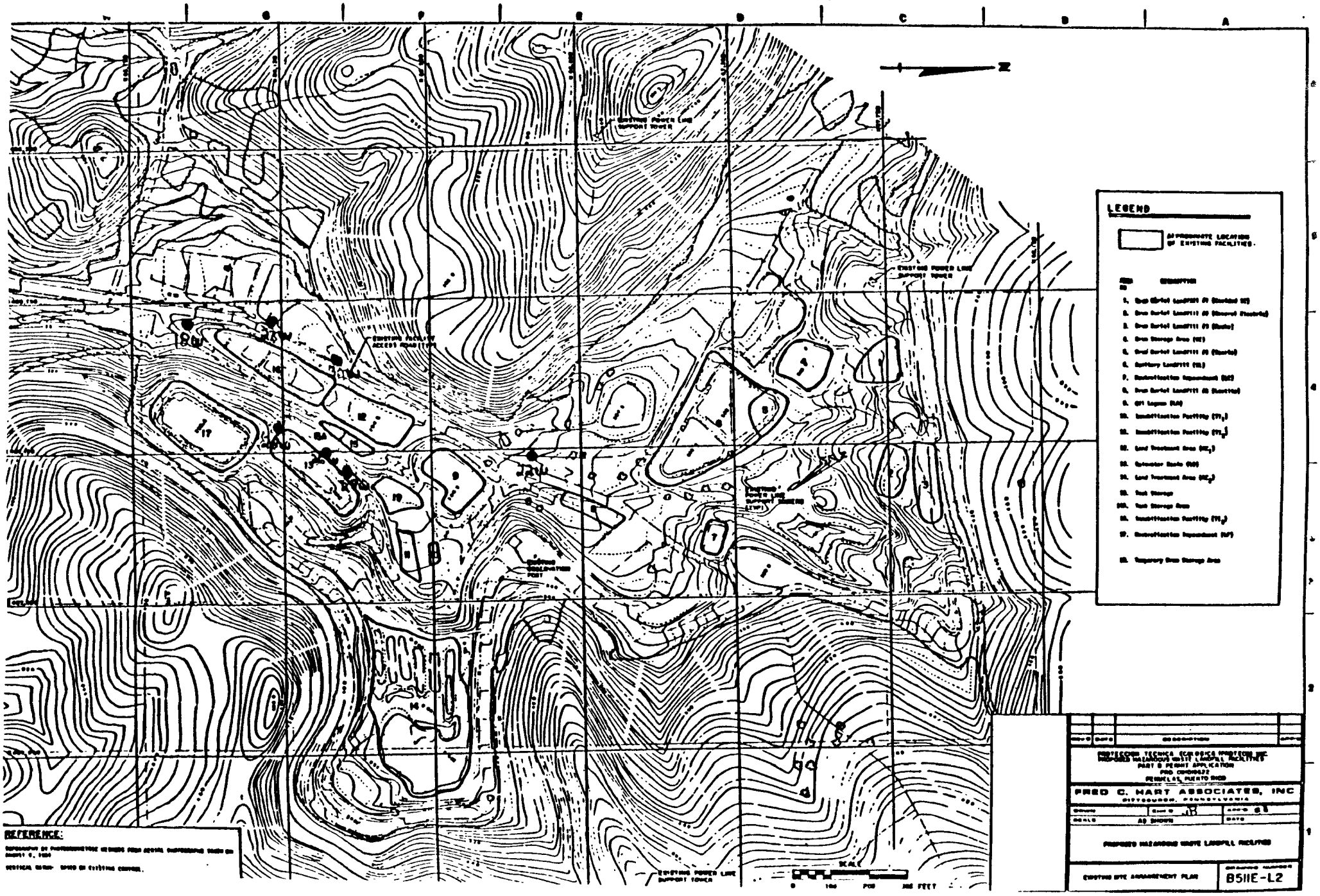


Figure 4 Present RCRA ground-water monitoring system.

TABLE 1

REGULATED UNIT MONITORING WELL SPECIFICATIONS

WELL NO.	MONITORED UNIT	SURVEYED ELEVATION (FT) TOP OF CASING	TOTAL DEPTH	SCREENED INTERVAL (FT.)	SCREEN LENGTH (FT.)	SCREEN SLOT SIZE (IN.)	WELL DIAMETER (INSIDE)	CASING MATERIAL
18W-85	Immobilization Unit TI_3	271.71	59.6	49.5 to 59.6	10	0.01	2 in.	PVC
23W-85	Immobilization Unit TI_3	276.67	39.0	29.0 to 39.0	10	0.01	2 in.	Teflon
30W-85	Immobilization Unit TI_3	279.54	54.0	44.0 to 54.0	10	0.01	2 in.	Teflon
26W-85	Rainwater Lagoon	296.83	69.0	59.0 to 69.0	10	0.01	2 in.	Teflon
28W-85	Rainwater Lagoon	297.33	74.0	64.0 to 74.0	10	0.01	2 in.	PVC
29W-85	Rainwater Lagoon	294.99	33.8	23.8 to 33.8	10	0.01	2 in.	Teflon
22W-85	Rainwater Lagoon and TI_3	304.07	55.0	45.0 to 55.0	10	0.01	2 in.	PVC

1. Monitoring wells installed hydraulically upgradient from the limit the waste of management area. Their number, location, and depth must be sufficient to yield ground-water samples that are:

   a. Representative of background ground-water quality in the uppermost aquifer near the facility; and

   b. Not affected by the facility.

2. Not less than three (3) monitoring wells installed hydraulically downgradient at the limit of the waste disposal area. Their number, location, and depth must insure that they immediately detect any statistically significant amounts of hazardous solid waste constituents that migrate form the area into the uppermost aquifer.

Although Proteco certified LOIS compliance for the rainwater basin (unit #13) and immobilization basin (unit #16) on November 8, 1985, there was no groundwater monitoring system associated with the following units which previously had interim status.

1) Neutralization Impoundment (LC)
2) Oil Lagoon (LA)
3) Immobilization Facility (TI 1)
4) Immobilization Facility (TI 2)
5) Neutralization Impoundment (LF)
6) Land Treatment Area (AC 1)

Rule 804(D) of RCHNSW requires:

D. Ground-Water Quality Assessment Program.

1. Within one (1) year after the effective date of this regulation, the owner or operator must prepare and submit to the Board for its approval an outline of a more comprehensive ground-water quality assessment program than tht described above in Sections A, B, and C. The more comprehensive program must be capable of determining:

   a. Whether hazardous solid waste or its constituents have entered the ground water;

   b. The rate and extent of migration of hazardous solid waste or its constituents in the ground water; and

   c. The concentrations of hazardous solid waste or its constituents in the ground water.

At the time of the Task Force inspection, the ground-water quality assessment program outline had not been submitted to the EPA. A civil referral addressing the above ground-water violations is presently pending.

Sampling and Analysis Plan Review

The Sampling and Analysis Plan, dated November 11, 1985, was reviewed for compliance with 40 CFR § 265.92. Detailed below are the deficiencies of the plan.

Some of the information contained in the plan appears not to correlate to actual practice, as noted below.

1. Pages 9 and 10 provide the ground water monitoring parameter list specifically tailored for each of the two regulated units. The list provided for each unit does not include all of the parameters required under § 265.92. For example, Total Organic Halogen (TOX), pesticides, trace metals, and parameters establishing ground water quality are missing from one of the lists; TOX, pesticides, and parameters establishing ground water quality are missing from the other unit's list.

   It should be noted that additional parameters, not specifically required under § 265.92, are included in both lists. It also should be noted that past versions of the plan observed by us did include all of the parameters required under § 265.92 and visits to the laboratories contracted to perform the analyses disclosed that all of the 265.92 parameters apparently were being analyzed at least in the past. Consequently, either the current plan is inaccurate as to its description of actual practice and the facility is in compliance regarding actual practice, or the plan is accurate, practice has changed, and interim status requirements are not being followed accurately.

2. Table 2 on page 11 presents sample preservation and container requirements. The following inadequacies exist with respect to at least the details provided in the table.

   a. The use of plastic or glass containers is listed for fluoride; EPA requires the use of plastic containers for fluoride work.

   b. The use of plastic or glass containers is listed for lindane and glass containers is listed for total organic carbon (TOC); EPA requires the use of glass containers with Teflon caps for lindane, all other pesticides, and TOC work.

   c. The use of glass containers is listed for volatile organics. The Agency requires the use of glass containers with Teflon lined septums for volatile organics.

Additionally, Table 4 on page 27 lists the EPA manual, "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983, for the analysis of the listed parameters. Based on information obtained during laboratory audits performed in November 1985, the methods contained in this document are not the ones being used in most cases (an evaluation of the methods being used is included in the laboratory audit report). Again, the plan needs to be based on fact.

8. Page 34 describes the process of background value establishment and of detection of increases in background. It states that four replicate samples will be collected and analyzed for each listed parameter in order to account for any variations resulting from analytical procedures. This statement is incorrect technically in that analyzing four replicate samples also accounts for any variations in data resulting from problems with sample reproducibility and representativeness. It should be noted that, for some purposes, analysis of four replicate samples is a better approach from a quality assurance perspective.

   § 265.92(c)(2) interim status regulation says that four replicate measure ments must be obtained for each sample, rather than, as stated in the plan, obtaining a measurement on each of four replicate samples. Consequently, based on interim status regulation, the procedure described in the plan is incorrect. However, again it is our understanding that the plan is inaccurate in that, at least in the past, the correct procedure has been used.

9. The plan does not provide any details of the facility's and facility contractors' quality assurance/quality control program(s) for sampling and analytical activities. At a minimum, information needs to be provided regarding:

   a. QA organization and responsibilities;

   b. procedures used to assess the completeness of data;

   c. procedures used to assess the precision, accuracy, and overall reliability of data, e.g., frequency and types of spikes, the use of surrogates, duplicates (field and lab), frequency and types of blanks (e.g., laboratory glassware, sample container, trip, equipment, etc.), internal and external performance evaluation samples, and systems audits;

   d. calibration and quantification procedures;

   e. data validation and corrective action procedures;

   f. preventive maintenance of instruments and equipment;

Audits of Laboratories Used by Proteco

As part of the HWGWTF's inspection of Proteco, audits were performed of two analytical laboratories: Envirolabs, Incorporated, and Orlando Laboratories, Incorporated. Envirolab, located in Ponce, Puerto Rico, recently has been the primary contract laboratory used by Proteco. Orlando Laboratories, located in Orlando, Florida, is a subcontractor performing certain analytical work contracted to Envirolab by Proteco. These audits were performed in order to determine the reliability of the analytical work currently being performed as part of Proteco's ground water monitoring program.

The audits covered drinking water suitability parameters (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, fluoride, nitrate, endrin, lindane, methoxychlor, toxaphene, 2,4-D, and 2,4,5-TP); parameters establishing ground water quality (chloride, iron, manganese, phenols, sodium, sulfate); and parameters used as indicators of ground water contamination (pH, specific conductance, total organic carbon (TOC), total organic halogen (TOX). Total coliform determinations also were evaluated.

Envirolab has been performing analysis of metals, pH, specific conductance, parameters establishing ground water quality, and total coliform. Orlando Laboratories has been performing analysis of TOC, pesticides (endrin, lindane, methoxychlor, toxaphene), and herbicides (2,4-D and 2,4,5-TP). It should be noted that in conversation with personnel from both of these laboratories prior to the audits, it was explained to us that Orlando Laboratories currently was performing TOX analysis. However, we discovered during the audits that TOX analysis most recently has been contracted out by Orlando Laboratories to Herman's Engineering, Alabama.

We did not perform an audit of Herman's Engineering. However, the reliability of their work will need to be determined if they continue to perform TOX analyses on well samples from Proteco.

It is important to note that various laboratories apparently have performed and will perform TOX and other analyses on well samples from Proteco. Determining statistically significant increases in parameter concentrations is difficult enough using results from a single laboratory. Using a variety of laboratories, and thus various operations and adaptations of methods, significantly increases further the variability of measurements and the difficulty of making valid statistical comparisons.

The regulated facility, Proteco, is responsible for ensuring that such controllable factors be controlled. This includes ensuring that laboratories under contract know exactly what is required of them.

Envirolab

Inadequacies were found in general quality assurance/quality control (QA/QC) practices, and specific analytical methods and operations. Regarding QA/QC, a written quality assurance plan does not exist for this facility. Many creditable QA/QC activities are performed and lines of responsibility of personnel apparently are well established. However, certain basic QC processes have

Regarding analytical methods for all other parameters analyzed by Envirolab, appropriate methods are being used. However, matrix spikes are not routinely performed. The routine use of matrix spikes is recommended to further ensure the reliability of data.

Regarding the field measurements of pH and specific conductance, up to the time of our inspection these measurements were not being performed in the field. They were being performed at Envirolab, within six hours of collection. This is not acceptable. EPA policy is that these measurements be made in the field, immediately at the time of collection. It was explained to us that all future measurements would be made in the field, at the time of collection.

Additionally, the instrument used for measuring specific conductance does not compensate for temperature, and corrections were not made for temperature. It should be noted that temperature was not recorded at the time of measurement for at least half of the measurement data observed by us. Consequently, much of the data cannot be corrected subsequently.

Performance evaluation (PE) samples for all of the parameters of interest, including pH and specific conductance, are analyzed every six months. Some, but not all, of the results for 1985 were provided to us. Results were not provided for arsenic, mercury, and selenium. Results provided indicate possible problems with the accuracy of barium analysis. (It should be noted that the results of PE analyses are meant to be an indication of the potential reliability of a facility's basic operations. They do not give any indication of a laboratory's ability to deal with matrix problems. They also do not provide, at least in this case, an indication of the facility's ability to achieve desired detection limits.)

Orlando Laboratories

This facility has a quality control manual which covers all sampling and analytical activities. The facility also has a recently established full-time quality assurance officer.

The laboratory is certified by the State of Florida's Department of Health and Rehabilitation Services for the pesticide and herbicide analyses of interest and State Department of Environmental Regulation for TOC analysis. However, in recent years these certifications have been based solely on results of performance evaluation samples.

Regarding general laboratory practice, certain inadequacies exist in that samples and analytical reagents are stored in a refrigerator without a thermometer. Working standards apparently are not always dated. Documentation of quality control data is lacking in some areas. Certain standard operating procedures are not complete. However, many good quality control activities are performed, and the laboratory currently is in the process of upgrading its overall quality assurance program.

Regarding analytical methods, the pesticide and herbicide analyses are performed by incomplete versions of EPA Method 608 and Method 509b from "Standard Methods for the Examination of Water and Wastewater", 15th Edition, respectively. The variations from these EPA approved methods apparently are due to the fact that they are set up by Orlando Laboratories as screening methods. The screening is based on a one point rather than five point calibration. The screening pro-

Timeline of Regulatory Activities Related to

Ground-Water Monitoring at Proteco

*SCI (Servicios Carbareon) Inc.) = Proteco

EPA's/EQB's Actions		Proteco's Actions
	1978	
October - EQB requests from SCI water table determinations at trenches and surface impoundments.		
	1979	
		February - SCI submits information on water table to EQB. They drilled two (2) thirty (30) foot wells. - SCI submits field procedures utilized for drilling the two (2) wells.
February - EQB performs site inspection and determines that wells are insufficient in number and not properly located.		
August - EQB sends SCI comments on Environmental Impact Statement (EIS) submitted by SCI on July 12th, 1979. EQB requests information on: - groundwater quality - water table contour map - map of boring and monitoring well locations		

June - EQB requests from SCI a visual inspection plan for the groundwater and surface water monitoring system during the active life and post-clsoure care period of the facility.

August - EQB requests from the Planning Board the visual inspection plan originally requested from the SCI in June.

September - 9/11/80 facility notifies EPA that it is a TSD.

November - EQB evaluates the Compliance Plan sent by SCI on October 28th, 1980. Deficiencies are found in the official monitoring system. 11/11/80 facility qualifies for interim status.

December - EQB sends notification to SCI of the evaluation of the Compliance Plan.

- EQB issues report on inspection. Included in the report are the comments from the November 7th evaluation

1981

January - SCI submits Compliance Plan including the official monitoring system with an effective date of February 19th, 1981.

February - EQB inspects SCI. SCI does not have results from the well sampling program.

May - Internal EQB memorandum states the need to install liner system and a leachate collection system under all the surface impoundments and the need to install new upgradient wells.

- EQB sends comments to SCI about the Compliance Plan. EQB recommends the placement of a liner and leachate collection system under all the surface impoundments.

1983

January - Ertec(EPA contractor) site visit to facility to evaluate groundwater monitoring system.

February - EQB performs site inspection at SCI and finds that they are drilling their last well for the hydrogeologic study.

March - EQB's Ruling Board approves a motion not to make any decision until a final determination is made with respect to the hydrogeologist study.

April - EQB sends NOD to SCI about Compliance Plan inadequacies. The groundwater monitoring system issue is left pending until latest hydrogeologic study is submitted and evaluated.

- At a meeting with EQB and SCI, Ertec Atlanta states that the groundwater monitoring system does not comply with federal and state regulations.

April - SCI sends EQB Phase A of its hydrogeologic study work plan for evaluation.

August - Settlement conference on 3013.

October - EQB evaluates SCI Monitoring Well Construction Specifications document. EPA signs 3013.

November - 11/8 facility files LOIS certification

- 11/11-11/24, Groundwater Task Force site investigation.

REGIONAL AND SITE SPECIFIC GEOLOGY AND HYDROLOGY

Regional Hydrogeology

Puerto Rico is the smallest and most easterly of the islands which form the Greater Antilles, and it is part of the Greater Antilles Geologic Province (see Figure 5). The structural evolution of Puerto Rico is associated with plate tectonics, and the island is part of the West Indies Island Arc system. The Puerto Rico Trench lies approximately 150 kilometers north of the island; the Atlantic Ocean reaches its maximum depth of 8,516 meters at this location. Some time after the middle Tertiary, Puerto Rico was separated by block faulting from the other islands of the Greater Antilles, and it was arched, uplifted and tilted to the northeast. Culebra, Vieques and the Virgin Islands are part of the Puerto Rican block, and they are separated from the main island because of the drowning that resulted from the tilting.

Figure 6 is a geologic map of Puerto Rico. The complex central (east-west axis) core of the island is flanked on the north and south by Oligocene and Miocene clastic sediments and limestones. The central core consists primarily of late Cretaceous and early Tertiary volcanic and intrusive rocks. The volcanic rocks include submarine volcanic ash deposits interspersed with lava flows, and they are intruded by a number of masses of plutonic rock. These rocks have been folded and intensively faulted into hundreds of fault blocks (Cox $ Briggs, 1978). Outcrops of serpentinite are present in western Puerto Rico.

The northern carbonates consist primarily of marine limestones, marls and claystone; they dip gently northward and have an east-west extent of 120 kilometers, and a maximum north-south width of 21 kilometers. The Northern carbonates have undergone extensive solutioning which has produced a juvenile karst topography in the northwest and mature karst topography in the northeast. The south coast carbonates have a maximum extent of 40 kilometers east to west and are up to 8 kilometers in width.

The south coast carbonates have undergone more structural disturbance than the northern carbonates, and they are are moderately faulted and dip seaward at a greater angle than those on the northern flank. The Juana Diaz Formation, which forms a part of the south coast carbonates, will be examined in detail in a subsequent section of this report. Extensive Quarternary alluvial deposits are located on the southern coast.

The divide of the east-west trending Central Cordillera mountain chain is approximately one-third closer to the south coast than the north coast, and the river courses which flow to the south therefore have steeper gradients and greater energy. This has resulted in a series of coalescing alluvial fans of poorly sorted clastic debris which form a coastal plain between Ponce and Guayama that reaches an average north/south width of approximately five kilometers. The coastal deposits form the major aquifer of southern Puerto Rico and much of the water is used for irrigation. West of Ponce, the coast is characterised by Tertiary limestone deposits and a series of alluvial valleys cut into the Tertiary limestone. One of these major alluvial valleys forms part of the Tallaboa River drainage basin, and since the Proteco facility is located in a small sub-catchment of this drainage, the Tallaboa River drainage basin will be examined in some detail.

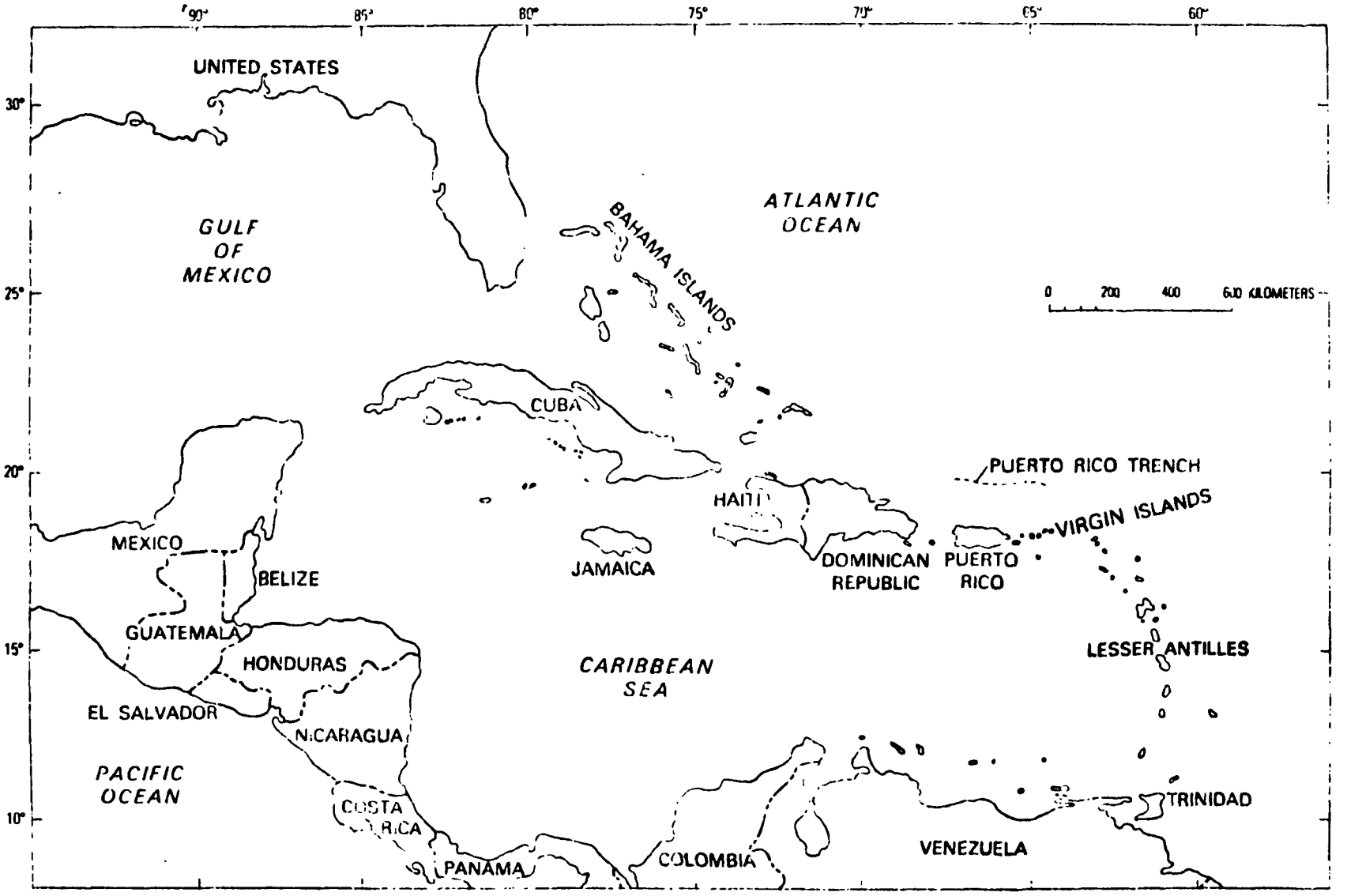


Figure 5 Location of Puerto Rico in Caribbean Region (from Monroe, 1980)

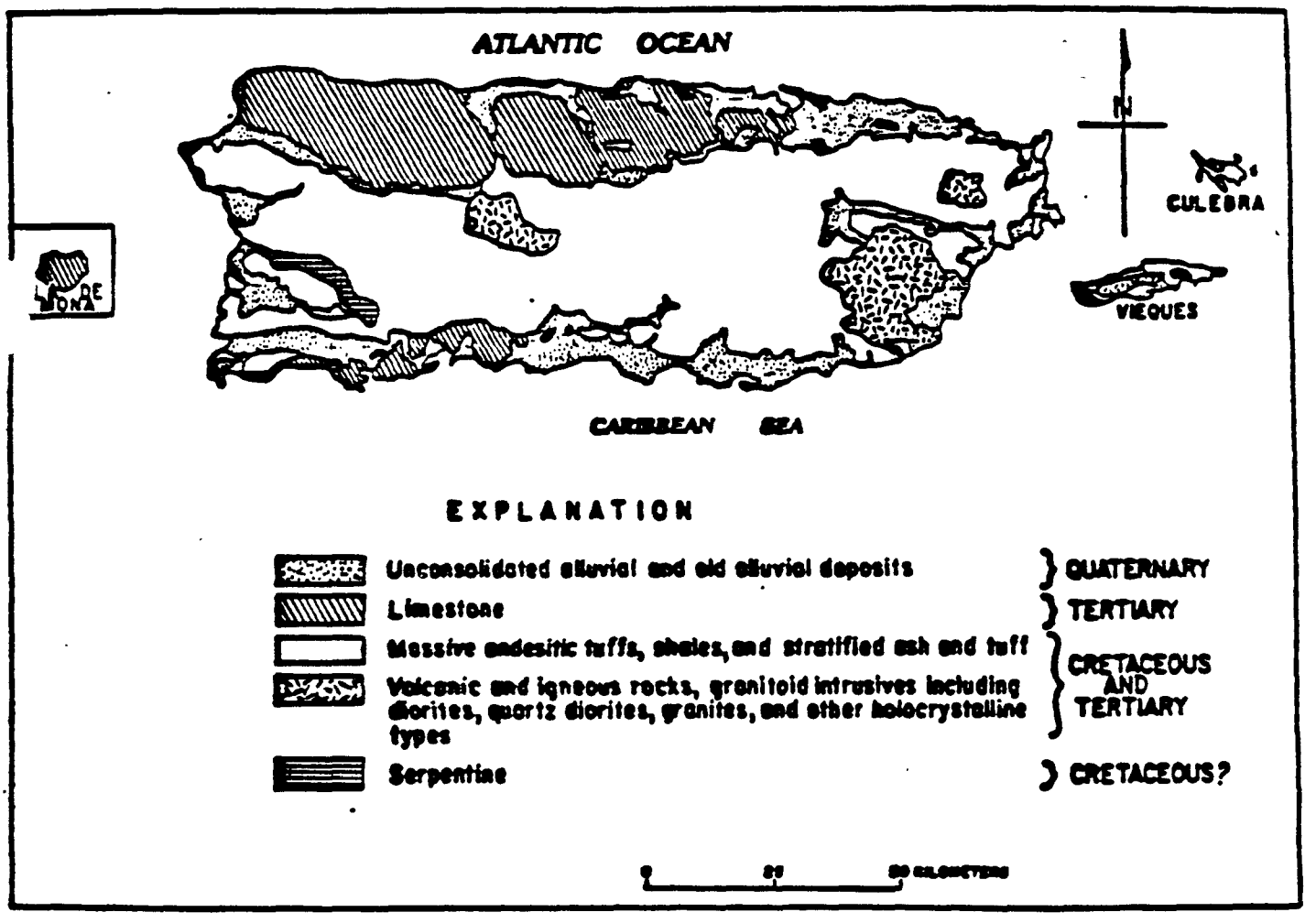


Figure 6 General geology of Puerto Rico and its offshore islands (from Gomez and Heisel, 1980).

The Tallaboa River drainage basin (with the approximate boundaries of the Proteco sub-catchment area delineated) is included as Figure 7 . The drainage basin has an area of 31.0 square miles. The Rio Tallaboa and its main tributary, the Rio Guyanes, originate on the southern slopes of the Cordillera Central. North of the town of Penuelas, the Rio Tallaboa and Rio Guyanes are perennial streams, and they flow in steep, narrow valleys with relatively thin veneers of alluvium. Just south of Penuelas, the Rio Tallaboa and the Rio Guyanes join at a point where the valley floor decreases in slope and begins to widen. The Tallaboa Valley is the major geomorphological feature in the basin.

A geologic map of the Tallaboa basin is included as Figure 8 . As indicated previously, the headwaters of the Tallaboa River originate in the volcanic complex of the Central Cordillera. Stream sediments in the valley include detrital material from the igneous central core and lesser amounts of transported material from the Ponce Formation and Juana Diaz Formation which flank the valley walls along much of the main valley. The Ponce Limestone is a pale orange to grayish orange crystalline calcarenite. It is of Miocene age and rests unconformably on the Juana Diaz Formation in much of the area. It is believed to have a thickness of up to 850 meters near the southwestern corner of the Penuelas quadrangle (Monroe and Krushensky, 1978).

The Tallaboa Valley has been developed primarily by erosion of the relatively soft beds of the south coastal carbonate sequence. The valley width ranges from approximately 300 meters near the neck in the valley to over 1400 meters just north of Highway 2; below Highway 2 the valley broadens to over 6000 meters near the coast. The Tallaboa River has built a prograding delta into Tallaboa Bay. The longshore currents along the south coast are from the east-southeast, and much of the sediment deposited in the bay has been transported along the coast and is forming a distinctive spit (see Figure 8) which separates Tallaboa Bay from Guayanilla Bay. The Tallaboa River has shifted its course over time, widening its valley and forming a complex series of lenticular stream bed and flood plain deposits. As the carrying load of the stream decreases on its path from the Cordillera Central to the Tallaboa Bay, there is a concomitant decrease in detrital particle size along the valley. Grossman et al (1972) examined well logs in the valley and estimated alluvial thickness to range from approximately 12 meters near the neck of the valley to over 60 meters near the shore.

The alluvium represents the major aquifer in the region. Grossman et al (1972) examined the aquifer characteristics as part of a United States Geological Survey study of ground water along the south coast of Puerto Rico. Transmissivity estimates based on 4 well tests were approximately 300,000 gpd/ft; cross sectional flow was estimated at 2.5 million gallons per day during a wet period and 1.2 million gallons per day during a dry period. Well yields in the valley ranged from 2.5 to 2500 gpm. Wells south of Highway 2 tended to yield low quantities of water due to a predominance of silt and clay in the alluvium.

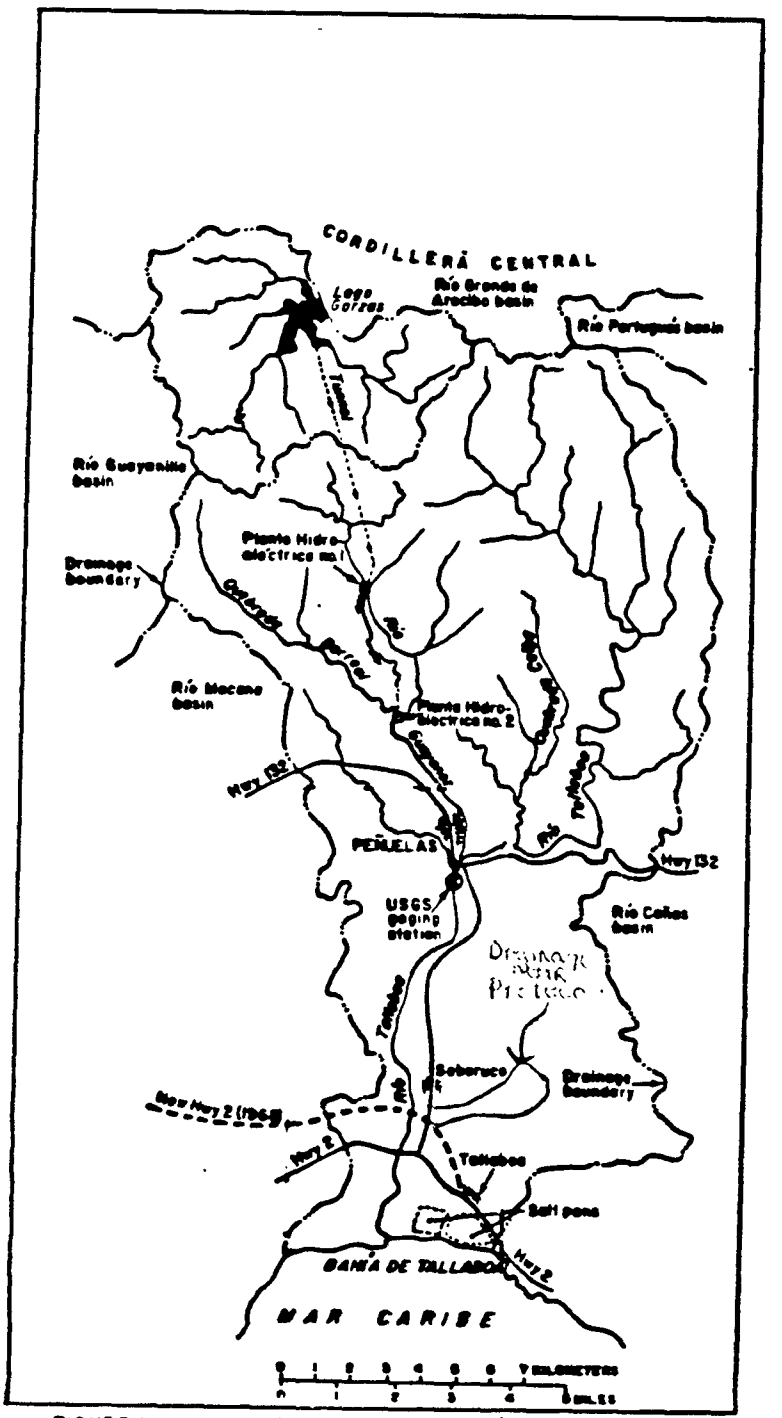


FIGURE 1--Location of study area and the Río Tallaboa basin.

Figure 7 Tallaboa River drainage basin (modified from Grossman et al, 1972).

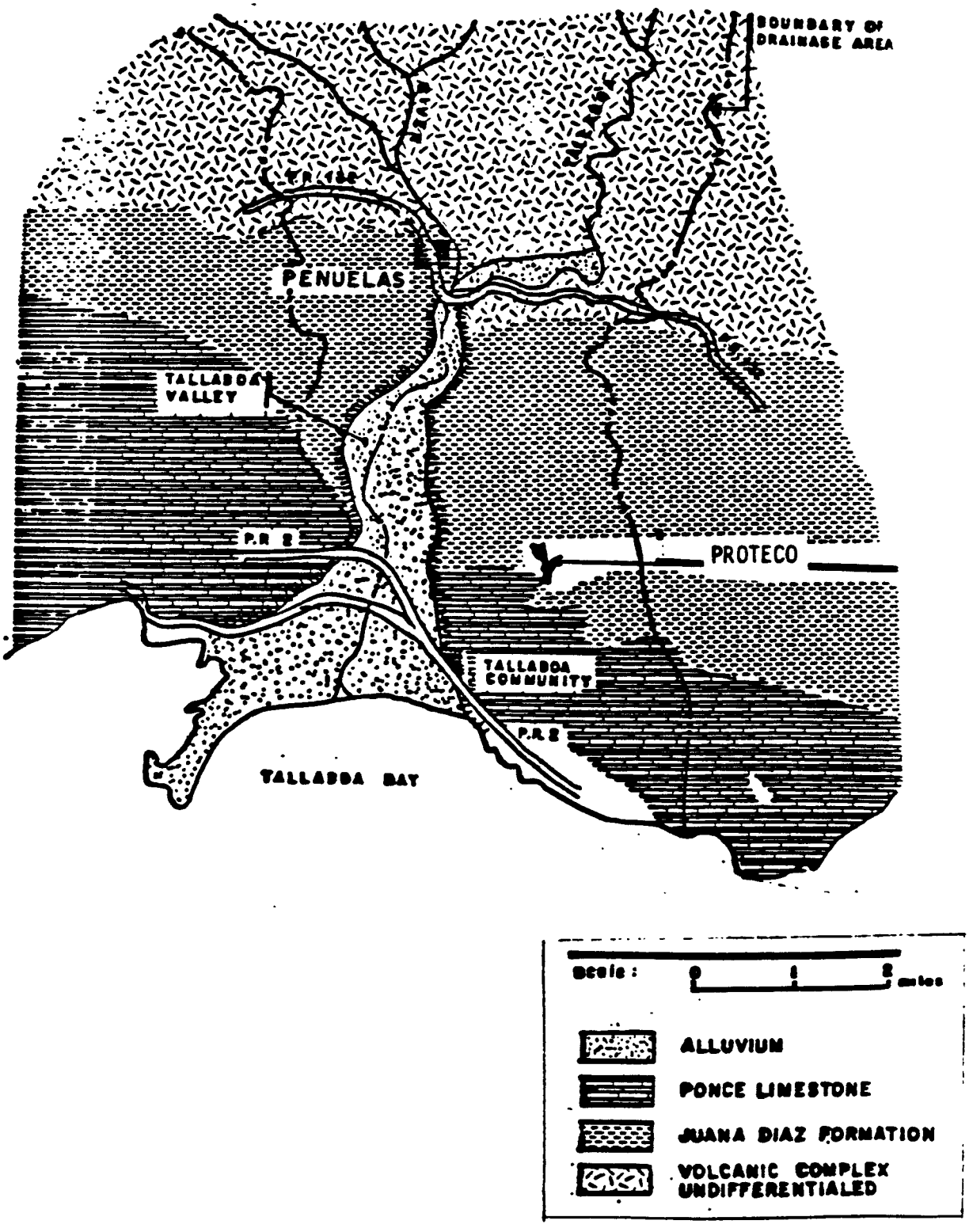


Figure 8 Geologic Map of Tallaboa basin (after Soriano, 1983).

Grossman studied the surface water quality of the Tallaboa Valley in detail. Samples were collected monthly from the Tallaboa River at Penuelas and at Tallaboa. Additional samples were collected at infrequent intervals from headwater streams and canals and irrigation ditches in the valley. All the surface water supplying the valley is of the calcium bicarbonate type.

Chemical quality of the ground water in the Tallaboa Valley in most places is similar to that of the surface water. Inputs into the ground-water system below Penuelas include components from surface water flow that enters the valley (dervived from volcanic and carbonate outcrops), underground flow to the valley, local rainfall in the valley and surrounding hills, and salt water from the Caribbean Sea. Chemical results from approximately 90 wells indicate calcium bicarbonate type waters. Due to a lack of wells in the upland areas and in the bedrock abutting the valley walls, the water chemistry of the of the Ponce Limestone and Juana Diaz deposits is not adequately defined. Giusti (1968) indicated that the Juana Diaz Formation, being of marine origin and relatively low permeability, is invariably salty due to its retention of original salinity at its time of deposition. To further complicate matters, many of the wells in the valley tap both the alluvial deposits and the Ponce Limestone and are perforated throughout both deposits. South of Highway 2, a salt water wedge exists shoreward of the Tallaboa Bay. Water quality in this area was studied by Diaz (1974), and sodium and chloride were the major inorganic constituents and water quality is a function of depth.

Grossman attempted a water budget for the Tallaboa basin, and his results indicate the difficulties of using this approach in semi-arid lands with high evapotranspiration rates which also experience widely fluctuating levels of rainfall in wet and dry years. The interested reader is referred to Grossman's paper.

Historically, the prime use of ground water in the Tallaboa basin has been for agriculture and domestic supplies. Fresh water is needed for the irrigation of sugar cane and for fodder, fruit and vegetable fields. The irrigation water comes from a series of dams and diversion ditches used to exploit surface water supplies in the valley and from agricultural supply wells in the valley alluvial aquifer. Grossman estimated that approximately 7 million gallons per day were pumped from the agricultural supply wells in 1961.

The 1950's witnessed a significant change in water use in the Tallaboa basin. Commonwealth Oil Refining Corporation (CORCO) and Union Carbide Caribe established refining and chemical manufacturing plants near the mouth of the Tallaboa Bay, and other industries established facilities in the same area. The industries required substantial amounts of fresh water for operation. Grossman estimated industrial pumpage at the industrial complex to be approximately 4 million gallons per day in 1960.

Although it appeared in the 1960's that there would be a major conflict between industry and agriculture for water supplies in the Tallaboa basin, world-wide economic conditions forestalled a crisis. The petrochemical industry in the Tallaboa Bay area has been largely shut down, and, with the exception of the power generating station, there is little industrial demand for water. The agricultural economy, based primarily on sugar cane, has also suffered as a result of low sugar prices and the shift towards sugar beets as the primary

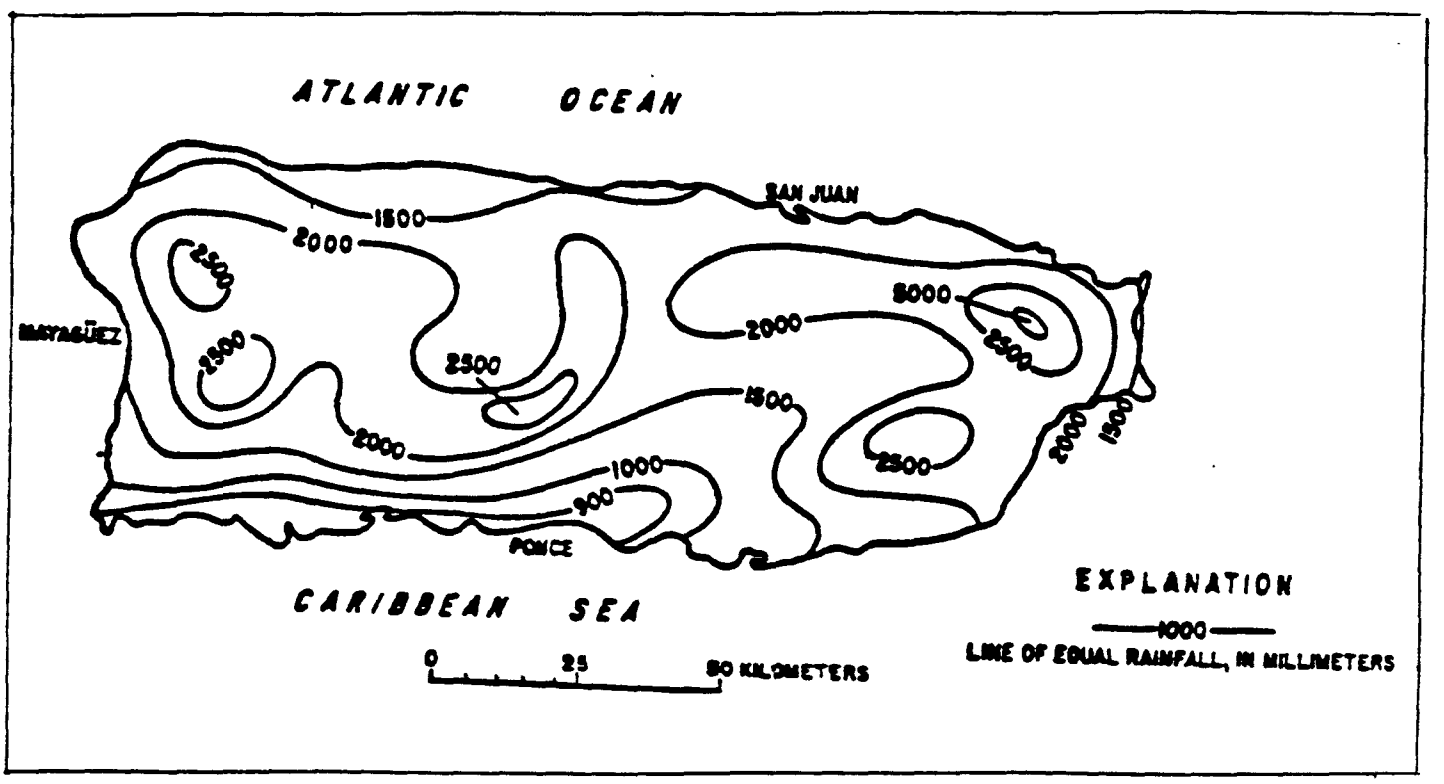


Figure 9 Average annual precipitation, Puerto Rico (from Gomez and Heisel, 1980).

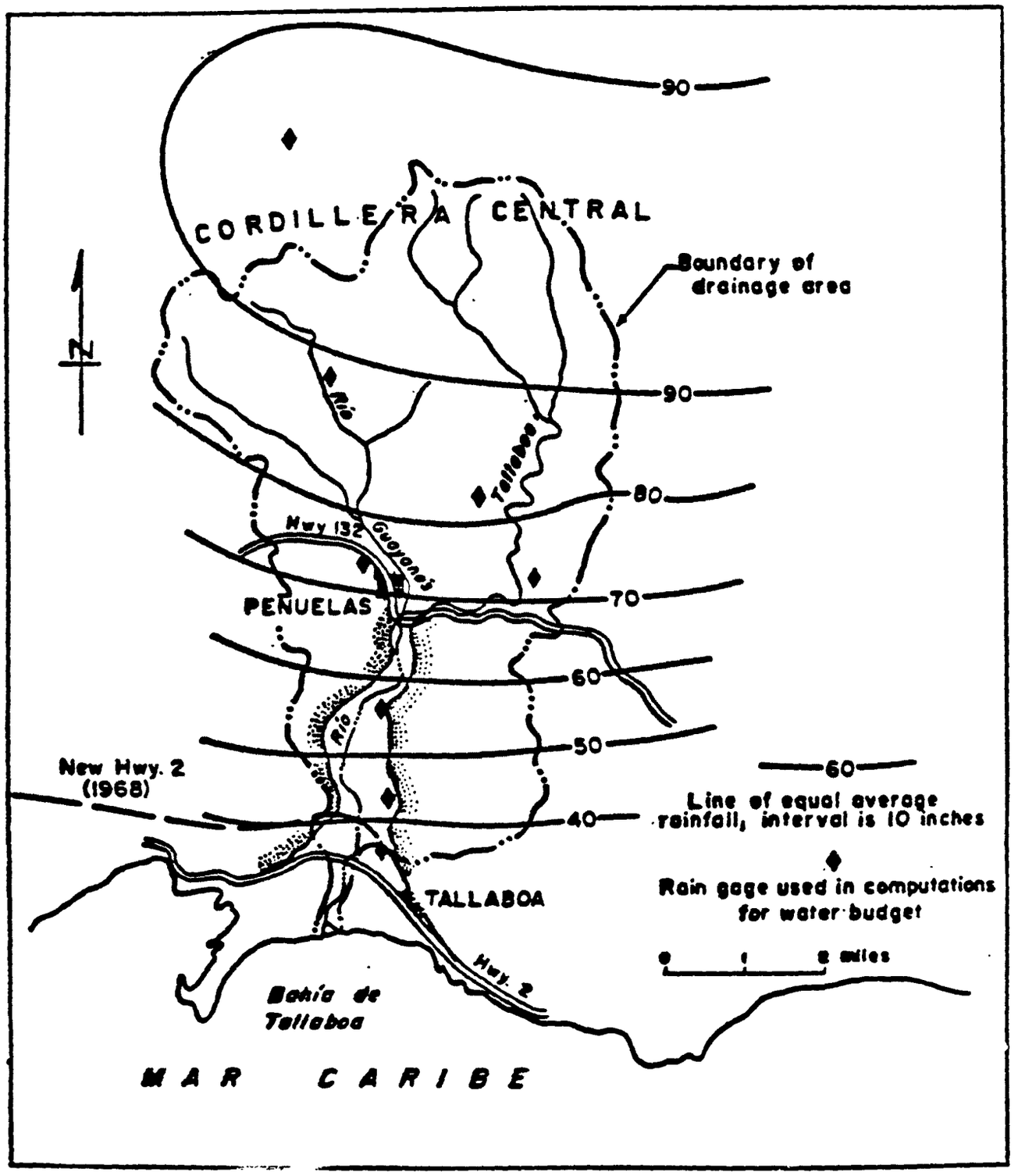


Figure 10 Average annual rainfall in the Tallaboa basin (after Grossman et al, 1972).

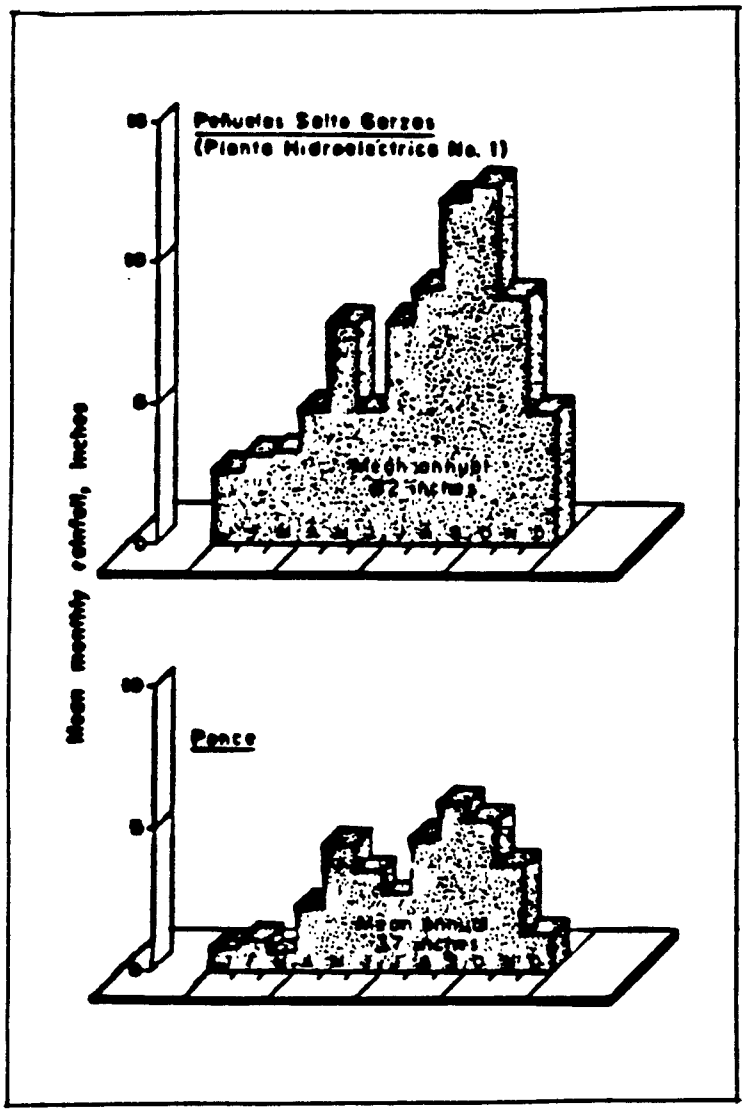


Figure 11 Mean monthly rainfall south coast of Puerto Rico (from Grossman et al, 1972).

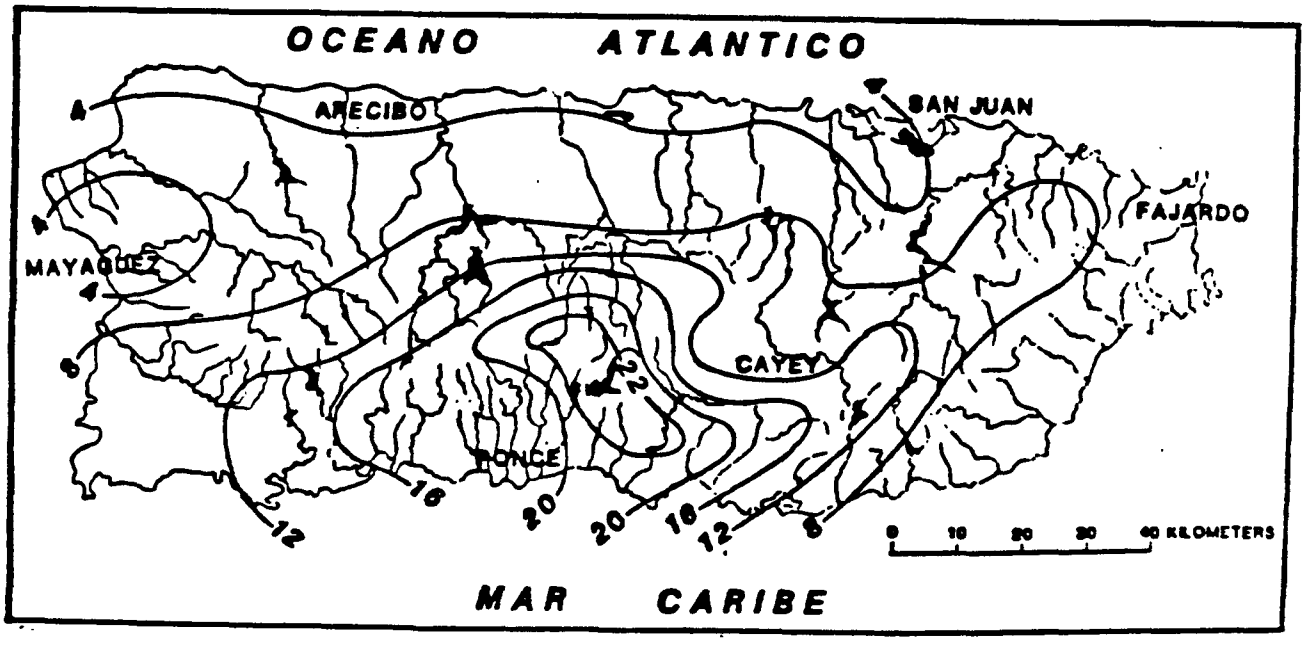


Figure 12 Total rainfall during 10/5/86 - 10/6/86 storm event in Puerto Rico (map prepared by Bob Caluvesbert, National Weather Service).

The Juana Diaz formation is lithologically quite varied. It consists of clastic beds composed of sands, pebbles and boulders, and mudstone, limestone and reef deposits. The lithologic units of the formation appear to be lenticular and frequently intertongue with each other. The lower part of the formation consists mainly of conglomerate and mudstone, with lenses of limestone present at many horizons. The upper part of the formation consists mainly of limestone and chalk, with lenses of mudstone and gravel. No formal members of the formation have been defined due to the shortage of cored boreholes along the south coast.

The Juana Diaz Formation is continuously exposed, except for alluvial filled valleys, from an area four kilometers east-southeast of Juana Diaz, west to the hills southwest of Ensenada. The outcrop is highly irregular because the formation is cut into many fault blocks. The Juana Diaz Formation is in fault contact with older rocks of Cretaceous to Eocene age. At other places, the Juana Diaz rests on an eroded and highly irregular surface of older rocks. The top of the Juana Diaz was truncated by erosion before the deposition of the Ponce Limestone.

In the area between the Tallaboa River and the town of Juana Diaz, limestone remnants of originally discontinous nearshore reefs are present; in the area between Quebrada del Agua and the Tallaboa River, much of the reef limestone intertongues with mudstone.

The origin of the Juana Diaz Formation is presently in dispute. Moussa and Seigle (1970), citing the abundance of planktonic foraminifers, postulated a deep-water marine origin. This interpretation is difficult to reconcile with the presence of cross bedded sands and carbonaceous clay which suggest desposition in a nearshore shallow water environment. In order to reconcile the conflicting lithologic and paleontologic evidence, Monroe postulated deposition of the lower Juana Diaz at a time when the upland to the north was being uplifted and the sea floor was subsiding, with the result that large qantities of cobbles, boulders and mud were being deposited by rivers on a subsiding shelf. Growth of the reef must have been rapid enough for it to remain in the sunlit zone of water, and mud must have settled rapidly so that the corals were able to surive. Monroe further postulated that the upper Juana Diaz chalky limestone was deposited during a time when the streams apparently were carrying less detrital material to the sea and deposition occurred in slightly muddy water in which lime-secreting organisms supplied most of the sediment.

Site Hydrogeology

The Proteco facility lies in the foothills of the Juana Diaz Formation at an elevation of approximately 80 meters. Four lithologic units have been recognized in either outcrops or well cuttings at the facility. These include:

(1) A chalky, silty, white to orange soft limestone with abundant foraminifers. This unit is exposed in several easily accessible outcrops at the facility.

(2) A tan to brown unconsolidated silty clay. This unit contains distinct gypsum veins, some of which are visible at the surface as a result of earth moving work at the facility.

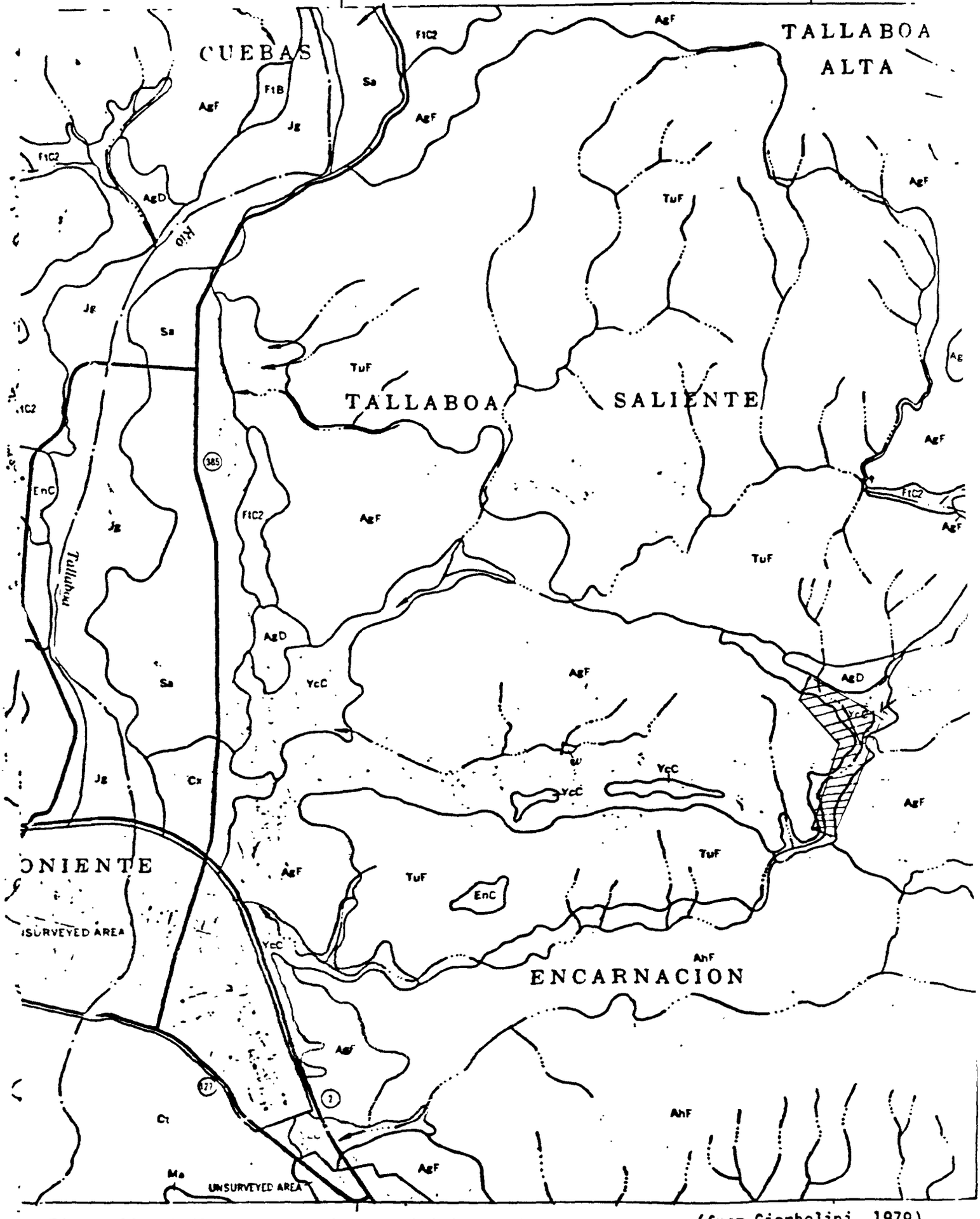


Figure 13 Soil survey map in the vicinity of PROTECO facility (from Gierbolini, 1979).

above the facility in order to establish drainage channels. As mentioned earlier in the section on storm patterns on the south coast, intense, short duration storms lead to extensive runoff and flooding. The storm of October, 1985, resulted in severe erosion in the area of the Proteco facility, and the road to the facility was washed out. A program of revegetation should be established at the facility in order to help control erosion and caution should be used to limit further denudation of the area. A work plan as part of the 3013 order has been designed to quantify the runoff and chemistry of the surface water at the facility.

In spite of several hydrogeologic investigations at the Protect facility, an adequate explanation of the hydrogeology at the facility has not been completed. The 3013 Order signed by Region II and the facility was partly designed to address this problem. Two work plans for a phased hydrogeological investigation have been approved by the EPA, and a report examining the results of an extensive drilling program is to be submitted to the EPA on September 30, 1986. The comments which follow are based on earlier reports submitted to the agency by hydrogeologic consultants for the facility, field visits to the site by the EPA lead hydrogeologist and progress reports submitted to the agency as part of the phased hydrogeologic investigations.

Proteco is located in a small catchment of the Talloboa River drainage basin, and is approximately 2.5 kilometers from the Tallaboa valley. The towns of Seboroco and Tallaboa lie approximately 2.5 kilometers to the west and southwest. No wells are located between the towns and the facility. There is an elevation difference of approximately 80 meters between the facility and the valley floor, and the ridge line above the facility attains an elevation of over 150 meters. The area is a potential recharge zone.

Ground water has been encountered in two major zones at the facility. The first water bearing unit is located in an upper zone of tan, silty clay. The tan, silty clay has a thickness of approximately 60 feet in several areas of the facility. Ground water is associated with gypsum veins in these marine clays. It should be emphasized that this upper aquifer zone is discontinuous at the site; many wells drilled into these deposits do not encounter ground water at shallow depth. Observations from drilling logs indicate that this water may be partially confined. Well yields are frequently minimal, with wells being bailed to dryness during sampling. No attempt was made to draw water level contours for this report due to the lack of borehole spatial controls and the discontinuous nature of the water bearing zone, but point elevations indicate flow is toward the valley axis. The water chemistry in the upper zone indicates a highly saline ground water, with sodium and chloride being the major inorganic constituents, and specific conductance values are in the range of 40000-50000 micromhos.

A deeper water bearing zone(s) is also present at the facility. This ground water has been encountered at depths ranging from 160-230 feet. The water bearing material appears to consist of sand and gravel layers within a massive grey mudstone. This zone appears to be confined -- drilling observations indicate that water rises 100-130 feet after it is encountered. Water chemistry is significantly different from that in the upper zone. Specific conductance

Groundwater Sampling and Analysis

During the evaluation of Proteccion Tecnica Ecologica (AKA: Servicios Carbareon), Task Force personnel collected samples from 15 of the facility's groundwater monitoring wells in an attempt to determine if hazardous wastes or hazardous waste constituents had migrated from the waste management units into the underlying groundwater. Well selection was based on a number of factors. These included: the screened interval of the well, hydraulic location (upgradient, downgradient), proximity to the waste management units and the results of previous sampling activities. Table 2 presents the physical characteristics of the wells selected for sampling. Figure 14 depicts the approximate location of these wells in relation to the hazardous waste management units designated, at the time of this inspection, as RCRA regulated units. Figure 15 depicts the approximate location of these wells in relation to the active and inactive waste management units known to exist at this site.

Of the 15 wells selected for sampling 12 were shallow wells. The screened interval of these wells is in the first groundwater occurrence beneath the site. This occurrence is found at a depth of between 30 to 75 feet below the land surface. The shallow wells selected are designated as monitoring wells: 4W81, 9W81, 14W85, 15W85, 18W85, 21W85, 22W85 23W85, 26W85, 28W85, 29W85 and 30W85.

The 3 remaining wells selected for sampling were deep wells. The screened interval of these wells is in the second groundwater occurrence beneath the site. This occurrence is found at depths greater than 158 feet beneath the land surface. The deep wells selected are designated as monitoring wells: 1W81, 11W83 and 12W83.

Prior to the evacuation of standing water, the well head and the breathing zone above each well head were monitored with an organic vapor analyzer (OVA) and/or HNu immediately after the removal of the well cap. The results of this monitoring are presented in Table 3. The physical characteristics of each well, ie: casing diameter, casing construction material, depth to static water and the total depth of the well, were also recorded.

Well evacuation was accomplished by removing 3 volumes of standing water from each well. Standing water volumes were calculated with the following mathematical equation:

$$V\ (gal.) = Tr^2\ (0.163)$$

where T is the linear feet of static water (total depth of well minus distance from top of casing to static water), and r is the inside radius of the well.

Evacuation procedures as described in the Work/QA Sampling Plan for the Groundwater Task Force Inspection at Proteccion Tecnica Ecologica, Inc. were followed. These procedures are outlined below:

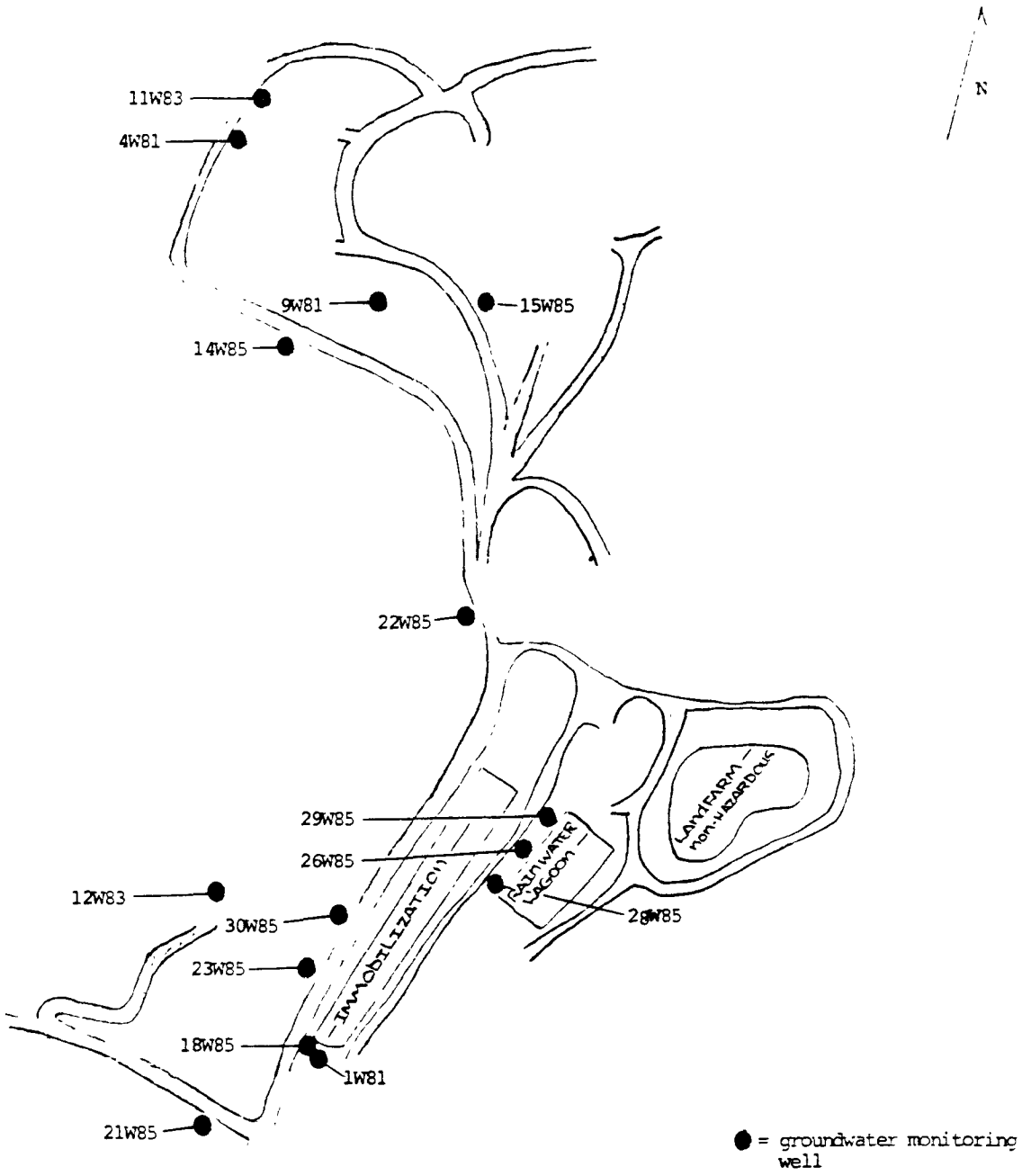


Figure 14 Location of wells sampled by the Task Force

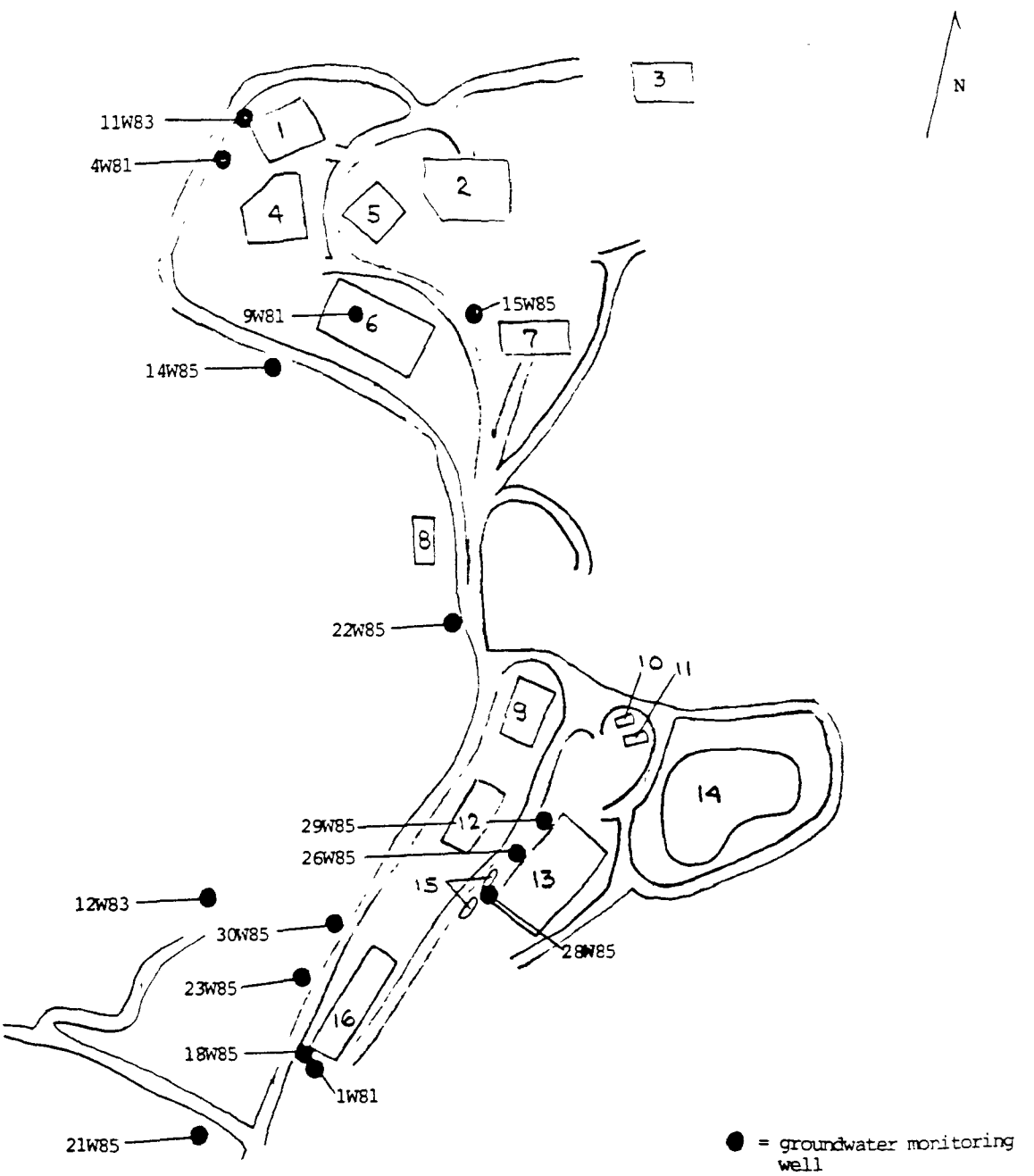


Figure 15 Location of wells sampled in relation to hazardous waste units

Proteco

Site Map Legend

Numerical Designation	Unit Description
1	Landfill, pre-RCRA drum burial
2	Landfill, pre-RCRA drum burial
3	Landfill, pre-RCRA drum burial
4	Drum storage area (active)
5	Landfill, pre-RCRA drum burial
6	Sanitary landfill (active)
7	Lagoon, corrosive waste (active)
8	Landfill, pre-RCRA drum burial
9	Lagoon, oil (active)
10	Immobilization area (inactive)
11	Immobilization area (inactive)
12	Land application area (active)
13	Lagoon, rainwater (active)
14	Land application, non-hazardous (active)
15	Tank storage area (active)
16	Immobilization area (active)

TABLE 2

-- Well Construction Specifications --

Well No.	Total depth of well	Depth to water	Screened interval	Screen length	Screen slot size	Well diameter	Construction material
1W81	229.0/230.0	71.2	214-229	15	0.01"	2"ID	PVC
4W81	53.0/54.02	42.15	39-53	14	0.001"	4"ID	PVC
9W81	57.5/73.9	32.4	46-56	10	0.001"	4"ID	PVC
11W83	193.0/197.5	166.65	170-193	23	unknown	2"ID	PVC
12W83	174.0/162.0	75.2	158-168	10	0.001"	2"ID	PVC
14W85	62.5/43.8	25.5	32.5-42.5	10	0.015"	2"ID	PVC
15W85	66.0/59.4	30.4	48-58	10	0.015"	2"ID	PVC
18W85	59.5/60.3	23.0	49.5-59.5	10	0.01"	2"ID	PVC
21W85	57.6/58.8	14.5	47.6-57.6	10	0.01"	2"ID	PVC
22W85	55.0/55.4	13.25	45-55	10	0.01"	2"ID	PVC
23W85	39.0/41.2	25.0	29-39	10	0.01"	2"ID	Teflon
26W85	69.0/69.2	23.1	59-69	10	0.01"	2"ID	Teflon
28W85	74.0/76.2	52.5	64-74	10	0.01"	2"ID	PVC
29W85	33.8/35.4	4.95	23.8-33.8	10	0.01"	2"ID	Teflon
30W85	54.0/54.8	37.75	44-54	10	0.01"	2"ID	Teflon

note: Total depth of wells are facility measurements/Task Force field measurements. Depth to water are Task Force measurements, all other construction details were provided by the the facility (Servicios Carbareon).

Table 3

-- Well Head and Breathing Zone Air Monitoring Data --

Well No.	Instrument Used	Well Head	Breathing Zone
1W81	HNu	2 ppm	background
	OVA	background	background
4W81	HNu	.4 ppm	background
	OVA	1.5 ppm	.2 ppm
9W81	HNu	background	2 ppm
	OVA	40-100 ppm*	2 ppm
11W83	HNu	background	background
	OVA	background	background
12W83	HNu	background	background
	OVA	background	background
14W85	HNu	------	------
	OVA	background	background
15W85	HNu	------	------
	OVA	2 ppm	background
18W85	HNu	1 ppm	background
	OVA	------	------
21W85	HNu	------	------
	OVA	background	background
22W85	HNu	------	------
	OVA	background	background
23W85	HNu	------	------
	OVA	background	background
26W85	HNu	------	------
	OVA	background	background
28W85	HNu	------	------
	OVA	background	background
29W85	HNu	------	------
	OVA	background	background
30W85	HNu	------	------
	OVA	background	background

------ = instrument not used
* = response characteristic of methane

1) Properly locate and identify monitoring well.

2) Remove locking cap and/or protective cap. If needed, the exterior and interior of the exposed riser pipe of the monitoring well should be wiped with filter paper and deionized water.

3) Use air monitoring equipment (i.e. OVA, HNU) on escaping gases at the well head to determine the need and/or level of respiratory protection. Record readings in a field notebook.

4) Use an interface probe and/or bottom loading teflon bailer to determine the presence of an immiscible phase.

   Record findings in a field notebook.

5) Using a clean weighted steel measuring tape, level indicator and/or acoustic sounder, determine the following physical measurements:

   a) well and casing diameter
   b) static water level from top of the casing
   c) total depth of the well

   Record all measurements in a field notebook and/or Well Monitoring Data Sheet.

6) Calculate static water volume in gallons using the tables provided.

7) Using a dedicated teflon bailer or bladder pump, begin removal of water from the well. During evacuation, lower purging equipment or pump intake into the well a short distance below the water level and begin water removal. Lower purging equipment as required to maintain submergence. Collect purge water in 55-gallon drums. The project coordinator (Ton Moy) will determine appropriate disposal procedures.

8) During the above operation, the following information should be recorded in a field notebook or on a Monitoring Well Data Sheet.

   a) purging times, beginning and ending
   b) general characteristics of water being removed (i.e. color, odor, turbidity, etc...)
   c) rate of discharge measured in a calibrated bucket
   d) volume of water in casing
   e) volume of water removed from well

9) The procedure for purging is dependent upon the yield of the well.

   - In low yield wells, the wells should be evacuated to dryness once and as soon as the well recovers, the first set of parameters taken are those which are pH and volatile sensitive.

The sampling procedures followed were those described in the Work/QA Sampling Plan for the Groundwater Task Force Inspection at Proteccion Tecnica Ecologica, Inc. These procedures are outlined below:

1) Select cleansed dedicated teflon bailer.

2) Attach bailer to either a cleansed stainless steel, teflon coated stainless steel or monofilament line.

3) Lower bailer until it contacts water surface.

4) Allow bailer to sink and fill with a minimum of surface disturbance.

5) Slowly raise bailer to surface. Do not allow bailer line to contact the ground. Discard first volume collected in bailer.

6) Begin sampling using a teflon bottom valve attached to the bailer for sample removal. Avoid, as much as possible, turbulence of sample in transfer from bailer to sample container.

7) Repeat steps 3-6 as needed to acquire sufficient volume.

8) Contain and preserve samples according to guidelines specified by the contract laboratory.

9) Measure in-situ parameters: pH, specific conductivity and temperature.

10) Label sample bottles with the following information:

    Well name and/or site number
    Date
    Time
    Traffic Report number
    Analysis Requested (i.e. metals, VOA, etc...)
    Preservative (if required)

    Record the information in a field notebook and complete all Traffic Reports (Inorganics and Organics), and Chain of Custody Records.

11) Place the sample containers in a metal or plastic cooler maintained at 4 $^{\circ}$C throughout the sampling and transportation period.

Samples were collected for the analytical parameters specified in the list of Monitoring Parameters, attached as Appendix E . Table 4 presents the parameter, bottle type and methods of preservation used by the Task Force. The samples were analyzed by EPA contractor laboratories. In addition, samples requiring immediate measurement, i.e. pH, temperature and specific conductivity, were measured in the field. These results are presented in Table 5 .

TABLE 4

Parameter, Bottle Type and Preservative List

Parameter	Bottle Type	Perservative
1. Voltile organics	4 - 60ml vials	Cool @4 °C
2. Purgeable Organic Carbon (POC)	1 - 60ml vial	Cool @4 °C
3. Purgeable Organic Halogens (POX)	1 - 60ml vial	Cool @4 °C
4. Extractable Organics	4 - 1 qt amber glass	Cool @4 °C
5. Total Metals	1 qt. plastic	NHO_3
6. Dissolved Metals	1 qt. plastic	Filtered, NHO_3
7. Total Organic Carbon (TOC)	1 - 4 oz. glass	H_2SO_4, Cool @4 °C
8. Total Organic Halogens (TOX)	1 qt. amber glass	No Headspace Cool @4 °C
9. Phenols	1 qt. amber glass	H_2SO_4, Cool @4 °C
10. Cyanide	1 qt. plastic	Na OH, Cool @4 °C
11. Sulfate and Chloride	1 qt. plastic	Cool @4 °C
12. Nitrate and Ammonia	1 qt. plastic	H_2SO_4, Cool @4 °C
13. Pesticides	2 - 1 qt. amber glass	Cool @4 °C
14. Dioxin	2 - 1 qt. amber glass	Cool @4 °C

Table 5

-- Field Measurements --

Well Number	Temperature (°C)	pH	Specific Conductivity* (umhos)	Salinity (ppt)
1W81	27.0	6.8	3,300	2
4W81	26.0	6.7	6,000	--
9W81	26.0	5.8	41,000	26
11W83	26.0	6.7	6,000	--
12W83	29.5	6.3	6,000	4
14W85	28.0	6.1	35,000	--
15W85	26.0	6.4	39,000	25
18W85	29.0	7.0	41,000	26.5
21W85	29.0	6.2	32,000	18.5
22W85	26.0	6.1	35,000	--
23W85	27.0	6.2	19,000	21
26W85	26.5	6.5	39,000	23
28W85	29.5	6.8	17,500	10
29W85	26.5	6.4	40,000	20.5
30W85	27.0	6.3	31,500	21

* = at temperature of groundwater

-- = no measurements taken

All samples, with the exception of those from wells 4W81 and 11W83, were collected within three hours after evacuation. In the case of wells 4W81 and 11W83, samples for POA, POX, POC, pH, temperature and specific conductivity were collected following evacuation. The remaining parameters were collected the following morning, after first resampling pH, specific conductivity and temperature in order to confirm that groundwater equilibrium had not significantly changed. This deviation from project plan protocol was necessary in order to facilitate site personnel who had asked that the Task Force's sampling efforts be curtailed by 4:30^{pm}. These work hour limitations were only imposed on the day, 11/18/85, wells 4W81 and 11W83 were evacuated.

Table 6 presents the sequential order of well evacuation and sampling. This table also includes the samples collected to fulfill Task Force quality control/quality assurance protocol. These procedures included the collection of field blanks, equipment blanks and duplicate well samples to insure the quality and reliability of the data generated by the sampling activities of this inspection. In addition, a trip blank was prepared and shipped with the sample containers prior to on-site activities.

Following the collection of the samples, EPA contractor personnel placed the samples in coolers containing ice. The samples were then returned to a staging area (cargo van) where preservation and filtration, if required, were completed. The samples were then packaged, in accordance with applicable Department of Transportation (DOT) regulations, for shipment to the EPA contract laboratories.

Standard chain of custody procedures were employed by Task Force personnel throughout this inspection.

As required under Section 3007 (a) of RCRA a receipt for samples was presented to and signed by facility personnel. These documents are attached as Appendix F. In addition, the facility was offered split/replicate samples prior to the start of on-site activities. The facility declined the Task Force offer to collect split/replicate samples.

TABLE 6

Sequential Order of Sample Collection

Well Number	Date Evacuated/Sampled	Sample Number
4W81	November 18-19, 1985	MQO 603
Equipment Blank	November 18, 1985	MQO 601
11W83	November 18-19, 1985	MQO 602
Equipment Blank	November 19, 1985	MQO 604
Field Blank	November 19, 1985	MQO 605
Trip Blank	November 19, 1985	MQO 345
14W85	November 19, 1985	MQO 606
15W85	November 19-20, 1985	MQO 607
22W85	November 20, 1985	MQO 608
Field Blank	November 20, 1985	MQO 610
9W81	November 21, 1985	MQO 614
9W81 Duplicate	November 21, 1985	MQO 615
21W85	November 21, 1985	MQO 611
18W85	November 21, 1985	MQO 609
Equipment Blank	November 21, 1985	MQO 613
Field Blank	November 21, 1985	MQO 612
12W83	November 22, 1985	MQO 660
23W85	November 22, 1985	MQO 661
29W85	November 22, 1985	MQO 665
Field Blank	November 22, 1985	MQO 663
30W85	November 23, 1985	MQO 662
Field Blank	November 23, 1985	MQO 670
1W81	November 23-24, 1985	MQO 669
Equipment Blank	November 24, 1985	MQO 664
28W85	November 23-24, 1985	MQO 668
26W85	November 23-24, 1985	MQO 666
26W85 Duplicate	November 24, 1985	MQO 667
Field Blank	November 24, 1985	MQO 344
Equipment blank	November 24, 1985	MQO 671

Task Force Sampling Data Analysis

During the inspection, Task Force personnel collected samples from 15 ground-water monitoring wells in an atempt to determine if hazardous wastes or hazardous waste constituents had migrated from the RCRA regulated units into the groundwater. This section presents the results of data obtained from the analysis of samples collected at ground-water monitoring wells 4W81, 9W81, 14W85, 15W85, 18W85, 21W85, 22W85, 23W85, 26W85, 28W85, 29W85, 30W85, 1W81, 11W83 and 12W83; however, the data generated by sample collection and analyses at wells 14W85, 18W85, 22W85, 23W85, 26W85, 28W85, 29W85 and 30W85 is questionable. Wells 22W85, 23W85, 26W85, 28W85, 29W85 and 30W85 were installed immediately prior to the Task Force inspection and were inadequately developed. According to facility personnel, Well 14W85 was submerged during the intense storm of October 1985. 16 samples were analysed for quality control/quality assurance purposes.

The results indicate inorganics in the of ground-water samples collected at Proteco. The inorganic compounds detected include aluminum, antimony, arsenic, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, thallium, tin, vanadium and zinc. Table 7 presents the metallic compounds identified and the concentrations detected. The results of cyanide, selenium, silver and mercury analysis were rejected by the QA/QC process and are not reported.

Four of the groundwater monitoring wells yielded samples showing levels of volatile organics. The volatile organic constituents detected include 2-butanone, chloroform and bromodichloromethane. In addition, acetone, methylene chloride, 1, 1, 1-trichloroethane and toluene were also found in a number of samples. However, these constituents were also found in the associated QA/QC samples (i.e., field blanks, equipment blanks and trip blanks), and this data cannot be used in determining releases from the facility. Table 8 represents the organic compounds detected in the samples collected by the Task Force.

The results of semi-volatile compound analysis and a good portion of the pesticide, PCB, and herbicide data were rejected by the QA/QC process and are not reported.

Several tentatively identified organic compounds were detected. However, the specific compounds reported have not been confirmed against laboratory standards and additional work is necessary in order to positively identify these compounds. Table 9 presents these compounds and the samples in which they were detected.

Task Force data indicates the presence of inorganic constituents in all of the samples collected. Concentrations of several of the inorganics, including barium and chromium, exceed drinking water standards. The data from seven of the wells is questionable due to the fact that six of the wells were inadequately developed and one of the wells was apparently submerged during the October, 1985 storm. Of the inorganics sampled,

due to sample holding times. Additional sampling and analysis is would be necessary in order to confirm the absence of presence of semi-volative compounds.

The tentatively identified compounds indicate the possible presence of organic contamination. The specific organic compounds have not been positively identified. Additional sampling and analysis is necesary to identify these compounds. After the 3013 hydrogeologic study of the facility is completed and the hydraulic parameters defined on a site-wide basis, it is recommended that the organic data generated by the Task Force be reviewed. It is also recommended that the RCRA monitoring wells undergo further well development and additional organic sampling be conducted in the new wells recently completed at the facility.

Table 7

Results of Inorganic Analysis on Samples Collected at Proteco

Compound (total)	Sample Number/Location: MQO 603 Well 4W81	MQO 601 Equipment blank	MQO 602 Well 11W83	MQO 604 Equipment blank	MQO 605 Field blank	MQO 345 Trip blank
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	621 e	---	32200 e	---	---	---
Arsenic	21.1	--- *	--- *	--- *	--- *	--- *
Antimony	*	--- r	*	--- r	--- r	--- r
Barium	---	---	525	---	---	---
Beryllium	---	---	---	---	---	---
Cadmium	--- r	---	13 r	---	---	---
Calcium	460000 e	---	1380000 e	---	---	---
Chromium	39	---	83	10	(7)	---
Cobalt	---	---	---	---	---	---
Copper	---	---	65	---	---	---
Iron	666 e	---	22100 e	(45)	---	---
Lead	--- r	--- r	--- r	--- r	--- r	--- r
Magnesium	136000 e	---	173000 e	---	---	---
Manganese	39 e	---	1150 e	---	---	---
Nickel	--- r	---	56 r	---	--- r	---
Potassium	22500	---	22300	---	---	---
Sodium	924000 e	---	512000 e	---	---	---
Thallium	--- r	--- r	--- r	--- r	--- r	--- r
Tin	*	---	--- r	43	---	---
Vanadium	---	---	98	---	---	---
Zinc	(9)	75	117	(6)	---	---

Table 7 (cont)

Results of Inorganic Analysis on Samples Collected at Proteco

Compound (total)	Sample Number/Location: MQO 606 Well 14W85	MQO 607 Well 15W85	MQO 608 Well 22W85	MQO 610 Field blank	MQO 614 Well 9W81	MQO 615 Well 9W81 duplicate
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	52400 e	28900 e	3540 e	---	*	*
Arsenic	*	*	*	--- *	--- *	--- *
Antimony	582 r	490 r	316 r	--- r	*	*
Barium	882	1330	308	---	---	(49)
Beryllium	---	---	---	---	---	---
Cadmium	24 r	38 r	18 r	---	*	*
Calcium	2490000 e	3800000 e	3490000 e	---	3090000 e	3130000 e
Chromium	150	258	74	10	*	*
Cobalt	(45)	(29)	(31)	---	(32)	(32)
Copper	58	40	---	---	(20)	(19)
Iron	40300	22500	2060 e	(28)	*	*
Lead	--- r	35.4 e,r	--- e,r	--- r	--- r	--- r
Magnesium	3140000 e	1840000 e	1950000 e	---	3120000 e	3130000 e
Manganese	1330 e	1600 e	3100 e	---	412 e	376 e
Nickel	126 r	326 r	60 r	---	120 r	99 r
Potassium	140000	73000	74100	---	100000	125000
Sodium	6970000	9390000 e	7240000 e	---	9060000 e	8810000 e
Thallium	---	--- r	---	--- r	(6.9) r	--- r
Tin	*	*	*	43	*	*
Vanadium	148	86	---	---	*	*
Zinc	122	74	60	(10)	97	36

Table 7 (cont)

Results of Inorganic Analysis on Samples Collected at Proteco

Compound (total)	MQO 611 Well 21W85	MQO 609 Well 18W85	MQO 613 Equipment blank	MQO 612 Field blank	MQO 660 Well 12W83	MQO 661 Well 23W85
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	4680 e	449 e	---	---	1040 e	110000 e
Arsenic	*	--- *	--- *	--- *	--- *	*
Antimony	381 r	347 r	--- r	--- r	102 r	348 r
Barium	(144)	---	---	---	(179)	1620
Beryllium	---	---	---	---	---	---
Cadmium	24 r	20 r	---	---	5 r	26 r
Calcium	4790000 e	3500000 e	---	---	619000 e	1830000 e
Chromium	100	88	(6)	---	26	192
Cobalt	50	(26)	---	---	---	(31)
Copper	---	---	---	---	(9)	96
Iron	2530 e	420 e	(69)	(33)	1260 e	64580 e
Lead	--- r	--- e,r	--- r	(1.6) r	--- r	(4.7) r
Magnesium	3210000 e	2270000 e	---	---	149000 e	756000 e
Manganese	1310 e	187 e	---	---	354 e	1030 e
Nickel	110 r	86 r	---	---	--- r	104 r
Potassium	123000	125000	---	---	28500	56700
Sodium	6470000 e	8280000 e	---	---	481000 e	2960000 e
Thallium	---	--- r	--- r	--- r	--- r	--- r
Tin	*	*	*	---	*	*
Vanadium	(44)	---	---	---	---	172
Zinc	65	34	---	---	26	281

---------- Sample Number/Location ----------

Table 7 (cont)

Results of Inorganic Analysis on Samples Collected at Proteco

Compound (total)	MQO 665 Well 29W85	MQO 663 Field blank	MQO 662 Well 30W85	MQO 670 Field blank	MQO 669 Well 1W81	MQO 664 Equipment blank
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	6720 e	---	42100 e	---	4700 e	---
Arsenic	*	--- *	*	--- *	*	--- *
Antimony	265 r	---	464 r	---	90 r	---
Barium	554	---	2260	---	(103)	---
Beryllium	---	---	---	---	---	---
Cadmium	20 r	---	28 r	---	--- r	---
Calcium	3620000 e	---	3540000 e	---	462000 e	---
Chromium	94	(9)	166	(8)	21	---
Cobalt	---	---	(38)	---	---	---
Copper	---	---	34	---	---	---
Iron	4540 e	---	29900 e	---	3310 e	---
Lead	(3.2) r	--- r	--- r	--- r	(1.1) r	--- r
Magnesium	1370000 e	---	1590000	---	57400 e	---
Manganese	301 e	---	378 e	---	200 e	---
Nickel	--- r	---	82 r	---	--- r	---
Potassium	69900	---	77000	---	11600	---
Sodium	8800000 e	---	5620000 e	---	445000 e	---
Thallium	--- r	--- r	--- r	--- r	--- r	--- r
Tin	*	(36)	*	50	*	---
Vanadium	---	---	126	---	---	---
Zinc	83	---	121	---	45	---

---------- Sample Number/Location ----------

Table 7 (cont)

Results of Inorganic Analysis on Samples Collected at Proteco

Compound (total)	Sample Number/Location: MQO 668 Well 28W85	MQO 666 Well 26W85	MQO 667 Well 26W85 duplicate	MQO 344 Field blank	MQO 671 Equipment blank
	ug/l	ug/l	ug/l	ug/l	ug/l
Aluminum	55100 e	*	*	---	---
Arsenic	*	*	*	--- *	--- *
Antimony	124 r	548 r	567 r	---	--- r
Barium	302	310	390	---	---
Beryllium	---	---	---	---	---
Cadmium	20 r	30 r	34 r	---	---
Calcium	2860000 e	3850000 e	4010000 e	---	---
Chromium	155	208	234	---	---
Cobalt	57	(44)	(47)	---	---
Copper	149	58	86	---	---
Iron	19600 e	44900 e	66100 e	---	---
Lead	--- r	--- r	--- r	--- r	--- r
Magnesium	619000 e	1840000 e	1880000 e	---	---
Manganese	1220 e	1980 e	2150 e	---	---
Nickel	216 r	144 r	186 r	--- r	---
Potassium	44700	64900	72900	---	---
Sodium	3740000 e	8040000 e	8170000 e	---	---
Thallium	--- r	--- r	--- r	--- r	--- r
Tin	*	*	*	---	56
Vanadium	165	146	226	---	---
Zinc	656	223	218	---	---

Inorganics Data Reporting Qualifiers

* = QA/QC review resulted in data rejection.

e = Indicates a value estimated due to the presence of interference.

r = Indicates spike sample recovery was not within control limits.

--- = Indicates not detected or less than the detection limit.

( ) = Indicates value greater than the detection limit of the instrument but less than the contract required detection limit.

Note - During the QA/QC review process all data for cyanide, selenium, silver mercury and all but one data point for arsenic was rejected.

Table 8

Results of Organic Analysis on Samples Collected at Proteco

Compound	Sample Number/Location: MQO 603 Well 4W81	MQO 601 Equipment blank	MQO 602 Well 11W83	MQO 604 Equipment blank	MQO 605 Field blank	MQO 345 Trip blank	MQO 606 Well 14W85	MQO 607 Well 15W85	MQO 608 Well 22W85
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Acetone	---	---	--- *	*	*	*	*	190	*
2-Butanone	---	---	---	---	---	---	---	1100	---
Chloroform	---	---	---	---	---	---	---	---	16
Bromo-dichloromethane	---	---	---	---	---	---	---	---	9.5

Table 8 (cont)

Results of Organic Analysis on Samples Collected at Proteco

Compound	Sample Number/Location: MQO 610 Field blank	MQO 614 Well 9W81	MQO 615 Well 9W81 duplicate	MQO 611 Well 21W85	MQO 609 Well 18W85	MQO 613 Equipment blank	MQO 612 Field blank	MQO 660 Well 12W83	MQO 661 Well 23W85
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Acetone	*	---	*	---	---	--- *	--- *	*	*
2-Butanone	---	---	---	---	---	---	---	---	---
Chloroform	---	---	---	---	---	---	---	---	11
Bromo-dichloromethane	---	---	---	---	---	---	---	---	3.2 j

Table 8 (cont)

Results of Organic Analysis on Samples Collected at Proteco

Compound	Sample Number/Location: MQO 665 Well 29W85	MQO 663 Field blank	MQO 662 Well 30W85	MQO 670 Field blank	MQO 669 Well 1W81	MQO 664 Equipment blank	MQO 668 Well 28W85	MQO 666 Well 26W85	MQO 667 Well 26W85 duplicate
	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Acetone	---	*	*	*	*	*	*	*	*
2-Butanone	---	*	---	---	---	---	---	---	---
Chloroform	---	---	3.8 j	---	---	---	---	---	---
Bromo-dichloromethane	---	---	2.9 j	---	---	---	---	---	---

Table 8 (cont)

Reults of Organic Analysis on Samples Collected at Proteco

Compound	Sample Number/Location: MQO 344 Field blank	MQO 671 Equipment blank
	ug/l	ug/l
Acetone	*	*
2-Butanone	---	---
Chloroform	---	---
Bromo-dichloromethane	---	---

Organics Data Reporting Qualifiers

* = QA/QC review resulted in data rejection.

j = Indicates value estimated.

--- = Indicates not detected or less than detection limit.

Note - All semivolatile compound analysis was rejected during the QA/QC review process.

Table 9

Tentatively Identified Compounds ug/l

Compound	MQO 603 Well 4W81	MQO 601 Equipment blank	MQO 602 Well 11W83	MQO 604 Equipment blank	MQO 605 Field blank
Aziridine,2-Hexyl-	---	---	---	---	---
Cyclohexane, Methyl	---	---	---	---	---
Cyclohexanol	---	---	---	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	---	---
Cyclopentanol,2-Methyl-,Cis	---	---	---	---	---
Cyclopentanol,2-Methyl-,Trans	---	---	---	---	---
Cyclopentanone,2-Methyl	---	---	---	---	---
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	---	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---	---
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---	---
Furan, Tetrahydro-	---	---	---	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	---	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	---	---	---	---	---
1,2,-Dithiol-1-ium,Iodide	---	---	---	---	---
9-Octadecenamide, (2)-	---	10	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	---	---
2-Pentanol,2,4-Dimethyl	---	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	---	---	---	---
1-Propanol,2-Ispropoxy	---	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---	---

Table 9 (cont)

Tentatively Identified Compounds ug/l

Compound	MQO 345 Trip blank	MQO 606 Well 14W85	MQO 607 Well 15W85	MQO 608 Well 22W85	MQO 610 Field blank
Aziridine,2-Hexyl-	---	---	---	---	---
Cyclohexane, Methyl	---	---	---	15	---
Cyclohexanol	---	---	10	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	26	---
Cyclopentanol,2-Methyl-,Cis	---	---	15	48	---
Cyclopentanol,2-Methyl-,Trans	---	---	---	---	---
Cyclopentanone,2-Methyl	---	---	10	---	---
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	---	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---	---
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---	---
Furan, Tetrahydro-	---	11	140	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	40	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	---	---	8	---	---
1,2,-Dithiol-1-ium,Iodide	---	---	---	---	---
9-Octadecenamide, (2)-	---	---	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	16	---
2-Pentanol,2,4-Dimethyl	---	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	---	---	---	---
1-Propanol,2-Ispropoxy	---	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---	---

Table 9 (cont)

Tentatively Identified Compounds ug/l

Compound	MQO 614 Well 9W81	MQO 615 Well 9W81 duplicate	MQO 611 Well 21W85	MQO 609 Well 18W85	MQO 613 Equipment blank
Aziridine,2-Hexyl-	---	---	---	---	---
Cyclohexane, Methyl	---	---	---	---	---
Cyclohexanol	---	---	---	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	---	---
Cyclopentanol,2-Methyl-,Cis	8	---	---	---	---
Cyclopentanol,2-Methyl-,Trans	---	---	---	---	---
Cyclopentanone,2-Methyl	---	---	---	---	---
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	7	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---	---
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---	---
Furan, Tetrahydro-	6	---	---	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	---	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	10	---	---	---	---
1,2,-Dithiol-1-ium,Iodide	---	---	---	---	---
9-Octadecenamide, (2)-	---	---	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	---	---
2-Pentanol,2,4-Dimethyl	---	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	---	---	---	---
1-Propanol,2-Ispropoxy	---	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---	---

Tentatively Identified Compounds ug/l

Compound	MQO 612 Field blank	MQO 660 Well 12W83	MQO 661 Well 23W85	MQO 665 Well 29W85	MQO 663 Field blank
Aziridine,2-Hexyl-	---	---	13	---	---
Cyclohexane, Methyl	---	28	23	---	---
Cyclohexanol	---	13	---	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	---	---
Cyclopentanol,2-Methyl-,Cis	---	---	10	---	---
Cyclopentanol,2-Methyl-,Trans	---	---	---	---	---
Cyclopentanone,2-Methyl	---	---	9	---	---
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	---	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---	---
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---	---
Furan, Tetrahydro-	---	---	---	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	---	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	---	---	---	---	---
1,2,-Dithiol-1-ium,Iodide	---	---	---	---	---
9-Octadecenamide, (2)-	---	---	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	---	---
2-Pentanol,2,4-Dimethyl	---	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	---	---	67	---
1-Propanol,2-Ispropoxy	---	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---	---

Tentatively Identified Compounds ug/l

Compound	MQO 662 Well 30W85	MQO 670 Field blank	MQO 669 Well 1W81	MQO 664 Equipment blank	MQO 668 Well 28W85
Aziridine,2-Hexyl-	---	---	---	---	---
Cyclohexane, Methyl	26	---	---	---	---
Cyclohexanol	---	---	---	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	---	---
Cyclopentanol,2-Methyl-,Cis	---	---	---	---	---
Cyclopentanol,2-Methyl-,Trans	---	---	---	---	8
Cyclopentanone,2-Methyl	---	---	---	---	---
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	---	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---	640
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---	3300
Furan, Tetrahydro-	---	---	---	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	---	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	---	---	---	---	---
1,2,-Dithiol-1-ium,Iodide	---	---	---	---	---
9-Octadecenamide, (2)-	---	---	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	---	---
2-Pentanol,2,4-Dimethyl	---	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	---	---	---	110
1-Propanol,2-Ispropoxy	---	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---	---

Table 9 (cont)

Tentatively Identified Compounds ug/l

Compound	MQO 666 Well 26W85	MQO 667 Well 26W85 duplicate	MQO 344 Field blank	MQO 671 Equipment blank
Aziridine,2-Hexyl-	---	---	---	---
Cyclohexane, Methyl	---	---	33	---
Cyclohexanol	---	---	---	---
Cyclohexanol,2-Methyl-3-(1-Methylethenyl)-Acetate	---	---	---	---
Cyclopentanol,2-Methyl-,Cis	---	---	14	16
Cyclopentanol,2-Methyl-,Trans	---	---	---	---
Cyclopentanone,2-Methyl	---	---	15	16
1,3-Dioxane,4,6-Bis(2,2-Dimethylpropyl)-	---	---	---	---
Ethane,1,2-Dichloro-1,1,2-Trifluoro-	---	---	---	---
Ethane,1,1,2-Trichloro-1,2,2-Tirfluoro	---	---	---	---
Furan, Tetrahydro-	---	---	---	---
2-Heptene,5-Ethyl-2,4,Dimethyl-	---	---	---	---
Hexanoic Acid, 2-Cyano-,Ethyl-Ester	---	---	---	---
1,2,-Dithiol-1-ium,Iodide	---	49	---	---
9-Octadecenamide, (2)-	---	---	---	---
Oxirane,(Butoxymethyl)-	---	---	---	---
Pentane,1,5-Dibromo-	---	---	---	---
2-Pentanol,2,4-Dimethyl	---	---	---	---
Phenol,2,4-Dichloro-6-Methyl	---	160	---	---
1-Propanol,2-Ispropoxy	---	---	---	---
2-Propanol,1-Propoxy	---	---	---	---
3-Udecene,6-Methyl-,(E)-	---	---	---	---

Hazardous Waste Treatment, Storage, and Disposal During Interim Status

Regulatory Requirements

Pursuant to Section 3006 of RCRA, 42 U.S.C. §6926, on October 14, 1982, EPA authorized the Commonwealth of Puerto Rico to administer certain portions of its hazardous waste program in lieu of those portions of the federal hazardous waste program with respect to, inter alia, requirements for the generation,transportation, treatment, storage and disposal of hazardous wastes. The Commonwealth of Pureto Rico Environmental Quality Board ("EQB") promulgated a regulatury framework in the Commonwealth Rules for the Control of Hazardous and Non-Hazardous Solid Waste, ("RCHNSW"), which implements a hazardous waste management program pursuant to the Environmental Public Policy Act (Law No. 9 of June, 1970, as amended). In Rules 101-1001, of RCHNSW EQB adopted provisions equivalent to 40 CFR Part 265, which provide standards for owners and operators of hazardous waste treatment, storage, and disposal facilities (TSDFs) [with final] or interim status. Pursuant to Section 3006(d) of RCRA, 42 U.S.C. §6926(d), the Commonwealth of Puerto Rico hazardous waste statutes and regulations have the same force and effect as regulations issued by EPA under Subchapter III of RCRA. A violation of the authorized Commonwealth of Puerto Rico hazardous waste program is a violation of the requirements of subchapter III of RCRA

State Regulatons

The Commonwealth Regulations for the Control of Hazardous and Non-Hazardous Solid Waste (RCHNSW) (enacted in November 20, 1981) for owners and operators of hazardous waste treatment, storage, and disposal facilities are nearly identical to the RCRA Part 265, interim status requirements. The substantive differences are that the Commonwealth requires (1) the hazardous waste facilities that store containers of hazardous waste must have a continuous base which is impervious to the stored waste and which is constructed so that any surface runoff or spill can be contained until the spilled waste can be removed for either treatment or final disposal; (2) the facility operator shall store the containers in an area with a roof or other covering to prevent direct sunlight or rainwater from contact with the drums; and (3) where gases are generated within the landfill, a gas collection and control system shall be installed to control the vertical and horizontal escape of gases from the landfill. Regulation counterparts are shown in Table [10].

TABLE [10]
STATE AND FEDERAL COUNTERPART INTERIM STATUS REGULATIONS

Subpart Title	Puerto Rico Regulation (RCHNSW Rule)	RCRA Regulation (40 CFR Part)
Subpart A-General		
Applicability	801	265.1
Iminent Hazard Action	802	265.4
Subpart B - General Facility Standards		
Identification Number	803A	265.11
Required Notices	803B	265.12
General Waste Analysis	807I	265.13
Security	803D	265.14
General Inspection Requirement	803F	265.15
Personnel Training	808C	265.16
General Requirement for Ignitable, Reactive, or Incompatible Waste	809	265.17
Subpart C - Prepardness and Prevention		
Maintenance and Operation	810B	265.31
Requirement Equipment	810C	265.32
Testing and Maintenance of Equipment	810D	265.33
Access to Communications or Alarms System	810E	265.34
Required Aisle Space	810F	265.35
Arrangement with Local Authorities	810G	265.37
Subpart D - Contingency Plan and Emergency Procedures		
Content of Contingency Plan	207	265.52
Copies of Contingency Plan	207	265.53
Amendment of Contingency Plan	803E(7)	265.54
Emergency Coordinator	803E(1)	265.55
Emergency Procedures	803E	265.56

Management of Containers	812D(1)	265.173
Inspections	812E	265.174
Special Requirements for Ignitable or Reactive Waste	812B(5)	265.176
Special Requirements for Incompatible Waste	812D(3)	265.177

Subpart J - Tanks

Applicability	813A	265.190
General Operating Requirements	813B	265.192
Waste Analysis and Trial Tests	813C	265.193
Inspections	813D	265.194
Closure	813E	265.197
Special Requirements for Ignitable or Reactive Waste	813F	265.198
Special Requirements for Incompatible Waste	813G	265.199

Subpart K - Surface Impoundments

General Operating Requirements	817B	265.222
Containment Systems	817B	265.223
Waste Analysis and Trial Tests	817C	265.225
Inspections	817D	265.226
Closure and Post-Closure	817F	265.228
Special Requirements for Ignitable or Reactive Wastes	817G	265.229
Special Requirements for Incompatible Wastes	817H	265.230

Subpart L - Waste Piles

Applicability	818A	265.250
Protection from Wind	818B	265.251
Waste Analysis	818C	265.252
Containment	818D	265.253
Special Requirements for Ignitable or Reactive Waste	818F	265.256
Special Requirements for Incompatible Wastes	818G	265.257

Subpart M - Land Treatment

General Operating Requirements	819B	265.272
Waste Analysis	819C	265.273
Food Chain Crops	819E	265.276
Unsaturated Zone Monitoring	819G	265.278
Record Keeping	819H	265.279
Closure and Post-Closure	819I	265.280
Special Requirement for Ignitable Reactive Waste	819J	265.281
Special Requirement for Incompatible Wastes	819K	265.282

Content of Contengency Plan	207	265.52
Copies of Contengency Plan	207	265.53
Amendment of Contengency Plan	803E(7)	265.54
Emergency Coordinator	803E(1)	265.55
Emergency Procedures	803E	265.56

Subpart E - Manifest System, Record Keeping and Reporting

Use of Manifest System	504B	265.71
Manifest Discrepancies	504D(2)	265.72
Operating Record	502C	265.73
Availability, Retention and Disposition of Records	505	265.74
Unmanifested Waste Report	504D(3)	265.76
Additional Reports	503C	265.77

Subpart F - Groundwater Monitoring

Applicability	804A	265.90
Groundwater Monitoring	804B	265.91
Sampling and Analysis	804C	265.92
Preparation, Evaluation and Response	804D	265.93
Record Keeping and Reporting	503B	265.94

Subpart G - Closure and Post-Closure

Applicability	805A(1)	265.110
Closure Performance Standard	805A(2)	265.111
Closure Plan; Amendment of Plan	805A(3)	265.112
Closure; Time Allowed for Closure	805A(5)	265.113
Disposal or Decontamination of Equipment	805A(6)	265.114
Certification of Closure	805A(7)	265.115
Post-closure Care and Use of Property	805B	265.117
Notice to Local Land Authority	805D	265.119
Notice in Deed to Property	805C	265.120

Subpart I - Use and Management of Containers

Applicability	812A	265.170
Condition of Containers	812C	265.171
Compatibility of Waste with Container	812C	265.172

Subpart N - Landfills

Applicability	816A	265.300
General Operating Requirements	816B	265.302
Surveying and Record Keeping	816B	265.309
Closure and Post-Closure	816C	265.310
Special Requirements for Ignitable or Reactive Waste	816D	265.312
Special Requirements for Incompatible Wastes	816E	265.313
Special Requirements for Liquid Waste	816F	265.314
Special Requirements for Containers	816G	265.315
Disposal of Small Containers of Hazardous Waste in Overpacked Drums	816H	265.316

RCRA INSPECTION

As part of the Groundwater Monitoring Task Force a full RCRA inspection was conducted at Proteco's facility operation in accordance with 40 CFR 265 and RCHNSW Rule.

These requirements address the administrative non-technical and technical regulations and included a visual observation of current waste management units and a review/evaluation of records maintained at the facility.

WASTE MANAGEMENT UNITS/OBSERVATION

Drum Burial Unit #1 (Cavidad 1C Landfill)

This unit was used for the disposal of waste in drums from 1975 to 1979. Records show that there are approximately at least 5,757 drums buried in this landfill totalling 316,635 gallons. Detailed design plans for this unit are not available but it is estimated that this unit is approximately 15 to 18 feet deep. This unit does not have a liner system but it was constructed in a low permeability clay formation.

At the time of the inspection the following was noted:

- A 40' x 20' section of this had no cover
- A blue/green chalky material with no odor was scattered throughout this burial ground
- Surface was spongy and there is evidence of sliding of the 10 foot high bank along the north side of the unit

Drum burial Unit #2 (General Electric Landfill)

This unit was used for the disposal of waste in drums from 1975 to 1979. Records show that there are at least 416 drums buried in this landfill totalling 22,800 gallons. Detailed design plans are not available for this unit but it is estimated that this unit is 10 feet deep. This unit does not have a liner system but it was constructed in a low permeability clay formation.

At the time of the inspection the following was noted:

- Area is grass covered (4 feet) on a 30± degree slope
- Unable to enter this unit

Drum Burial Unit #3 (Roche Landfill)

This unit was used for the disposal of waste in drums from 1975 to 1979. Records show that there are at least 1,683 drums buried in this landfill totalling 92,565 gallons.

At the time of the inspection the following was noted:

- The impoundment is unlined
- Overall freeboard is 2'±
- The dike has no cover, is soggy and possible unstable
- North side of the unit has approximate 15 foot high embankment with slope failure

Immobilization Facility #10 (TI1) (inactive since 1981)

This unit was used for the disposal of immobilized waste until circa 1981. Immobilization process is to fix the waste in a matrix of cement dust and water. Records show that there are approximately 15,965 gallons of waste disposed in this unit. This unit is estimated to be 50 feet long, 14 feet deep, and 22 feet wide, giving a total volume of 15,000 FT^3. At the time of the inspection no measure were taken to prevent run-on or run-off control.

Immobilization Facility #11 (TI-2) (inactive since 8/82)

This unit was used for the disposal of immobilized waste until August 1982. Records show that there are approximately 201,450 gallons of waste disposed in this unit.

This unit is estimated to be 160 feet long, twenty eight feet deep, and forty feet wide for a total volume of 179,200 FT^3. At the time of inspection, no measure were taken to prevent run-on or run-off control.

Immobilization Facility #16 (TI-3) (active)

The volume of this unit is 47 feet by 240 feet by 20 feet deep. It has a total available capacity of 7.617 cubic yards. A mixture of clay and sand cover the area. The west and south side of the unit drops off on a 45 degree slope for approximately 30'. This sloped area is grass covered. The east side of the unit has both an uncontrolled drainage ditch and an embankment. This ditch could or does carry hazardous waste off of the unit. The north of the unit is contiguous with unit AC-1, Landfarm. Run-on to this landfill from AC-1 is uncontrolled.

At the time of the inspection, no measure were taken to prevent run-on or run-off control.

is 7,222 cubic yards. The maximum waste inventory is estimated to be 1.62 million gallons. This lagoon also contains an aqueous solution of salts and metals, including ferric chloride. Wastewater treatment sludge from a tuna fish processing plant has also been placed in the surface impoundment.

At the time of the inspection the following was noted:

° Freeboard is approximately 6 feet

° Run-on control from the southeast side of the unit is uncontrolled

Tank Storage Area #15

The existing tank at Proteco is an 8,000 gallon horizontal carbon steel tank.

The shell thickness is a uniform 0.25 inches and the material of construction is ASTM 283-C carbon steel. The tank is 91 inches in diameter and 24 feet long and was manufactured in accordance with Underwriters Laboratory standard UL-58 for gasoline storage. It presently stores wastewater from shampoo manufacture which is EP toxic due to high concentrations of lindane.

At the time of the inspection the following was noted:

° No discharge control equipment or monitoring equipment

° Fire prevention consists of a single fire extinguisher

° Inspections being accomplished weekly

Rainwater Lagoon #13 (LB)

The rainwater basin is used as a holding basin for supernatant water collected in the oil lagoon. the maximum waste inventory is estimated to be 100,000 gallons. The rainwater basin does not collect run-off and return run-on but only collects water that is specifically pumped from the oil lagoon.

Water from the oil lagoon is pumped into the rainwater basin after determination that the water is not hazardous. Rainwater and supernatant liquids collected in the rainwater basin evaporates, since net annual evaporation exceeds the rainfall and oil lagoon supernatant discharge.

At the time of the inspection, freeboard is maintained at much more than two feet.

Empty Drum Storage Area

This unit is for storage of empty drums after liquids are decanted from drums.

8/9/85 - 2 gal of hydrochloric acid

6/6/85 - 5000 gal of phosphoric acid

- On 10/11/85 132 lbs. of potassium cyanide was placed into oil lagoon LA

- On 10/11/85 84 lbs of sulfuric acid was also placed into this surface impoundment

  The potential consequences of this mixing include generation of toxic hydrogen cyanide of hydrogen sulfide gas.

- On 9/23/85 200 lbs of hazardous waste solids consisting of P030 (cyanides), D002 (corrosives) and U188 (phenols) were placed into landfill TI3

  The following potentially incompatible materials were also placed into this landfill:

  On 11/7/85 500 lbs of "contaminated solid waste" (D001)

  On 11/8/85 22860 lbs of "corrosive solids" (D002)

- On 8/22/85 5178 lbs. of waste Pyrethrins was placed in Landfarm AC2

- On 10/3/85 7,200 lbs of waste slake lime was placed in AC2

  Although these substances may not be "hazardous" wastes, pyrethins are known to be incompatible with alkalies.

Waste Analysis Plan Review

The Proteco facility instituted new Waste Analysis Procedures in October 1985. These procedures were followed by the facility but were deficient as follows:

- The procedures used to inspect and analyze each shipment of hazardous waste do not ensure that the waste matches the identity of the waste designated on the accompanying manifest. The instituted procedures only verify the characteristic of the waste as it would indicated on the manifest.

- The procedures used do not provide a detailed chemical and physical analysis of a representative sample of the waste to identify treatability, ignitability, reactivity, or incompatibility of the wastes.

- The Waste Analysis plan does not include Quality Assurance/Quality Control Procedures to ensure that the analysis is accurate or up-to-date (i.e., evaluation of laboratory procedures, data obtained, etc.)

- The Plan does not include the waste analysis that hazardous waste generators have agreed to supply.

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APPENDIX A

TYPES OF INDUSTRIES SERVED BY PROTECO

TABLE B-1

TYPE OF INDUSTRIES SERVICED

Name of Industry	SIC Code	Typical Manufactured Products	Typical Wastes Generated
Abbott Chemicals	2834	Antibiotics, Pharmaceutical Products	F001
Applied Magnetics	3679	Magnetic Recording Heads	F002
Bayamon Electroplating	3471	Metal Finishing-Electroplating	D011
Becton-Dickinson	2834	Health Care Products-Thermometers	U151
Carribbean Gulf Refining	2911	Petroleum Refining	D008
Centronics	3679	Electronic Circuit Boards	F001,D008
Checkpoint Systems	3679	Electronic Secuirty Components	D002
C.W. Caribe, Inc.	3679	Printed Circuits Manufacturing	F006,D008,D00
El Morro Corrugated Box Corp.	2653	Corrugated Boxes	D008
Lilly Industries, Inc.	2834	Pharmaceutical Products	F003
Ex Lax	2834	Laxitives	F002
Instrumentation Laboratory	2819	Diagnostic Chemical Reagents	D002,D009
Livesavers	2067	Chewing Gum	F002,D001
Johnson & Johnson	3843	Dental Floss	D001
Millipore Corp.	3841	Membrane Filters & Associated Devices	D001
Mobil Oil	2911	Petroleum Refining	D008
Motorola Portavoz	3666	Communication Devices & Components	D001,F002
Motorola Radiomovil	3662	Two-way Radios	D001,F001
Motorola Radio Sintetizado	3651		D001,F001
Motorola Telcarro	3662, 3666	Mobile Communication Equipment	F001
maseal	3842	Disposable Medical Supplies	D001,F002,F00

TABLE B-1 (CONTINUED)

TYPE OF INDUSTRIES SERVICED

Name of Industry	SIC Code	Typical Manufactured Products	Typical Wastes Generated
Productos Circuitos de PR, Inc.	3679	Printed Circuit Boards	F006
Reedco	2844	Pharmaceutical Products	D013
Syntex	2834	Pharmaceutical Products	D001,D002,U04
Texaco	5172	Petroleum Products	D008
Wicks, Inc.	2834	Pharmaceutical Products	D009
Wang	3573	Printed Circuit Boards and Computer Products	D001,D008
Waters	3811	High Pressure Chromotography Systems	D001
Western Fher	2834	Pharmaceutical Products	D001,F002,F00
Westinghouse	3622	Line Starters, Magnetic Contractor Relays	F002,D008

APPENDIX B

PROPOSED CLOSURE SUMMARY

TABLE 1

PROTECO FACILITY STATUS AND CLOSURE SUMMARY

Unit	Status	Closure Summary
1. Drum Burial Landfill #1 (Cavidad 1C)	Pt. 265 Closure	Units 1,2 and 3 are outside of areas to be modified for future disposal activities. These areas will be regraded for proper drainage and final cover and toe drains will be constructed.
2. Drum Burial Landfill #2 (General Electric)	Pt. 265 Closure	Included above.
3. Drum Burial Landfill #3 (Roche)	Pt. 265 Closure	Included above.
4. Drum Storage Area (DE)	Pt. 264 Closure	Must be relocated for landfill 1, Stage 1 to Temporary Drum Storage Area 19.
5. Drum Burial Landfill #5 (Searle)	Pt. 265 Closure	Estimated 720 drums to be excavated; must be excavated before construction of landfill 1, see also Unit8
6. Sanitary landfill (SL)	Non-Hazardous	Proposed excavation and redisposal in Unit 14 (Awaiting EPA Approval).
7. Neutralization Impoundment (LC)	Pt. 264 Closure	Planned processing of all wastes through proposed Facilities prior to excavation for Landfill 1, Stage 2.
8. Drum Burial Landfill #8 (Loctite)	Pt. 265 Closure	Conflicts with proposed leachate management. The excavation of an estimated 240 of drums will require the expansion of Temporary Drum Storage Area #19.
9. Oil Lagoon (LA)	Pt. 264 Closure	Decanting of lower liquid layer to Rainwater Basin to allow evaporation. Unit will then be processed through proposed Stabilization/Fixation Facility.
10. Immobilization Facility (TI_1)	Pt. 265 Closure	Units 10, 11 and 12 will be tested to determine if they are acceptable for direct landfill disposal.

(0936B-1)

TABLE 1 (CONTINUED)

PROTECO FACILITY STATUS AND CLOSURE SUMMARY

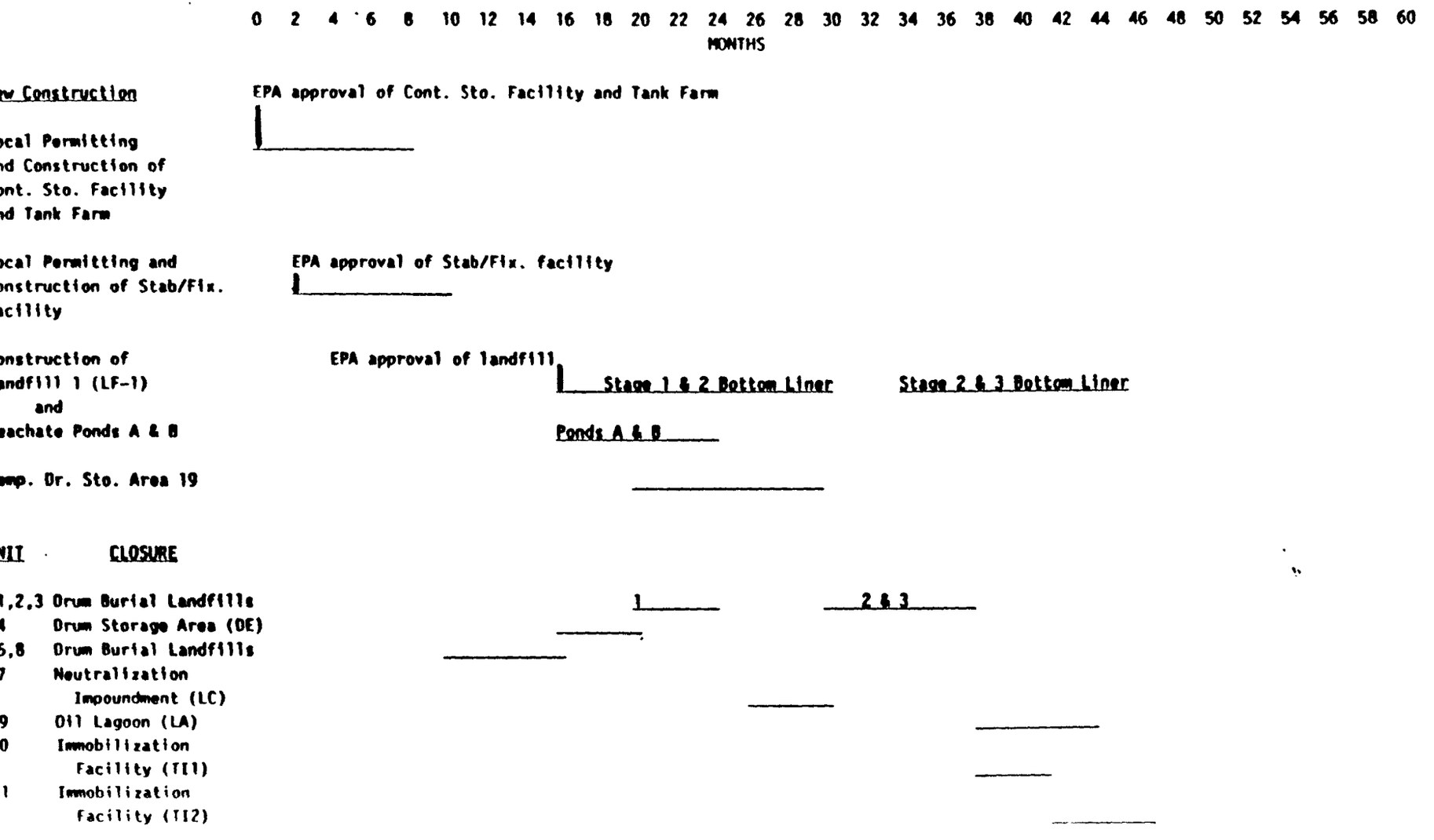
Unit	Status	Closure Summary
11. Immobilization Facility (TI_2)	Pt. 265 Closure	See unit 10.
12. Land Treatment Area (AC_1)	Pt. 265 Closure	See unit 10.
13. Rainwater Basin (LB)	Pt. 264 Closure	This unit will be the last existing unit to be processed through the proposed facilities to allow as much evaporation as possible to occur.
14. Land Treatment Area (AC_2)	Special Status	Regrading to promote proper drainage and cap of existing waste with 3ft of clay. Facility would then continue use as sanitary landfill upon EPA approval.
15. Tank Storage	Pt. 264 Closure	Only one tank is awaiting closure. The tank will be decontaminated, crushed and sold as scrap or disposed of in an on-site landfill.
15A. Tank Storage Area	Pt. 264 Closure	
16. Immobilization Facility (TI_3)	Pt. 264 Closure	To be used for on-site generated hazardous waste disposal. Interim cap to be constructed prior to excavation for proposed Landfill 2.
17. Neutralization Impoundment (LF)	Pt. 264 Closure	Relocation of liquids to rainwater basin and construction of interim cap. Area will eventually be excavated for proposed Landfill 2.
19. Temporary Drum Storage Area	As Per Consent Agreement	The proposed expansion of this facility will be used for temporary storage of inventory from Unit 4, and excavated drums from Units 5 and 8. The drums will then be processed through proposed facilities prior to excavation of proposed Landfill 2.

APPENDIX C

PROPOSED CLOSURE SCHEDULE

FIGURE 1

TENTATIVE
INTEGRATED CLOSURE AND NEW FACILITIES
CONSTRUCTION SCHEDULE



(09378-1)

FIGURE 1 (Continued)

TENTATIVE
INTEGRATED CLOSURE AND NEW FACILITIES
CONSTRUCTION SCHEDULE

Appendix D

Work/QA Sampling Plan

Work/QA Sampling Plan
for the

Groundwater Task Force Inspection
at

Proteccion Tecnica Ecologica, Inc.
(AKA Servicios Carbareon)

Prepared by: Joseph Cosentino -ESD/SMB
Louis DiGuardia -ESD/SMB
Fred Haber -ESD/MMB

Table of Contents

1. Project Name: Groundwater Task Force Inspection at Proteccion Tecnica Ecologica, Inc.

2. Project Requested By: Region II, Solid Waste Branch

3. Date of Request: August 16, 1985

4. Date of Project Initiation: October 1, 1985

5. Project Officer: Richard Walka, Region II, SWB

6. Quality Assurance Officer: Fred Haber, Region II, ESD

7. Project Description:

A. Objective and Scope:

This project plan will address the sampling activities to be conducted at Servicios Carbareon in order to determine if the hazardous waste disposal, storage and treatment activities conducted at this site and regulated by the Resource Conservation and Recovery Act (RCRA P.L. 94-580) have impacted the quality of groundwater underlying this facility. The primary objective of these efforts is to determine compliance with the requirements of 40 CFR, Part 265, Subpart F - Groundwater Monitoring and potential compliance with the requirements of 40 CFR, Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities. Specifically, the sampling of designated RCRA groundwater monitoring wells will determine the following:

1. If the designated RCRA monitoring wells are properly located and and constructed (to the extent possible) so that the system can immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer underlying the facility

2. contamination of the underlying groundwater exists at this facility

In order to fulfill the above objectives this inspection will include the sampling of all RCRA designated groundwater monitoring wells deemed by the inspection team to be adequately located, installed, constructed, developed and capable of yielding representative samples and significant results. If the groundwater monitoring system at the facility is deemed inadequate and sampling will not yield any significant results then the inspection should be delayed until the facility has installed an acceptable groundwater monitoring system. The sampling aspects of this inspection will focus on obtaining the following information:

1. monitoring well locations, construction materials, casing sizes depths and static water levels

2. the location of existing RCRA regulated hazardous waste units and extent of hazardous waste management area

3. groundwater contamination resulting from site operations

4. the size and type of containers, sample preservation techniques and chain of custody procedures used by the facility for split and/or replicate samples

5. the results of the facility's analysis of replicate samples

B. Data Usage:

The data generated by the monitoring activities will be utilized to determine:

1. the depth to static water level at each well and estimated direction of groundwater flow

2. the total depth of each well

3. if well construction materials are suited for monitoring the constituents of interest in the hydrogeologic environment at Servicios Carbareon

4. if the wells are constructed and protected in a way as to secure them from tampering and accidential collison

5. the adequacy of the facility's groundwater monitoring system to immediately detect any statistically significant amounts of hazardous wastes or hazardous waste constituents that migrate from the waste management area to the uppermost aquifier underlying the facility

6. if the wells are constructed to function through the active life and post closure monitoring period for the facility

7. the need for additional sampling, (ie: areas of suspected prior releases, improper disposal, vadose zone monitoring and areas of surface water run-off)

8. the need for a comprehensive review of the facility's sampling and analysis plan

9. the need for a comprehensive laboratory evaluation, ie: appendix VIII compoumds.

C. Monitoring Network Design and Rationale

Servicios Carbareon presently has a groundwater monitoring system consisting of four (4) monitoring wells. There is one (1) upgradient well, designated as monitoring well 11W-83 and three (3) downgradient wells designated as wells 1W-81, 2W-81 and 12W-83. These wells were constructed of 2.5 inch PVC, slotted with a hand saw prior to installation and vary in depth from 175 ft. to 240 ft. below the land surface. The column of standing or static water in these wells ranges from 21 feet to 164 feet. The location of these wells is depicted in Figure 1. Based upon the results of past EPA, Region II sampling activities these wells appear to be relatively free of organics contamination, with bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, di-n-butyl phthalate, 1,1,1-trichloroethane and 1,1-dichloroethane being found in the parts per billion range. These results are attached as Appendix 1.

This RCRA groundwater monitoring system, however, is inadequate in light of hydrogeologic conditions at the site, well construction materials, construction techniques, well locations and well depths. The facility has until November 8, 1985 to install an acceptable and approved groundwater monitoring system or be faced with the loss of interim status and possible closure of the facility. At present the facility has undertaken an effort to install a RCRA groundwater monitoring system that has been tentatively deemed to be adequate by EQB, EPA, Region II and EPA, Washington personnel. This system will include three (3) 2.0 inch wells, constructed of teflon and located hydraulically downgradient of each hazardous waste management unit and two (2) monitoring wells constructed hydraulically upgradient of potential site influence. In all there are three (3) hazardous waste management units that require groundwater monitoring in accordance with Subpart F requirements. They include: the rainwater lagoon, immobilization area and land application area. All other existing hazardous waste management units are or will be closed. A site map and legend are attached as Figure 2. In addition, two (2) PVC observation wells will be installed.

The groundwater monitoring system presently in existence at Servicios Carbareon has been deemed to be an inadequate system. The only useful results and conclusions that could be drawn from the sampling of these wells would be to determine the quality and reliability of past sampling techniques and analytical procedures. The primary sampling objective at this site will be to sample the twelve (12) new teflon wells, provided they are installed and properly developed prior to the start of this inspection.

The facility has identified two (2) groundwater occurrences beneath this site. The first occurrence is found at a depth of between fifty (50) to sixty (60) feet and is believed to be isolated bodies of perched water. These occurrences are believed to be sea water that was trapped in the sediments after the geologic unit lifted from the sea. The second groundwater occurrence is found at a depth of about two hundred (200) feet. This occurrence is found in the thick mudstone units of the Juana Diaz Formation and demonstrates groundwater movement. It is unknown, at this time, which of the new wells will intercept the shallow perched water bodies and which will intercept the deep groundwater occurence. This will not be known until the wells are actually drilled. If a

perched water body is not intercepted during drilling the well will be drilled to the deep groundwater occurtence.

Upgradient wells - samples of groundwater from these wells will establish groundwater quality prior to site influence. The analytical data obtained from these samples will be used as a basis for determining if a statistically significant increase in indicator parameters (pH, TOC, TOX and specific conductivity) or hazardous constituents can be detected in downgradient wells.

Downgradient wells - samples of groundwater from these wells will determine the facility's impact on the groundwater underlying this site.

Previously installed wells - samples from these wells can be used to determine the possible quality and reliability of past sampling techniques and analytical procedures.

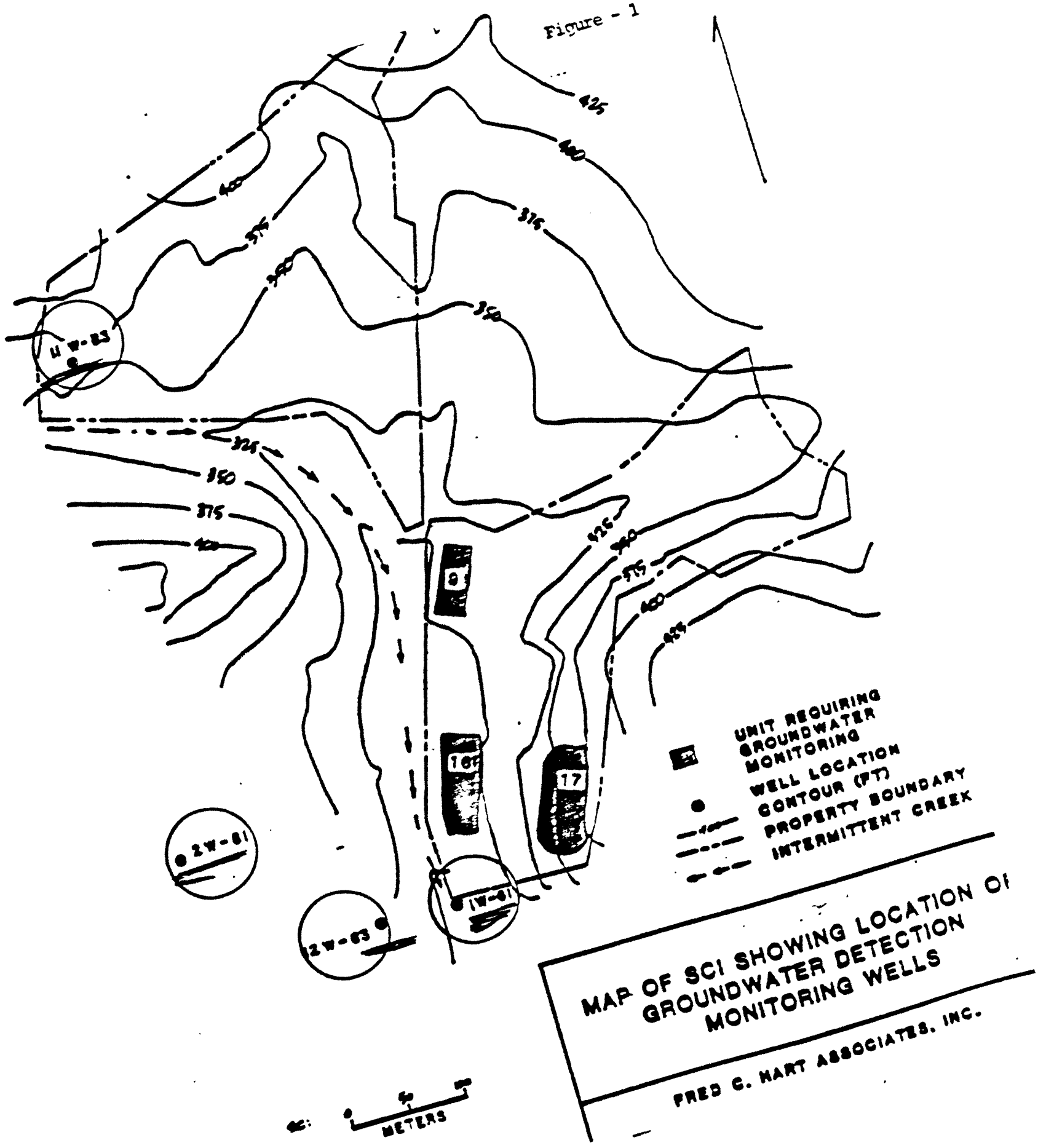
Physical measurements - such as: well depth, casing size, construction material and location will help to establish the adequacy of the monitoring system's ability to immediately detect any significant amounts of hazardous waste or hazardous waste constituents that migrate from the hazardous waste management area to the uppermost aquifer. Static water levels will be used to establish groundwater flow direction.

It should be anticipated that a total of fifteen (15) groundwater monitoring wells will be sampled. The wells selected are as follows:

- Two (2) new upgradient wells (2.0 in., teflon)
- Nine (9) new downgradient wells (2.0 in., teflon)
- One (1) old upgradient well (2.5 in., PVC)
- Three (3) old downgradient well (2.5 in., PVC)

The actual depth and location of the new wells is, at this time, unknown. This information will be provided at a later date. It can be anticipated, however, that all fifteen (15) wells will be deep, approximately two-hundred (200) feet. Vehicle access to all of the wells will not be a problem. Sampling parameters will be the RCRA indicator parameters, groundwater quality parameters, metals (dissolved and total) and organics (NVOA and POA). A complete parameter list is attached.

Figure - 1



MAP OF SCI SHOWING LOCATION OF GROUNDWATER DETECTION MONITORING WELLS

FRED C. HART ASSOCIATES, INC.

Servicios Carbareon,Inc.

Site Map Legend

1 - Landfill, drum burial

2 - Landfill, drum burial

3 - Landfill, drum burial

4 - Drum storage area

5 - Landfill, drum burial

6 - Sanitary landfill

7 - Lagoon, corrosive waste

8 - Landfill, drum burial

9 - Lagoon, oil

10 - Immobilization area

11 - Immobilization area

12 - Land application area

13 - Lagoon, rainwater

14 - Land application

15 - Tank storage area

16 - Immobilization area

17 - Surface impoundment (future)

18 - Immobilization area expansion (proposed)

19 - Immobilization area expansion (proposed)

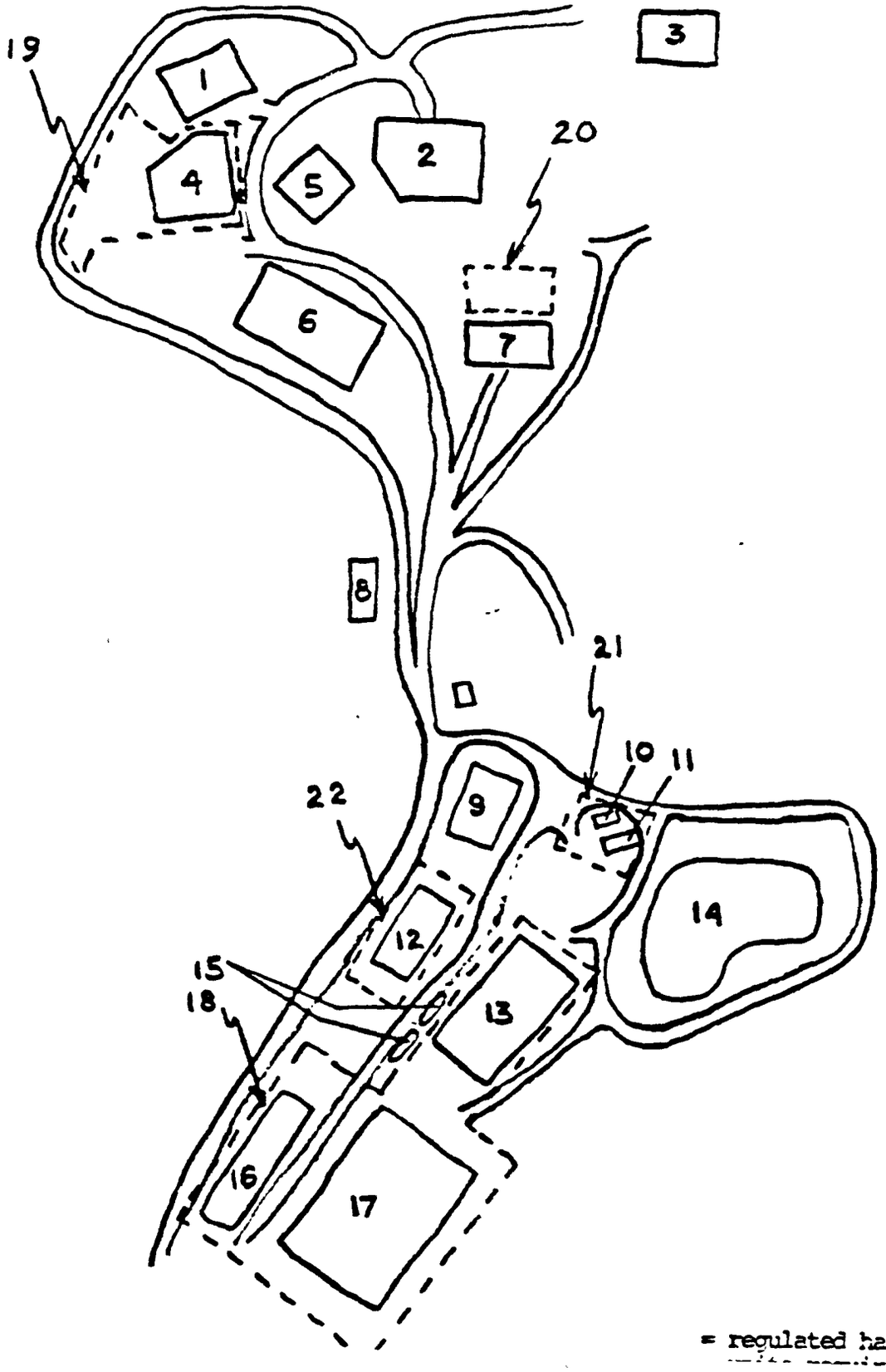
20 - Corrosive lagoon expansion (proposed)

21 - Drum storage area (proposed)

22 - Lagoon, rainwater (proposed)

—SERVICIOS CARBAREON, INC.—

FACILITY DRAWING



= regulated hazardous waste

D. Monitoring Parameters and Frequency of Collection:

A list of the parameters of interest is attached as Appendix 2. Each well will be sampled once and the samples analyzed for all parameters of interest for which contractural arrangements have been made. In addition, split or replicate samples will be offered to Servicios Carbareon as requested.

There are a total 15 individual sampling locations from which samples will be collected and analyzed. Samples from each sampling location will be analyaed for the entire hazardous substance list (HSL) organic and inorganic parameters.

E. Parameter Table:

Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
See Attached Parameter List	15 plus QC samples	See footnote below*	See attachment 1 - Statement of Work for Organic and Inorganic Analyses		

* Samples will be fresh and salt water, depending on whether lower or upper aquifer is sampled. The exact groundwater currents that will be monitored are unknown at this time.

10. Project Organization and Responsibility:

The following is a list of key project personnel and their corresponding responsibilities:

Joseph Cosentino (ESD)	- sampling operations
Joseph Cosentino/John Winter	- sampling QC
Stan Kovell (EPA/HQ)	- laboratory analysis
Paul Freedman (OWS)	- laboratory QC
Rich Walka/Ton Moy (SWB)	- data processing activities
Rich Walka/Ton Moy	- data processing QC
ICAIR/Life Systems	- data quality review
John Winters (EMSL-Cincinnati)	- performance auditing
Garreth Pearson (EMSL-Las Vagas)	- systems auditing
Fred Haber/Florence Richardson	- QA activities review
Ton Moy (SWB)	- overall project coordination

11. Data Quality Requirements and Assessments

Parameter	Sample Matrix	Detection Limit	Quantitation Limit	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
See Attached Parameter List	*See Foot-note below	(See Statements of Work for Organics and Inorganics Analyses) Attachment 1					

Data Representativeness - See Section 3.4 of HQ QA Project Plan (Attachment 2); representativeness can be accomplished only if all new wells are in place, fully developed and chemically stable.

Data Comparability - See Section 3.6 of HQ QA Project Plan (Attachment). This applies only if all new wells are in place, fully developed and chemically stable.

Data Completeness - See Section 3.5 and 12.1.3 of HQ QA Project Plan.

* Samples will be fresh or salt water depending on whether upper or lower aquifer is sampled. The exact ground water currents that will be monitored are unknown at this time.

12. Sampling Procedures:

During this inspection, samples will be collected and analyzed from designated RCRA monitoring wells to determine if the groundwater beneath the site contains hazardous waste constituents or other indicators of contamination.

A total of fifteen (15) wells have been tentatively selected for sampling. As the primary objective of well sampling is to obtain representative samples of the underlying groundwater, well selection will be made in the the field based on the following criteria:

1. Wells hydraulically upgradient and downgradient of the RCRA regulated hazardous waste units.

2. Wells that have been properly located, constructed and developed prior to the start of on-site sampling activities.

Wells not meeting the above criteria will only be sampled to compare data to existing facility records and reports (ie: previously generated groundwater data).

All sampling activities will be conducted by the EPA sampling contractor, (Versar, Inc.). The contractor will supply all equipment and materials necessary to collect, handle, document and ship the required samples. All samples will be shipped to contractor laboratories and analyzed for the constituents listed in Appendix 2. Samples collected for inorganic analyses are to be shipped to Rocky Mountain Analytical and samples collected for organic analyses are to be shipped to California Analytical.

Pre-Sampling activities:

In preparation for sampling activities, the following equipment and materials are required to be assembled and prepared as follows:

1. All equipment shall be assembled and compared to a master equipment checklist.

2. All equipment shall be labeled and given an identification number prior to field use. Back-up equipment and spare parts should also be brought to the field.

3. All equipment that will potentially contact the sampling media will be cleaned/decontaminated. This will include a thorough washing with hot water and a non-phosphate soap or detergent followed by successive rinses with an appropriate solvent. This equipment will then be air dried and wrapped in aluminum foil.

4. The equipment should be packaged and shipped in such a manner as to minimize damage and loss. Shipment of equipment should take place prior to the arrival of the sampling team and a team member should be on hand to insure equipment arrival. All equipment should be checked and any mechanical or electrical equipment tested prior to team arrival.

5. All equipment not amenable to shipping, ie: acids, gases and solvents, should be located and purchased prior to the arrival of the sampling team. Disposal of these items must also be considered and an appropriate disposal method found.

6. Logistics concerning the shipment of samples, ie: flight times and location of vendor sevices, must be known and secured prior to team arrival. The availability of these services together with sample holding times will dictate the amount of time that can be dedicated to field sampling activities.

7. Logistics concerning equipment storage and transport must also be considered and resolved prior to the arrival of the sampling team.

8. The entire sampling team should arrive and assemble at a common location at least one day prior to the start of on-site activities in order to discuss team objectives, procedures and resolve any overlooked logistics.

9. An assessment of the areas of on-site sampling using HNUs and OVAs will be conducted prior to the start of field sampling. This assessment will dictate the level of personnal protection, ie: SCBAs, respirators, tyvek... ect., needed by team members to enter the work areas. Verification of well existence and location will also result from this assessment. A well location map will be constructed at this time.

Figure - 3

WELL VOLUME (gallons)

Well Diameter (inches)

	2"	2.5"	3"	3.5"	4"	4.5"	5"	6"
0.5	.09	.13	.20	.26	.32	.42	.50	.75
1.0	.17	.26	.37	.50	.65	.83	1.0	1.5
1.5	.25	.39	.55	.75	1.00	1.3	1.5	2.2
2.0	.33	.50	.75	1.00	1.30	1.7	2.1	2.9
2.5	.42	.64	.92	1.26	1.6	2.1	2.6	3.7
3.0	.50	.77	1.13	1.50	1.9	2.5	3.1	4.4
3.5	.58	.90	1.30	1.73	2.3	2.9	3.6	5.1
4.0	.66	1.02	1.47	2.02	2.6	3.3	4.1	5.9
4.5	.75	1.15	1.65	2.25	2.9	3.7	4.6	6.6
[illegible].0	.83	1.28	1.84	2.47	3.2	4.1	5.1	7.3
[illegible].5	.91	1.40	2.02	2.77	3.5	4.5	5.6	8.1
6.0	1.00	1.53	2.20	3.00	4.2	5.0	6.1	8.7
6.5	1.07	1.66	2.40	3.30	4.2	5.4	6.7	9.5
7.0	1.16	1.78	2.57	3.52	4.5	5.8	7.2	10.5
7.5	1.24	1.91	2.77	3.75	4.8	6.2	7.6	10.9
8.0	1.32	2.04	2.94	4.04	5.1	6.6	8.1	11.6
8.5	1.40	2.17	3.15	4.27	5.4	7.0	8.6	12.4
9.0	1.49	2.29	3.33	4.49	5.8	7.5	9.1	13.1
9.5	1.57	2.42	3.52	4.79	6.1	7.9	9.6	13.8
10.0	1.65	2.55	3.67	5.02	6.4	8.3	10.1	14.6
10.5	1.73	2.68	3.82	5.24	6.7	8.7	10.7	15.3
11.0	1.82	2.80	4.04	5.54	7.0	9.1	11.1	15.8
1.5	1.90	2.93	4.19	5.77	7.3	9.5	11.6	16.7
12.0	1.97	3.05	4.41	5.98	7.7	10.0	12.2	17.5

WELL VOLUME (gallons)

Well Diameter (inches)

Height Of Water (Total Le - Depth To Water) in FEET	2"	2.5	3"	3.5"	4"	4.5"	5"	6"
13.0	2.06	3.31	4.79	6.51	8.3	10.7	13.1	18.9
14.0	2.31	3.57	5.17	7.04	8.9	11.5	14.2	20.4
15.0	2.53	3.82	5.50	7.49	9.6	12.3	15.2	21.8
16.0	2.64	4.07	5.87	8.01	10.1	13.2	16.2	23.2
17.0	2.80	4.33	6.21	8.53	10.8	14.0	17.2	24.7
18.0	2.97	4.58	6.59	9.06	11.5	14.8	18.2	26.2
19.0	3.13	4.84	6.96	9.50	12.1	15.7	19.2	27.7
20.0	3.30	5.09	7.34	10.03	12.7	16.5	20.5	29.1
21.0	3.46	5.35	7.71	10.55	13.4	17.3	21.1	30.5
22.0	3.62	5.60	8.08	11.00	14.0	18.1	22.3	29.1
23.0	3.79	5.86	8.46	11.53	14.6	19.0	23.2	33.4
24.0	3.95	6.11	8.83	12.05	15.3	19.8	24.3	34.8
25.0	4.12	6.36	9.13	12.50	15.9	20.6	25.3	36.3
26.0	4.28	6.62	9.51	13.02	16.5	21.14	26.3	37.8
27.0	4.45	6.87	9.88	13.55	17.2	22.2	27.3	39.3
28.0	4.62	7.13	10.25	14.07	17.8	23.0	28.3	40.7
29.0	4.78	7.38	10.63	14.52	18.5	23.9	29.3	42.2
30.0	4.94	7.64	11.00	15.04	19.1	24.7	30.3	43.6
31.0	5.11	7.86	11.38	15.72	19.7	25.5	31.3	45.0
32.0	5.27	8.16	11.75	16.00	20.3	26.4	32.3	46.4
33.0	5.44	8.38	12.12	16.54	21.0	27.2	33.3	47.9
34.0	5.60	8.68	12.50	17.06	21.6	28.0	34.4	49.4
35.0	5.77	8.91	12.87	17.51	22.3	28.8	35.4	50.8

Site Safety:

As a rule, all wells should be assumed to pose a health and safety risk. Therefore, the area immediately surrounding each well (ie: breathing zone) will be monitored with OVA and HNU to determine appropriate safety gear. The level of protection needed will be determined by the following breathing zone measurements:

- Level C Protection (full face respirator) - Above ambient (off-site OVA and HNU readings) but less than 5 ppm.
- Level B Protection (self-contained breathing appartus) - Greater than 5 ppm above ambient.

At a minimum all team members entering the active portion of the site will be equipped with a fit tested full-face respirator, safety shoes, hard hat, safety glasses and a long sleeved shirt. In addition, all team members entering the active portion of the site or engaging in sampling activities will have completed the necessary Health and Safety Training for Field Employees as dictated by EPA Order 4014.2.

Safety:

Emergency phone numbers and locations

°Police

Name - Department of Police

Phone number - 836-1010

Location - Pedro Velasquez Diaz St.
Penuelas, P.R.

°Fire

Name - Department of Fire

Phone number - 836-2330

Location - Doctor Loyola St.
Penuelas, P.R.

°Injury or Illness

Name - Hospital de Damas

Phone number - 843-5151

Location - Highway 2
Ponce, P.R.

Name - Department of Health

Phone number - 836-1651 location - Penuelas Medical Center

Location - Peneulas Medical Center
Penuelas, P.R.

Name - Tito Mattey Hospital

Phone number - 856-2105

Location - carreterra 128, km 1.0
Yauco, P.R.

Protocol for Well Purging

The following sequence of operations should be followed:

1) Properly locate and identify monitoring well

2) Remove the locking cap and/or protective cap. If needed, the exterior and interior of the exposed riser pipe of the monitoring well should be wiped with filter paper and deionized water.

3) Use air detection equipment (i.e. OVA, HNU) on the escaping gases at the well head to determine the need and/or level of respiratory protection. Record reading in field notebook.

4) Use an interface probe and/or a bottom loading teflon bailer with teflon coated or stainless steel wire to determine the presence of a immiscible phase. Record findings in field notebook.

5) Using a clean weighted steel measuring tape, level indicator and/or acoustic sounder, determine the following physical measurements:

   a) well and casing diameter
   b) static water level from the top of the casing
   c) total depth of well

   Record all measurements in field notebook and/or Well Monitoring Data Sheet.

6) Calculate static volume in gallons using tables such as presented in Figure 3.

7) Using the same bottom loading teflon bailer used in determining if a immiscible layer is present, or dedicated bladder pump, begin removal of water from well. During evacuation, lower purging equipment or intake into the well to a short distance below the water level and begin water removal. Lower purging device as required to maintain submergence. Collect purge water in 55-gallon drums. The project coordinator will determine an appropriate disposal procedure.

8) During the above operation, the following information should be recorded in a field notebook or on Monitoring Well Data Sheet (attached as Appendix 4):

   a) purging times, beginning and ending
   b) general characteristic of water being removed (i.e., color, odor, turbidity, etc...)

c) rate of discharge measured in a calibrated stainless steel bucket
d) volume of water in casing
e) volume of water removed from well

9) The procedure for well purging is dependent upon the yield of the well.

- In low yield wells, the wells should be evacuated to dryness once and as soon as the well recovers, the first set of parameters taken are those pH and volatile sensitive.

- During long recovery times, pH and pressure sensitive parameters, if possible, should not be taken more than three hours after evacuation to dryness. The additional parameters should be taken as water becomes available.

- For rapidly recharging wells, water should continue to be removed as it recharges until three (3) well volumes have been removed prior to sampling.

Sample Collection:

Sample with a bottom loading teflon bailer according to the following procedure:

a) Select cleansed dedicated teflon bailer.

b) Attach bailer to either a cleansed stainless steel, teflon coated stainless steel or monofilament line.

c) Lower bailer slowly until it contacts water surface.

d) Allow bailer to sink and fill with a minimum of surface disturbance.

e) Slowly raise bailer to surface. Do not allow bailer line to contact ground. Place bailer line on protective liner. Discard first volume collected in bailer.

f) Begin sampling using a teflon coated bottom valve attached to bailer for sample removal. Avoid as much as possible turbulence of sample in transfer from bailer to sample container.

g) Repeat steps b-f as needed to acquire sufficient volume.

h) Contain and preserve samples according to guidelines specified by the contract laboratory.

i) Measure in-situ parameters: pH, specific conductivety and temperature.

j) Label the sample bottles with the following information:

Well name and/or site number
Locality
Date: Time:
Traffic Report number
Analysis Requested (i.e., metals, VOA, etc...)
Preservative (if required)

Record the information in the field notebook and complete all Traffic Reports (Inorganic and Organic), and Chain of Custody Records.

k) Place the properly labeled sample bottle in a metal or plastic cooler maintained at 4°C throughout the sampling and transportation period.

Split and Replicate Samples:

Samples will be split with Servicios Carbareon where possible, however for pressure sensitive (volatile) sample parameters, such as: TOC, TOX and volatile organics, replicate samples will be provided. Split sampling procedures call for the transfer of the collected media to a large common container. Once a sufficient volume has been collected the individual sample aliquots are poured off. This practice increases the chances of cross contamination and the loss of volatiles. Therefore, samples collected for these parameters will only be split if bailer volumes allow.

The EPA sampling contractor will provide sample containers sufficient for split or replicate samples and large volume containers for spliting samples.

Field measurements:

During the sampling of each well three in-situ parameters will be measured: temperature, pH and specific conductivity. A seperate sample will be withdrawn from the well and transfered to a beaker. Direct reading instruments will be used and the results recorded in a field notebook.

All instruments will be calibrated prior to use and calibration information recorded in a field notebook. Calibration of the pH meters will utilize three (3) buffers: pH 4, 7 and 10. The thermometers or temperature measuring instrument instruments will be calibrated against an NBS certified or NBS traceable thermometer prior to field activities and the results recorded. The conductivity meters will be calibrated prior to use according to the manufacturers instructions. The person performing the calibration will initial the results recorded.

All instruments and equipment will be marked so that each piece can be identified and its use recorded.

Quality Assurance/Quality Control Measures:

The sampling activities conducted during this inspection will be supported by preparing and analyzing several sets of quality control (QC) samples and adherence to quality assurance measures. The field QC samples will include the following types:

- Trip blanks - will be used to determine if contamination is introduced to the sample containers during handling, transport and storage. These blanks will be prepared by the sampling team. They are prepared by using distilled deionized water of known high purity, and are sent with sampling equipment and other bottles into the field. One set of trip blanks will be prepared for each parameter group, (ie: metals, NVOA... ect.), and shipped once during the inspection.

- Field blanks - will be used to determine if contamination is introduced by sample collection activities or sampling environment. They are prepared by bringing a quantity of distilled deionized water and using this water to prepare aliquots for each parameter group, while in the field. This is the responsibility of the sampling team and will be done once each day during the inspection.

- Equipment blanks - will be used to determine if contamination is introduced by the sampling equipment. They are prepared by passing a quantity of distilled deionized water over the sampling apparatus prior to field use and collecting aliquots for each parameter group. This is the responsibility of the sampling team and will be done once during each day of sampling.

It should be stressed that all field QC blanks must be submitted in the same manner as the field samples, with no distinguishing labeling or markings. Care should be taken to insure that the contract laboratory does not use a blank for matrix spike.

- Duplicate Samples - will be collected for each parameter. This will be done once for each set of parameters per ten (10) sampling locations.

In addition to the above, the following techniques and procedures will be adhered to during the sampling activities of this inspection to insure sample integrity and representativeness:

- Equipment such as bailers, bladder pumps and bailer wire will be dedicated to evacuation or sampling at each well. This will minimize the need for decontamination and chances of cross contamination during sampling activities.

- Sampling equipment will be constructed of materials compatible with the parameters of concern at this site. Teflon and/or stainless steel are the recommended materials and all equipment contacting the groundwater will be fabricated of this material.

- Prior to shipment all equipment that will contact the sampling media: bailers, pumps, bailer cord/wire, well tape.... etc., will be cleaned and decontaminated. This procedure will include a thorough washing with hot water and a non-phosphate detergent, followed by successive rinses with deionized water and an appropriate solvent: acetone, methylene chloride or hexane. The equipment will then be air dried an wrapped with aluminum foil prior to packaging.

- Gloves and any soiled outer garments will be removed and discarded between evacuation and sampling at each and between each well. This will be done to minimize the chances of cross contamination between wells and purging and sampling.

- The wells will be sampled in the order of least to most contaminated (if such information is available).

Equipment list:

° Personal

hard hats
safety glasses
steel toed safety shoes
rubber boots (safety toe)
disposable booties
coveralls
tyvek (regular and polylaminated)
chemical protection suits
self contained breathing apparatus and air tanks
duct tape
gloves (butyl rubber, neoprene, nitrile)
rainsuits
cartridge respirator (dust, organic vapor, acid mist)
first aid kits
knife
flash light
walkie talkies

° Sampling

OVA
HNU
interface probe
bottom loading teflon bailers and teflon bladder pumps and bailers
teflon coated wire, stainless steel wire or monofilament line
crank or winch
well measuring tape
carpenters chalk
water level indicator or sounder
55 gallon steel or plastic drums
stainless steel buckets
pH meters, spare probes and batteries
buffers (4, 7 and 10)
distilled deionized water
thermometers
conductivity meters and calibration standards
plastic sheets/ground cloth
plastic bags (garbage and sample size)
plastic bags (ice)
whirl pacs or zip lock bags for VOA vials
ice chests or coolers (metal)
sample containers (plastic and glass)
caps and liners
filters and filtering apparatus for dissolved metals

° decon

tubs or buckets
distilled deionized water
sprayers
tap water
sponges and brushes
hexane
non-phosphate detergent (Alconox)
paper towels, kim-wipes or kay-dries

° Documentation

caneras and film
field notebooks
custody tape
wire sealers
chain-of-custody forms
traffic reports
receipt for samples
field data sheets
label tape or tags

° Miscellaneous

preseratives
pH paper
diaposable pipets
vermiculite or other packing material
electrical tape
fiber tape
compass
waterproof markers
pens (black)

13. Sample Custody Procedures

The field sampler will be personally responsible for the care and custody of all samples until they are properly dispatched. After collection, identification and decontamination the samples will be maintained under Chain-of-Custody procedures. Sample tags or labels will be completed using water-proof ink. All sample shipments will be accompanied by a Chain-of-Custody record, provided by the contractor, identifying their contents. If the samples are split with the facility or other regulatory agency, it will be recorded on the custody record. The original Chain-of-Custody record will accompany each shipment, a copy of which will be provided to the project coordinator. Each shipping container shall be sealed with custody tape upon completion of packing and insertion of custody records. Chain-of-Custody procedures to be followed will be based upon NEIC policies and procedures as described in: "Enforcement Considerations for Evaluation of Uncontrolled Hazardous Waste Disposal Sites by Contractors", U.S. EPA: NEIC, 1980. When samples are received by the contractor laboratory, the analyst, after signing, retains a copy of the custody record for the laboratory's files and returns the original to the project coordinator or designated document control officer.

Serialized Chain-of-Custody records will be assigned and accounted for in a field notebook. These documents will contain the following information for each sampling point:

- Project code number
- Sample number
- Station designation (sample location, well number)
- Date and time of collection
- Sample type (grab)
- Signature of sampler
- Additional remarks (samples split and with whom)

As required under section 3007 (a) of RCRA, a Receipt for Samples will be used to document all samples collected. This document will be signed and dated by facility personnel. A copy will be given to Servicios Carbareon and the originals given to the project coordinator.

The above documents, Chain-of Custody and Receipt for Samples, will be provided by the sampling contractor. A sample EPA, Region II Chain-of-Custody form and sample traffic reports are attached as Appendix 3.

Sample Handling and Shipment:

Samples from groundwater monitoring wells are and will be considered "environmental" samples. Environmental samples are not hazardous materials, and consequently they are not subject to DOT hazardous materials transport regulations. These samples will be handled and shipped according to the procedures detailed below:

1. Sample volumes and containers will be specified by the analytical methods. However, plastic containers should be used unless the specific analytical method requires glass. All sample containers should have screw type lids and appropriate liners, ie: teflon. Container lids must fit tightly to prevent sample leakage. Sample volumes should be limited to the quantity necessary to conduct the required analysis and appropriate QA/QC. All sample containers will be prepared by I Chem Company. Random containers are selected and analyzed for cleanliness. Versar receives containers from I Chem, supplies ORD with bottles to be used for performance evaluation samples. Sample bottles and performance evaluation samples are taken by Versar to site.

2. All sample containers will be identified with a sample tag or label at the time of collection.

3. Preservation, if required, will take place immediately after collection.

4. After preservation all containers will be decontaminated by washing with water and a non-phosphate detergent. Each sample will then be placed in a plastic bag and sealed with water-proof tape. In addition, custody tape will also be used.

5. The sample containers will be placed inside a clean metal cooler. Appropriate cushioning, absorbant and ice (if required) will be placed in each cooler to minimize the possibility of breakage and leakage. If preservation by ice is required the ice will be placed in sturdy plastic bags to minimize ice water leakage.

6. After all the samples have been carefully arranged and ice added, the Chain-of-Custody form corresponding to the samples contained in the cooler will be sealed in a plastic bag and taped to the inside surface of the cooler lid.

7. The shipping containers will be closed, sealed with a wire sealer/ fiber tape and custody tape.

8. Each container will be labeled to reflect container number and size of shipment, ie: 1 of X, where X equals total number of containers

being shipped. Each shipping container will be marked " This End Up" with arrows indicating the proper upward position of the container. In addition, a label indicating the responsible Agency's name, address and telephone number will be placed on the outside of each shipping container.

8. A team member must accompany each shipment to the carrier and, if required, be prepared to open and reseal the containers should the carrier request an inspection of its contents.

14. Calibration Procedures and Preventive Maintenance - See Field Measurements Section of this Project Plan and Sections of Statements of Work for Organic and Inorganic Analysis referenced by Section 6.0 of HQ QA Project Plan.

15. Documentation, Data Reduction and Reporting

    A. Documentation

    Sampling and Field Activities: See Section 7.4 and 7.5.3 of "Revised Draft Protocol for Ground Water Inspections at Hazardous Waste Treatment, Storage and Disposal Facilities" (Attachment).

    Laboratory Activities: See IFB document WA 84-A267 referenced by Statements of Work for Organic and WA84-J092 referenced by Statement of Work for Inorganic Analysis.

    B. Data Reduction and Reporting: See Section 8.2 of HQ QA Project Plan which references various parts of the Statements of Work for the various categories of analysis.

16. Data Validation: See Sectioin 8.3 of HQ QA Project Plan; validation to be performed by ICAIR/Life Systems.

17. Performance and Systems Audits - Systems audits performed by EMSL-Las Vegas; procedures to be followed described in Exhibit E of Statement of Work for Organics and in Parts II and III of Statement of Work for Inorganics. Performance audits by EMSL-Cincinnati; procedures followed described in same sections referenced above for systems audit.

18. Corrective Action - See Section 13.2 of HQ QA Project Plan.

19. Reports - See Section 8.1 of "Revised Draft Protocol for Ground Water Inspections at Hazardous Waste Treatment, Storage and Disposal Facilities" (Attachment). The Solid Waste Branch is responsible for the final report. Personnel responsible for various work assignments will submit respective reports to the Solid Waste Branch.

October 11, 1984

RCRA sampling inspection at Servicios Carbareon, Inc., Penuelas, Puerto Rico (PRD091016622)

Joseph V. Cosentino, Environmental Scientist
Source Monitoring Section

Ernest Regna, Chief
Solid Waste Branch

THRU: John Ciancia, Chief
Source Monitoring Section

Richard D. Spear, Chief
Surveillance and Monitoring Branch

On March 21-22, 1984 a RCRA sampling survey was conducted at Servicios Carbareon, Inc. (PRD091016622) located on Rt. 385, Km 3.5 in Penuelas, Puerto Rico. Participating in this inspection were Louis DiGuardia, Mike Clogower, Brian Kovak, Nick Magriples and myself. Myra Perez, Ivette DeJesus, Olga Aveles, Roberto Berberena, Yazmin Lopez, Maria Rodriquez, Dulcilio Medina and Jose Torraca of the Environmental Quality Board (EQB) of Puerto Rico accompanied EPA. Also present were Edert Ortiz, Director of Operations, Juan Negron, Chief Chemist, Mario Rissy, Compliance Officer for Servicios Carbareon and Adolfo Valdes of Envirolabs Inc.

Servicios Carbareon is engaged in the transport, treatment, and storage and disposal of industrial wastes, both hazardous and non-hazardous. A site map and legend are attached as Figure 1.

This survey, conducted at the request of the Solid Waste Branch was to verify site conditions, groundwater monitoring data and unit closures. The areas of concern were: a waste oil lagoon, non-hazardous waste landfarm, drum storage area, lindane storage tank area and the ground water monitoring wells.

As a result, the following samples were collected at the locations described:

- Sample #66055 was a composite of soil (surface to 4 inches deep) collected from the eastern half of the drum storage area for organics and metals analysis. The drum storage area, designated as #4 on site map and shown in photographs # 4 & 6 has an earthen floor and dike. The floor of the storage area did not appear to be sloped nor was a system for removal of spills, leaks or precipitation evident. At the time of this inspection, approximately 150 plastic bags (yellow) containing electroplating sludge were being stored for Digital Equipment Corporation pending the outcome of a petition to exclude the waste from regulation. Several of the bags were torn and a portion of their contents had spilled onto the ground. Also, about 100 drums of various wastes (i.e. solvents, tars and scrap thermometers) were being stored prior to immobilization.

2-LS-SM:JCosentino:6790:tr:10/3/84
2-LS-SM Cosentino | 2-LS-SM Ciancia | 2-LS-SM Spear

- Sample #66056 was a composite of soil (surface to 4 inches deep) collected from the western half of the drum storage area for organics and metals analysis.

- Sample #66057 was a single grab collected from the oil lagoon for metals and organics analysis. The lagoon is designated as #9 on site map and is shown in photographs #7 & 8. The lagoon is unlined and used for the storage of various petroleum wastes. Accumulated water and rainwater are pumped to an adjacent rainwater lagoon, number 13 on site map.

- Sample #66058 was a composite of soil (surface to 5 inches deep) collected around an above ground lindane storage tank for EP toxicity (organics) analysis. The tank designated as #15 on site map is shown in photographs 3 and 14. An earthen containment system surrounds the tank. Photograph #15 shows the former lindane storage tank, no longer in use. The lindane is disposed of via solidification/immobilization.

- Sample #66059 was a composite of soil (surface to 5 inches deep) collected from the southern half of the landfarm for organics analysis. This area designated as #14 on site map is shown in photographs 9 thru 13. The landfarm is used for disposal of non-hazardous industrial wastes (i.e. sludges, off-spec food stuffs and off-spec pharmaceuticals).

- Sample #66060 was a composite of soil (surface to 5 inches deep) collected from the northern half of the landfarm for organics analysis.

- Sample #66062, 66063 and 66064 were grabs from the facility's downgradient RCRA monitoring wells collected for organics analysis. It would appear from the information on hydrogeologic conditions at this site that these wells are not downgradient of the regulated waste treatment/disposal units (see Figure 3).

- Sample #66065 was a grab from the facility's upgradient RCRA well collected for organics analysis.

- Sample #66066 was a grab sample collected from the oil lagoon for testing as an ignitable waste.

- Sample #66067 was a grab from the rainwater lagoon collected for organics analysis. This unit is designated as #13 on the site map and shown in photographs 16 thru 19. This lagoon was selected for sampling after a small tank truck was observed discharging an unknown substance into it (see photograph #16).

All samples were collected in accordance with EPA standard procedures. Figures 2 and 3 depict sample locations. Figure 4 presents monitoring well measurements taken prior to sample collection.

All samples were analyzed at EPA's Edison, NJ laboratory. The data obtained from the analyses is attached as Tables 0 thru 4. Table 0 presents the organic compounds for which analysis was conducted. Tables 1 and 2 present the results of the organics analysis. Table 3 presents the results of metals analysis and Table 4 presents the results of ignitability testing and EP toxicity analysis.

The results indicate significant metals contamination of the soil in the crude storage area and significant organics contamination in the oil lagoon and non-hazardous landfarm. The designated RCRA monitoring wells were relatively free of organics contamination. However, well depths and locations in light of hydrogeologic conditions at the site make this data questionable at best.

Attachments:

Table 0 - List of Organic Compounds for which Analysis was Conducted.
Table 1 - Results of Organics Analysis on Samples Collected 2-21-84.
Table 2 - Results of Organics Analysis on Samples Collected 2-22-84.
Table 3 - Results of Metals Analysis
Table 4 - Results of Ignitability and E.P. Toxicity Analysis

Figure 1 - Site Map and Legend.
Figure 2 - Sample Location Map.
Figure 3 - Well and Well Sample Location Map.
Figure 4 - Monitoring Well Measurements.

Appendix 1 - Photographs taken at Servicios Carbarcon.
Appendix 2 - Receipt for Samples.

cc: John Jimenez - AWM-SW

Organic Compounds for which Analysis was Conducted

Sample Numbers; 66055, 66056, 66057, 66059; 66060, 66062, 66063, 66064, 66065 and 66067

Acid Compounds:

2,4,6-trichlorophenol
p-chloro m cresol
2-chlorophenol
2,4 dichlorophenol
2,4 dimethylphenol
2-nitrophenol
4-nitrophenol
2,4-dinitrophenol
4,6 dinitro o cresol
pentachlorophenol
phenol

Base/Neutral Compounds

acenaphthene
benzidine
1,2,4-trichlorobenzene
hexachlorobenzene
hexachloroethane
bis(2-chloroethyl)ether
2-chloronaphthalene
1,2 dichlorobenzene
1,3-dichlorobenzene
1,4 dichlorobenzene
3,3' dichlorobenzidine
2,4 dinitrotoluene
2,6 dinitrotoluene
1,2 diphenylhydrazine
(as azobenzene)
fluoranthene
4-chlorophenyl phenyl ether

Base/Neutral Compounds

4-bromophenyl phenyl ether
bis-(2-chloroisopropyl)ether
bis(2-chloroethoxy)methane
hexachlorobutadiene
hexachlorocyclopentadiene
isophorone
naphthalene
nitrobenzene
N-nitrosodiphenylamine
N-nitrosodi-n-propylamine
bis(2-ethylhexyl)phthalate
butyl benzyl phthalate
di-n-butyl phthalate
di-n-octyl phthalate
diethyl phthalate
dimethyl phthalate
benzo(a)anthracene
benzo(a)pyrene
3,4-benzofluoranthene
benzo(k)fluoranthene
chrysene
acenaphthylene
anthracene
benzo(ghi)perylene
fluorene
phenanthrene
dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene
pyrene

Volatiles

acrolein
acrylonitrile
benzene
carbon tetrachloride
chlorobenzene
1,2-dichloroethane
1,1,1-trichloroethane
1,1-dichloroethane
1,1,2-trichloroethane
1,1,2,2,-tetrachloroethane
chloroethane
2-chloroethylvinyl ether
chloroform
1,1-dichloroethene
1,2-trans dichloroethene
1,2 dichloropropane
1,3-dichloropropene
ethylbenzene
methylene chloride
chloromethane
bromoethane
bromoform
dichlorobromomethane
trichlorofluoromethane
dichlorodifluoromethane
chlorodibromomethane
tetrachloroethylene
toluene
trichloroethylene
vinyl chloride

Pesticides

aldrin
dieldrin
chlordane
4,4'-DDT
4,4'-DDE
4,4'-DDD
endosulfan I
endosulfan II
endosulfan sulfate
endrin
endrin aldehyde
heptachlor
heptachlor epoxide
BHC-Alpha
BHC beta
BHC delta
BHC Gama
PCB 1242
PCB 1254
PCB 1221
PCB-1232
PCB-1248
PCB-1260
PCB-1016
toxaphene

Dioxins

2,3,7,8 tetrachlorodibenzo p dioxin

Results of Organics Analysis on Samples Collected at Servicios Carbareon

Febuary 21,1984

Compounds Identified	#66055 Drum storage area #1 (soil)	#66056 Drum storage area #2 (soil)	#66057 Oil lagoon (liquid)	#66059 Non-hazardous land farm #1 (soil)	#66060 Non-hazardous land farm #2 (soil)
1,2-dichlorobenzene		160. ug/kg			
fluoranthene				2000. ug/kg	
isophorone					
naphthalene				1600. ug/kg	5300. ug/kg
bis(2-ethylhexyl)phthalate	18000. ug/kg	15000. ug/kg	290000. ug/l	52000. ug/kg	190000. ug/kg
butyl benzyl phthalate					
di-n-butyl phthalate					
di-n-octyl phthalate					
diethyl phthalate					
fluorene				2000. ug/kg	
phenanthrane			160000. ug/l	10000. ug/kg	36000. ug/kg
pyrene			17000. ug/l	4000. ug/kg	8000. ug/kg
benzene				140. ug/kg	1300. ug/kg
1,2-dichloroethane				3300. ug/kg	2200. ug/kg
1,1,1-trichloroethane	38. ug/kg	31. ug/kg	280000. ug/l	5800. ug/kg	76000. ug/kg
1,1-dichloroethane			9300. ug/l	200. ug/kg	2900. ug/kg
chloroform				20000. ug/kg	63000. ug/kg
1,1-dichloroethene				140. ug/kg	2500. ug/kg
ethylbenzene				1100. ug/kg	2500. ug/kg
methylene chloride				1000. ug/kg	3800. ug/kg
bromomethane	80. ug/kg				
tetrachloroethylene			120000. ug/l	14000. ug/kg	230000. ug/kg
toluene	64. ug/kg	290. ug/kg	110000. ug/l	7800. ug/kg	57000. ug/kg
trichloroethylene			26000. ug/l	1600. ug/kg	21000. ug/kg
BHC-Gama	60.3 ug/kg			42400. ug/kg	1308. ug/kg

Results of Organics Analysis on Samples Collected at Servicios Carbareon

Febuary 22, 1984

Compounds Identified	#66062 Well #1W81 -downgradient-	#66063 Well #2W81 -downgradient-	#66064 Well #12W83 -downgradient-	#66065 Well # 11W83 -upgradient-	#66067 Rain water lagoon
1,2-dichlorobenzene					
fluoranthene					
isophorone					
naphthalene					
bis(2-ethylhexyl)phthalate	3 ug/1	3 ug/1		350 ug/1	17 ug/1
butyl benzyl phthalate		4 ug/1			
di-n-butyl phthalate				3 ug/1	
di-n-octyl phthalate					
diethyl phthalate					
fluorene					
phenanthrane					40 ug/1
pyrene					13 ug/1
benzene					
1,2-dichloroethane					
1,1,1-trichloroethane	7.1 ug/1	57 ug/1			
1,1-dichloroethane	3.0 ug/1	44 ug/1			
chloroform					
1,1-dichloroethene					
ethylene					
methylene chloride					
bromomethane					
tetrachloroethylene					
toluene					
trichloroethylene					
BHC-Gama					

- Table 3 -

Results of Metals Analysis on Samples Collected at Servicios Carbareon

Parameter	#66055 Drum storage area #1	#66056 Drum storage area #2	#66057 Oil lagoon
silver	---	---	---
arsenic	18 mg/kg	24 mg/kg	---
beryllium	1.7 mg/kg	1.7 mg/kg	.84 mg/kg
cadmium	---	---	---
chromium	460 mg/kg	81 mg/kg	---
copper	800 mg/kg	43 mg/kg	3.4 mg/kg
mercury	3.0 mg/kg	4.0 mg/kg	---
lead	160 mg/kg	51 mg/kg	---
nickel	---	60 mg/kg	---
antimony	---	---	---
selenium	---	---	---
thallium	---	---	---
zinc	160 mg/kg	130 mg/kg	21 mg/kg

- Table 4 -

Results of Ignitability and EP Toxicity Analysis on Samples Collected at Servicios Carbareon

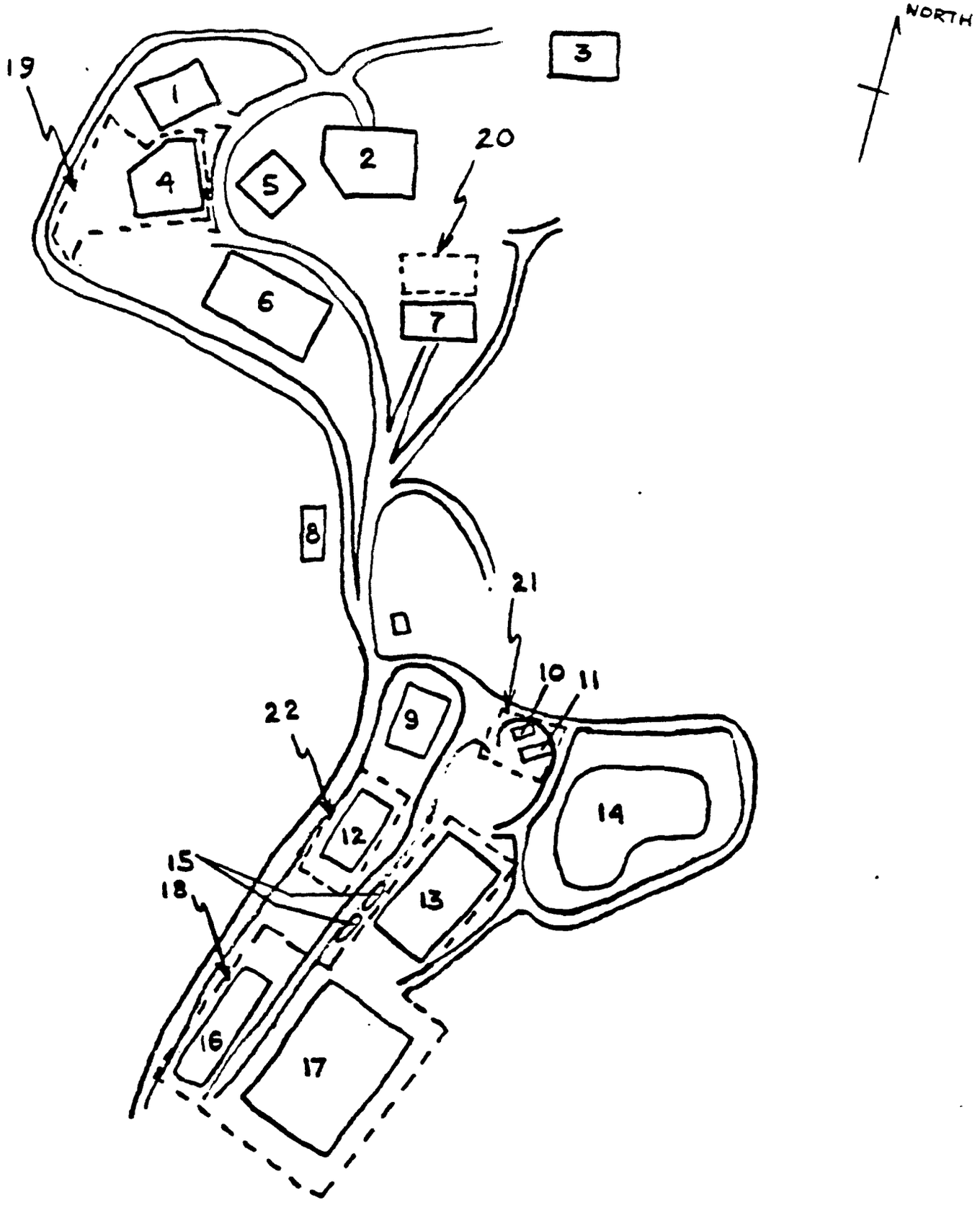
Parameter	#66058 Lindane Storage Tank	#66066 Oil Lagoon
EP Toxicity (organics)	0	---
Endrin	0	---
Gamma BHC (lindane)	0	---
Methoxychlor	0	---
2,4,D	0	---
Silvex	0	---
Toxaphene	0	---
Flash point	---	>140

0 = Sample not analyzed due to lab accident

FIGURE 1

—SERVICIOS CARBAREON, INC.—

FACILITY DRAWING



Servicios Carbareon,Inc.

Site Map Legend

1 - Landfill, drum burial

2 - Landfill, drum burial

3 - Landfill, drum burial

4 - Drum storage area

5 - Landfill, drum burial

6 - Sanitary landfill

7 - Lagoon, corrosive waste

8 - Landfill, drum burial

9 - Lagoon, oil

10 - Immobilization area

11 - Immobilization area

12 - Land application area

13 - Lagoon, rainwater

14 - Land application

15 - Tank storage area

16 - Immobilization area

17 - Surface impoundment (future)

18 - Immobilization area expansion (proposed)

19 - Immobilization area expansion (proposed)

20 - Corrosive lagoon expansion (proposed)

21 - Drum storage area (proposed)

22 - Lagoon, rainwater (proposed)

FIGURE 2

—SERVICIOS CARBAREON, INC.—

FACILITY DRAWING

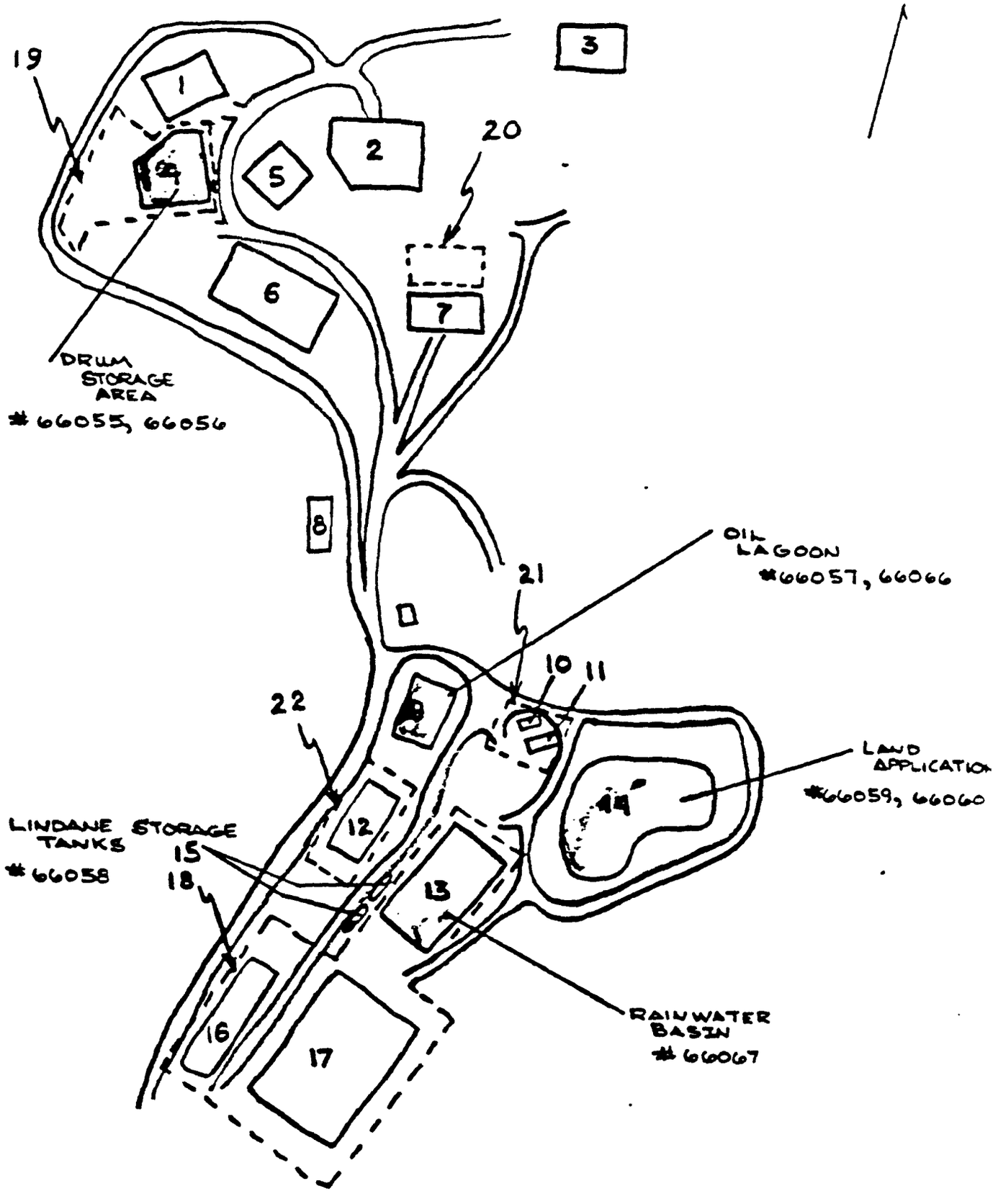


FIGURE 3

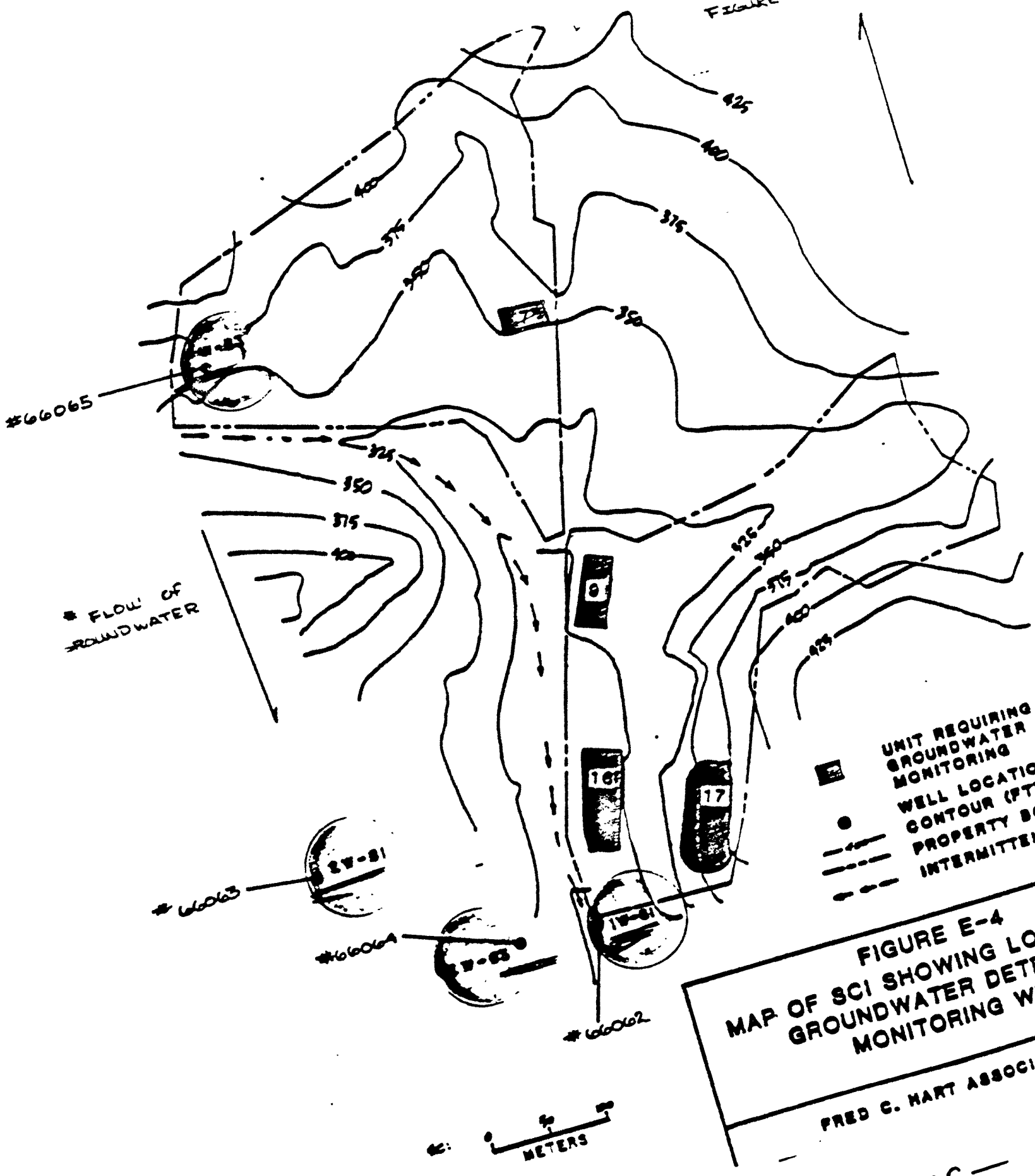


FIGURE E-4
MAP OF SCI SHOWING LOCATION O
GROUNDWATER DETECTION
MONITORING WELLS

FRED C. HART ASSOCIATES, INC.

—SERVICIOS CARBAREON, INC.—

ACCORDING TO HYDROGEOLOGIC CONDITIONS AT CARBAREON WASTE-DISPOSAL SIT

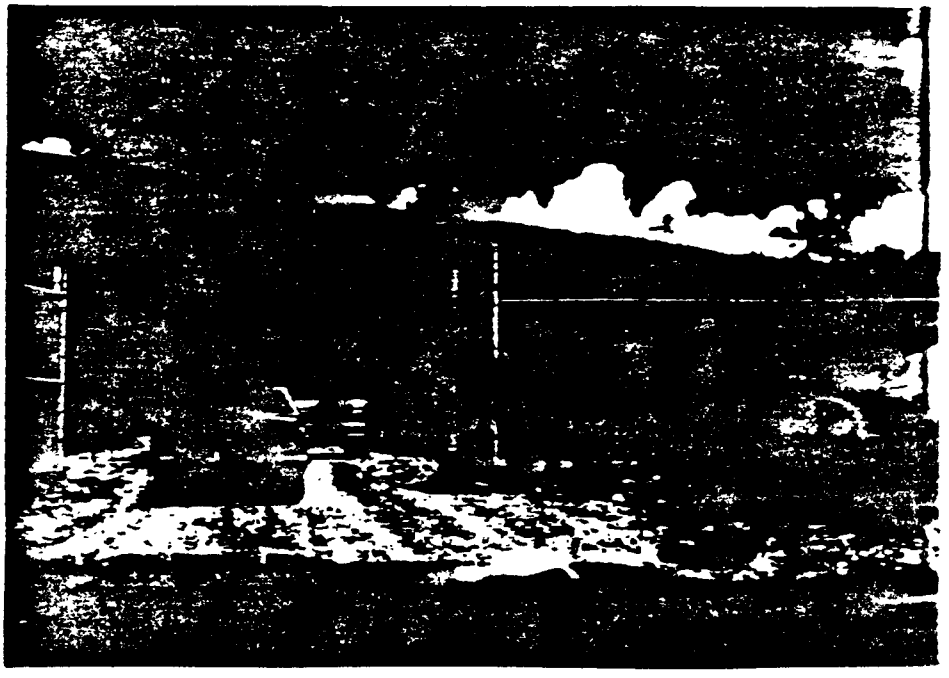
Figure 4

Servicios Carbareon - Monitoring Well Measurements

Well number	1W-81	2W-81	11W-83	12W-83
Original Depth of Well	229 ft.	240 ft.	193 ft.	175 ft.
Well size	2.5 in.	2.5 in.	2.5 in.	2.5 in.
Water level (from top)	77 ft.	76 ft.	172 ft.	90 ft.
Height of water (from bottom)	152 ft.	164 ft.	21 ft.	85 ft.
Water level after bailing	228 ft.	217 ft.	184 ft.	175 ft.
Volume of water evacuated	41 gal.	46 gal.	30 gal.	22 gal.
Volume necessary to evacuate one well volume	38 gal.	42 gal.	5 gal.	22 gal.

Photograph #1 - Entrance to facility from Rt. 365.

Photograph #2 - Entrance to actual waste disposal site.



Photograph #3 - General site view looking south from center of site.

Photograph #4 - General site view looking north-west from center of site.

Photograph #5 - Empty drum storage area.

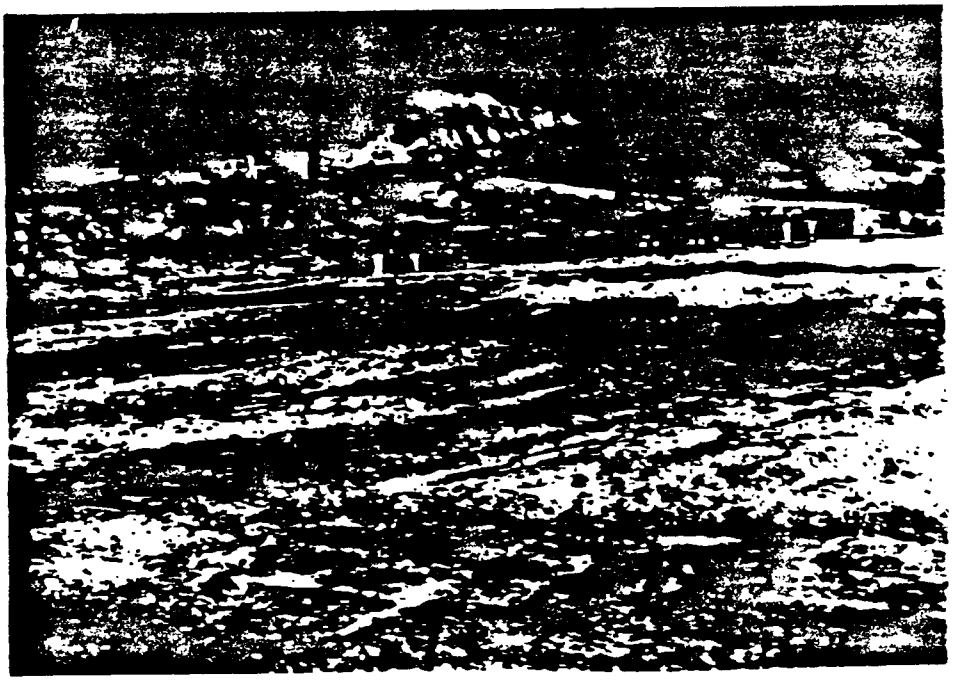
Photograph #6 - Drum storage area (#4 on site map). Yellow bags contain electroplating sludge.

Photograph #7 - Shows oil lagoon, lindane storage tank and immobilization area.

Photograph #8 - Collection of sample #06057 from oil lagoon.

Photograph #9 - General view of landfarm used for non-hazardous waste disposal.

Photograph #10 - Northeast section of landfarm.



Photograph #11 - Southern portion of landfarm.

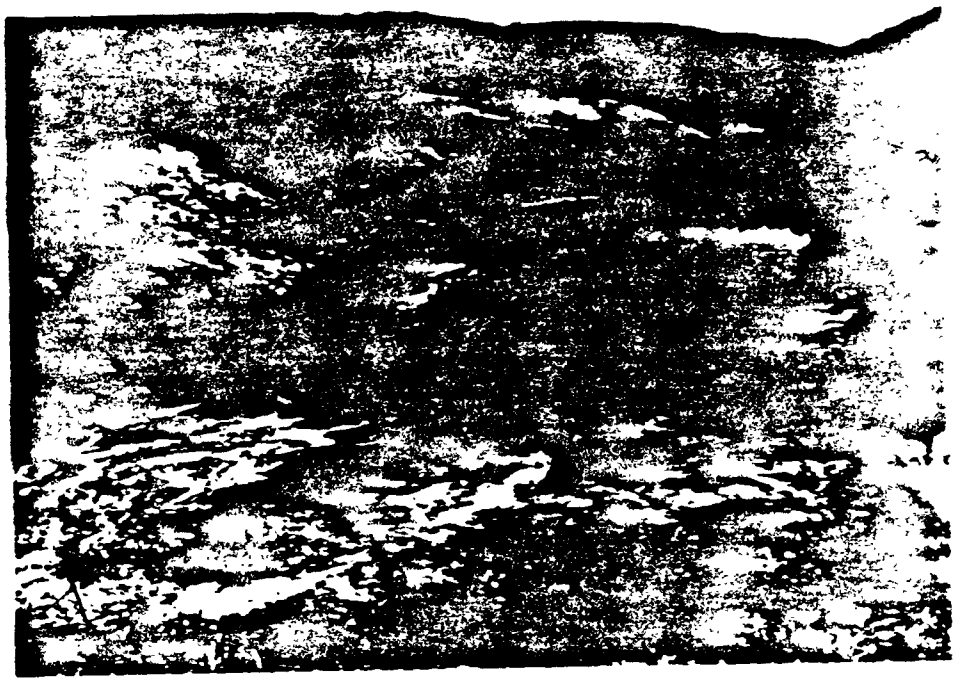
Photograph #12 - southern tip of landfarm.

Photograph #13 - Collection of samples #66059-66060 from landfarm.

Photograph #14 - Lindane storage tank (blue) presently in use.

Photograph #15 - Relocated lindane storage tank (on right) no longer used.

Photograph #16 - Rainwater lagoon

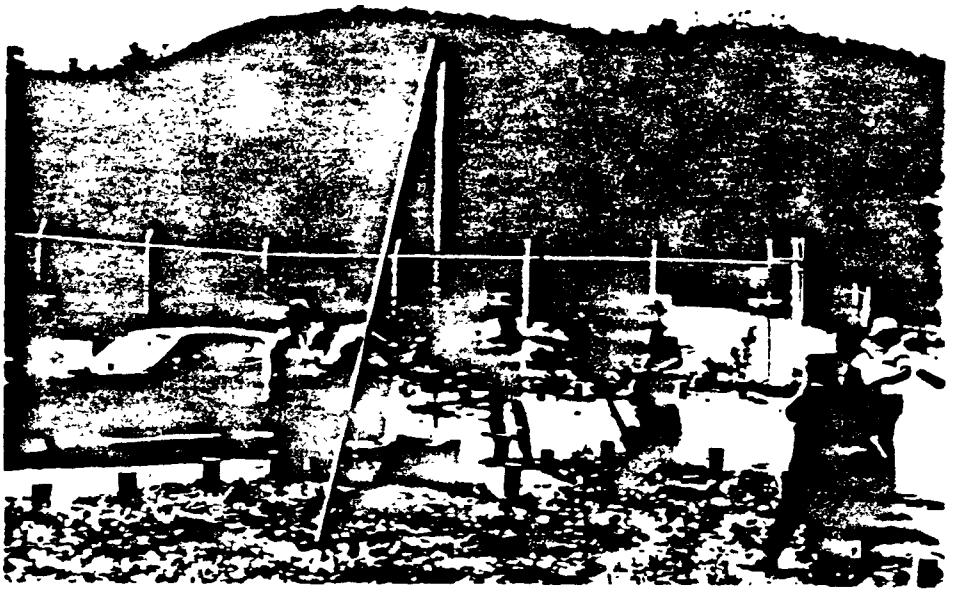


Photograph #17 - Hose used to discharge into rainwater lagoon.

Photograph #18 - Tank truck discharging unknown substance into rainwater lagoon.

Photograph #19 - Collection of sample #66067 from rainwater lagoon.

Photograph #20 - Sampling at well #1W-81 (downgradient).



~~CHAIN OF CUSTODY RECORD~~

1 of 2

RECEIPT FOR SAMPLES

ENVIRONMENTAL PROTECTION AGENCY – REGION II
SURVEILLANCE & ANALYSIS DIVISION
EDISON, NEW JERSEY 08817

Name of Unit and Address: SERVICIOS CARBARREON
RT. 385, Km 3.5
PEÑUELAS, P.R.

PRD091018622

Sample Number	Number of Containers	Description of Samples — COLLECTED 2-21-84
66055	3	1 QT FOR NVOA & METALS SCAN (DRUM STORAGE AREA) SOIL 2 VIALS FOR POA
66056	3	1 QT FOR NVOA & METALS SCAN (DRUM STORAGE AREA) SOIL 2 VIALS FOR POA
66057	3	1 QT FOR NVOA, METALS SCAN (OIL LAGOON) 2 VIAL FOR POA
66058	1	1 QT FOR EP TOXICITY (LINDANE TANK) SOIL
66059	3	1 QT FOR NVOA (LAND FARM SOIL) 2 VIALS FOR POA
66060	3	1 QT FOR NVOA (LAND FARM SOIL) 2 VIALS POA

* We acknowledge that these areas were sampled at Carbareón, Inc. However we did not receiv any of these samples.

Person Assuming Responsibility for Sample | Time | Date

Sample Number	Relinquished By	Received By	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By	Received By	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By	Received By	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By	Received By	Time	Date	Reason for Change of Custody

Page No.

Appendix 2

2 of 2

~~CHAIN OF CUSTODY RECORD~~

RECEIPT FOR SAMPLES

ENVIRONMENTAL PROTECTION AGENCY – REGION II
SURVEILLANCE & ANALYSIS DIVISION
EDISON, NEW JERSEY 08817

Name of Unit and Address: Servicios Carbareon
Rt 385, Km 3.5
Penuelas, PR.

PRD091018622

Sample Number	Number of Containers	Description of Sample: COLLECTED 3-22-89
66062	3	1 QT FOR NVOA (WELL #1, 1WB1) 2 VIALS FOR POA
66063	3	1 QT FOR NVOA (WELL #2, 12WB3) 2 VIALS FOR POA
66064	3	1 QT FOR NVOA (WELL #3, 2WB1) 2 VIALS FOR POA
66065	3	1 QT FOR NVOA (WELL #4, 11W-83) 2 VIALS FOR POA
66066	1	1 POR. JAR FOR IGNITABILITY (OIL LAGOON)
66067	3	1 QT FOR NVOA & METALS SCAN (RAIN WATER LAGOON) 2 VIALS FOR POA.

* We acknowledge that these areas were sampled at Carbareon, Inc. However we did not receive any of these samples. Except the well sample

Person Assuming Responsibility for Sample.	Time	Date

Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody

Page No.

To: ESD/REG.II (EPA9281)
From: AWMD/REG.II (EPA9261) Posted: Fri 18-Oct-85 15:00 EDT Sys 63 (252)
Subject: Attachment B (Analytical Parameters for GW & Leachate Samples)

ATTACHMENT B/Ton/10/17

TO: JOE COSENTINO
OM: TON MOY

Analytical Parameters for Groundwater and Leachate Samples

Acrolein

Acetone

Acrylonitrile

Benzeneene

Bromodichloromethane

Bromoform

Bromomethaneracene

Chlorobenzeoranthene

Chloroethaneranthene

2-Chloroethyl vinyl ether

Chloroform

Chloromethane

1,2-Dibromo-3-chloropropane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

trans-1,2-Dichloroethene

1,2-Dichloroethene

Dichloromethane

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

1,4-Dioxane

Ethylbenzene

Tribromomethane

1,2,4-Trichlorobenzene

1,1,1-Trichloroethane

Trichloroethene

Vinyl chloride

Acenaphthene

Acenaphtalene

Aniline

Anthracene

Benz[a]anthracene

Benzidine

Benzo(a)anthracene

Benzo[b]fluoranthene

Benzo[k]fluoranthene

Benzo[a]pyrene

Benzo[g,h,i]perylene

Benzyl chloride

Bis(2-chlorethoxy)methane

Bis(2-chloroisopropyl)ether

Bis(2-ethylhexyl)phthalate

4-Bromophenyl phenyl ether

Butyl benzyl phthalate

p-Chloroaniline

p-Chloro-m-cresol

Methyl ethyl ketone (MEK)

Pyridine

Styrene

1,2,4,5-Tetrachlorobenzene

1,2,3,4-Tetrachlorobenzene

1,1,2,2-Tetrachloroethane

Tetrachloroethene

Tetrachloromethane

Toluene

1,3-Dichlorobenzene

1,4-Dichlorobenzene

3,3'-Dichlorobenizidine

2,4-Dichlorophenol

2,4-Dichlorophenoxyacetic acid

Diethyl phthalate

2,4-Dimethylphenol

Dimethyl phthalate

4,6-Dinitro-o-cresol

2,4-Dinitrophenol

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Di-n-octyl phthalate

Diphenylamine

Fluoranthene

Fluorene

Hexachlorobutadiene

2-Chloronaphthalene

2-Chlorophenol

Chlorophenylphenyl ether

Chrysene

Dibenz[a,h]anthracene

Dibenzofuran

Di-n-butyl phthalate

1,1,2-Trichloroethane

1,2-Dichlorobenzene

Pyrene

1,2,4,5-Tetrachlorobenzene

1,2,3,4-Tetrachlorobenzene

1,2,4-Trichlorobenzene

2,4,5-Trichlorophenol

2,4,6-Trichlorophenol

Acrylonitrile

1,4-Dioxane

Aldrin

alpha BHC

Beta BHC

Delta BHC

Gamma BHC (Lindane)

Chlordane

4,4'-DDD

4,4'-DDE

4,4'-DDT

Hexachlorocyclopentadiene

Hexachloroethane

Indeno(1,2,3-cd)pyrene

Isophorone

2-Methyl Phenol

4-Methyl Phenol

Naphthalene

4-Nitroaniline

Nitrobenzene

2-Nitrophenol

4-Nitrophenol

N-Nitrosodimethylamine

N-Nitrosodipropylamine

Pentachlorobenzene

Pentachloronitrobenzene (PCNB)

Pentachlorophenol

Phenanthrene

Phenol

Cyanide

Ammonia

Gross Alpha

Gross Beta

Radium Total

Radium 226

Uranium

1,1,2-Trichloro-1,2,2-Tri Fluoroethane

Dieldrin

Endosulfan I

Endosulfan II

Endosulfan Sulfate

Endrin

Endrin aldehyde

Heptachlor

Heptachlor epoxide

Methoxychlor

Toxaphene

PCB-1016

PCB-1221

PCB-1232

PCB-1242

PCB-1248

PCB-1254

PCB-1260

Nitrate

Trichlorofluoromethane

Xylene

Ethyl Acetate

Ethyl Ether

Methyl Isobutyl Ketone

n-butyl Alcohol

Cyclohexanone

Methanol

Benzene

Acetic Acid

Formaldehyde

Methylene Oxide

Lead Acetate

Resorcinol

Benzidine(1,1'-Biphenyl)-4,4'-Diamine

Total Metals

Dissolved Metals

Arsenic

Cadmium

pH)
Temperature)
Conductivity)
Color)
Odor)
Turbidity))--Field Measurements

Sulfate

Priority Pollutants

Extra Peak Scan

Purgeable Organic Carbon

Purgeable Organic Halogens

Carbon Disulfide

Isobutanol

Sodium Azide

Iodomethane

Chromium

Lead

Mercury

Selenium

Silver

Barium

Iron

Coliform Bacteria

Total Organic Carbon

Total Organic Halogens

Chlorides

Magnesium

Potassium

Sodium

Carbonate

Bicarbonate

Calcium

Methyl Benzene

pH)
)
Temperature)
)
Conductivity)
)--Field Measurements
Color)
)
Odor)
)
Turbidity)

Sulfate

Priority Pollutants

Extra Peak Scan

Purgeable Organic Carbon

Purgeable Organic Halogens

Coliform Bacteria

Total Organic Carbon

Total Organic Halogens

Chlorides

Magnesium

Potassium

Sodium

Carbonate

Bicarbonate

Calcium

Methyl Benzene

CHAIN OF CUSTODY RECORD

ENVIRONMENTAL PROTECTION AGENCY – REGION II
Environmental Services Division
EDISON, NEW JERSEY 08817

Name of Unit and Address:

Sample Number	Number of Containers	Description of Samples

Person Assuming Responsibility for Sample | Time | Date

Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By:	Time	Date	Reason for Change of Custody
Sample Number	Relinquished By:	Received By	Time	Date	Reason for Change of Custody

6-85

U.S. ENVIRONMENTAL PROTECTION AGENCY / HWI Sample Management Office
P.O. Box [illegible] Alexandria, VA 22313 703 557-2490 FTS 557-2490

INORGANICS TRAFFIC REPORT

Sample Number
MBE 117

(1) **Case Number:** _____
Sample Site Name/Code:

_____

_____

_____

(2) **SAMPLE CONCENTRATION**
(Check One)
_____ Low Concentration
_____ Medium Concentration

(3) **SAMPLE MATRIX**
(Check One)
_____ Water
_____ Soil/Sediment

(4) **Ship To:**

Attn: _____

Transfer Ship To:

) **Sampling Office:** _____

Sampling Personnel

(Name) _____

(Phone) _____

Sampling Date

(Begin) _____ (End) _____

(6) **Shipping Information:**

Name Of Carrier:

_____

Date Shipped. _____

Airbill Number _____

(7) **Sample Description:**
(Check One)
_____ Surface Water
_____ Ground Water
_____ Leachate
_____ Mixed Media
_____ Solids
_____ Other _____
(specify)

MATCHES ORGANIC SAMPLE NO. _____

(8) **Mark Volume Level On Sample Bottle**
Check Analysis required
___ Total Metals
___ Cyanide

SMO COPY

MBE 117 - Total Metals

MBE 117 - Total Metals

MBE 117 - Cyanide

MBE 117 - Cyanide

MBE 117

MBE 117

MBE 117

[redacted]

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U.S. ENVIRONMENTAL PROTECTION AGENCY / HWI Sample Management Office
P.O. BOX [illegible] 703/557-2490

ORGANICS TRAFFIC REPORT

Sample Number:
BC 999

① **Case Number:**

Sample Site Name/Code:

② **SAMPLE CONCENTRATION**
(Check One)

___ Low Concentration
___ Medium Concentration

③ **SAMPLE MATRIX**
(Check One)

___ Water
___ Soil/Sediment

④ **Ship To:**

Attn:

Transfer
Ship To:

⑤ **Regional Office:** _____

Sampling Personnel:

(Name)

(Phone)

Sampling Date:

(Begin) (End)

⑥ **For each sample collected specify num of containers used and mark volume lev on each bottle.**

	Number of Containers	Approxi Total Vo
Water (Extractable)		
Water (VOA)		
Soil/Sediment (Extractable)		
Soil/Sediment (VOA)		
Other		

⑦ **Shipping Information**

Name of Carrier

Date Shipped:

Airbill Number:

BC 999	· Water (Extractable)
BC 999	· Water (Extractable)
BC 999	· Water (Extractable)
BC 999	· Water (Extractable)
BC 999	· Water (VOA)
BC 999	· Water (VOA)
BC 999	· Soil/Sediment (Extractable)
BC 999	· Soil/Sediment (Extractable)
BC 999	· Soil/Sediment (VOA)
BC 999	· Soil/Sediment (VOA)

⑧ **Sample Description**

___ Surface Water ___ Mixed Media
___ Ground Water ___ Solids
___ Leachate ___ Other (specify) _____

⑨ **Sam**

⑩ **Special Handling Instructions:**
(e.g., safety precautions, hazardous nature)

Well Monitoring Data Sheet

Site Name _____ Date: Beg. _____ End _____

Location _____ Well No. _____ Lat. _____ Long. _____

EPA ID # _____ Site Rep. _____

Sampler(s) _____

_____ Photo Log _____

Well Measurements

Well Diameter _____ cm _____ in

Well Depth _____ m _____ ft

Casing Size _____ cm _____ in

Water Depth _____ m _____ ft

Hght of Water (Well Dpt - Water Dpt)

_____ m _____ ft

General Observations

Detectable Odor - OVA _____

- HNU _____

Temperature _____ pH _____

Turbidity _____ Sediment _____

Color _____ Odor _____

Conductivity _____

Evacuation Method

Vacuum _____

Bailer _____

Pressure _____

Other _____

Time: Beg. _____ End _____

Rate of Discharge _____

Volume _____ gal

Volume Removed _____ gal

Recharge Wait _____

Sample Method

Bailer _____

Diaphragm _____

Other _____

Time: Beg. _____ End _____

Depth Sampled _____

General Comments:

_____

_____

Analysis:

_____

_____

_____

Preservation Method:

_____

_____

_____

Conversions: 1 meter = 3.28 ft
1 foot = .3048 m

WELL VOLUME (gallons)

Well Diameter (inches)

Height Of Water (Total Length Of Water) In FEET Depth To Water

	2"	2.5"	3"	3.5"	4"	4.5"	5"	6"
36.0	5.93	9.21	13.17	18.03	22.9	29.7	36.4	52.3
37.0	6.09	9.43	13.55	18.56	23.5	30.5	37.4	53.8
38.0	6.26	9.66	13.92	19.08	24.1	31.3	38.4	55.2
39.0	6.42	9.95	14.29	19.53	24.8	32.1	39.4	56.7
40.0	6.59	10.18	14.67	20.05	25.5	32.9	40.4	58.1
41.0	6.75	10.48	14.97	20.58	26.1	33.8	41.4	59.5
42.0	6.92	10.70	15.42	21.03	26.7	34.6	42.5	61.0
43.0	7.08	10.93	15.72	21.55	27.4	35.4	43.5	62.4
44.0	7.25	11.23	16.16	22.07	28.0	36.2	44.5	63.9
45.0	7.41	11.45	16.46	22.52	28.6	37.0	45.5	65.4
50.0	8.23	12.72	18.33	25.07	31.8	41.2	50.5	72.6
55.0	9.06	13.99	20.20	27.60	35.0	45.3	55.6	79.9
60.0	9.21	15.27	22.00	30.08	38.1	49.4	60.6	87.1
65.0	10.44	16.72	23.87	32.55	41.3	53.5	65.7	94.7
70.0	11.53	17.81	25.66	35.09	44.5	57.6	70.7	101.6
75.0	12.35	19.08	27.68	37.63	47.6	61.7	75.7	108.9
80.0	13.17	20.35	29.33	40.10	50.8	65.9	80.8	116.2
85.0	13.99	21.63	31.20	42.65	54.0	70.0	85.9	123.4
90.0	14.82	22.90	33.00	45.12	57.1	74.1	91.0	130.7
95.0	15.04	24.17	34.87	47.66	60.3	78.2	96.0	137.9
100.0	16.46	25.44	36.66	50.13	63.5	82.3	101.0	145.6

Appendix E

Monitoring Parameters

To: ESD/REG.II (EPA9281)
From: AWMD/REG.II (EPA9261) Posted: Fri 18-Oct-85 15:00 EDT Sys 63 (252)
Subject: Attachment B (Analytical Parameters for GW & Leachate Samples)

ATTACHMENT B/Ton/10/17

TO: JOE COSENTINO
OM: TON MOY

ATTACHMENT B

Analytical Parameters for Groundwater and Leachate Samples

Acrolein

Acetone

Acrylonitrile

Benzeneene

Bromodichloromethane

Bromoform

Bromomethaneracene

Chlorobenzeoranthene

Chloroethaneranthene

2-Chloroethyl vinyl ether

Chloroform

Chloromethane

1,2-Dibromo-3-chloropropane

Dibromochloromethane

1,1-Dichloroethane

1,2-Dichloroethane

Tribromomethane

1,2,4-Trichlorobenzene

1,1,1-Trichloroethane

Trichloroethene

Vinyl chloride

Acenaphthene

Acenaphtalene

Aniline

Anthracene

Benz[a]anthracene

Benzidine

Benzo(a)anthracene

Benzo[b]fluoranthene

Benzo[k]fluoranthene

Benzo[a]pyrene

Benzo[g,h,i]perylene

trans-1,2-Dichloroethene

1,2-Dichloroethene

Dichloromethane

1,2-Dichloropropane

cis-1,3-Dichloropropene

trans-1,3-Dichloropropene

1,4-Dioxane

Ethylbenzene

Methyl ethyl ketone (MEK)

Pyridine

Styrene

1,2,4,5-Tetrachlorobenzene

1,2,3,4-Tetrachlorobenzene

1,1,2,2-Tetrachloroethane

Tetrachloroethene

Tetrachloromethane

Toluene

1,3-Dichlorobenzene

1,4-Dichlorobenzene

3,3'-Dichlorobenizidine

2,4-Dichlorophenol

2,4-Dichlorophenoxyacetic acid

Diethyl phthalate

Benzyl chloride

Bis(2-chlorethoxy)methane

Bis(2-chloroisopropyl)ether

Bis(2-ethylhexyl)phthalate

4-Bromophenyl phenyl ether

Butyl benzyl phthalate

p-Chloroaniline

p-Chloro-m-cresol

2-Chloronaphthalene

2-Chlorophenol

Chlorophenylphenyl ether

Chrysene

Dibenz[a,h]anthracene

Dibenzofuran

Di-n-butyl phthalate

1,1,2-Trichloroethane

1,2-Dichlorobenzene

Pyrene

1,2,4,5-Tetrachlorobenzene

1,2,3,4-Tetrachlorobenzene

1,2,4-Trichlorobenzene

2,4,5-Trichlorophenol

2,4,6-Trichlorophenol

2,4-Dimethylphenol

Dimethyl phthalate

4,6-Dinitro-o-cresol

2,4-Dinitrophenol

2,4-Dinitrotoluene

2,6-Dinitrotoluene

Di-n-octyl phthalate

Diphenylamine

Fluoranthene

Fluorene

Hexachlorobutadiene

Hexachlorocyclopentadiene

Hexachloroethane

Indeno(1,2,3-cd)pyrene

Isophorone

2-Methyl Phenol

4-Methyl Phenol

Naphthalene

4-Nitroaniline

Nitrobenzene

2-Nitrophenol

4-Nitrophenol

N-Nitrosodimethylamine

N-Nitrosodipropylamine

Pentachlorobenzene

Pentachloronitrobenzene (PCNB)

Acrylonitrile

1,4-Dioxane

Aldrin

alpha BHC

Beta BHC

Delta BHC

Gamma BHC (Lindane)

Chlordane

4,4'-DDD

4,4'-DDE

4,4'-DDT

Dieldrin

Endosulfan I

Endosulfan II

Endosulfan Sulfate

Endrin

Endrin aldehyde

Heptachlor

Heptachlor epoxide

Methoxychlor

Toxaphene

PCB-1016

PCB-1221

PCB-1232

PCB-1242

PCB-1248

Pentachlorophenol

Phenanthrene

Phenol

Cyanide

Ammonia

Gross Alpha

Gross Beta

Radium Total

Radium 226

Uranium

1,1,2-Trichloro-1,2,2-Tri Fluoroethane

Benzene

Acetic Acid

Formaldehyde

Methylene Oxide

Lead Acetate

Resorcinol

Benzidine(1,1'-Biphenyl)-4,4'-Diamine

Total Metals

Dissolved Metals

Arsenic

Cadmium

PCB-1254

PCB-1260

Nitrate

Trichlorofluoromethane

Xylene

Ethyl Acetate

Ethyl Ether

Methyl Isobutyl Ketone

n-butyl Alcohol

Cyclohexanone

Methanol

Carbon Disulfide

Isobutanol

Sodium Azide

Iodomethane

Chromium

Lead

Mercury

Selenium

Silver

Barium

Iron

Appendix F

Receipt for Samples

Versar INC.

Receipt for samples
~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE Y / (N)
	PTE/Puerto Rico		

SAMPLERS: *(Signature)* Darcy Higgins

(Printed) D. Higgins, D. Paquette, J. Maier, A. Fleites, L. Bueta

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	VOA-DI	POC	POX	EXT.ORG	Pest/Herb.	Dioxin	T. Metals	D. Metals	TOC	TOX	Phenols	CN	NH3/NO3	SO4/Cl	REMARKS
0611	11/21/85			✓	~~[illegible]~~ 21-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0614	↓			✓	9-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0615	↓			✓	9-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0660	11/22/85			✓	12-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0663	↓			✓	Field Blank/12-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0664	↓			✓	Equipt. Blank/1-W*	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0609	11/21/85			✓	18-W-85	22	2	2	1	1	4	2	2	1	1	1	1	1	1	N	1	—
— N	O	T	H	I	NG TO	F	O	L	L	O	W —											

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[signature]	11/22/85 1300	Darcy Higgins			
(Printed) JUAN E NEGRÓN		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
				* pump
(Printed)		(Printed)		

Versar INC

Receipt For ~~Samples~~ RECORD

PROJECT NO.	PROJECT NAME
	PTE/Puerto Rico,

SAMPLERS: (Signature) Darcy L. Higgins

(Printed) D. Higgins, J. Mauer, C. Bueler, D. Paquette, A. Freitas

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	VOA-DT	POC	POX	EXT.ORG	Herb/Pest.	Dioxin	T.Metals	D.Metals	TOC	TOX	PHENOLS	CN	NH3/NO3	SO4/Cl-	REMARKS
0661	11-22-85			V	23-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0662	11-23-85			V	30-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0670	↓			V	Field Blank/30-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0671	↓			V	Equipt. Bl./26-W*	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0665	11-22-85			V	29-W	20	1**	1**	1	1	4	1	1	1	1	1	1	1	1	1	1	—
0675	11-22-85			V	PE Samples	21	2	2	1	1	4	2	2	1	—	1	1	1	1	1	1	—
0676	↓			V	PE Blank	8	2	2	—	—	2	1	1	—	—	—	—	—	—	—	—	—
0666	11-23-85			V	26-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0667	↓			V	26-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0668				V	28-W	9	2	2	1	1	—	1	—	1	—	1	—	—	—	—	—	—
0669				V	1-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0344	11-24-85			V	Field Bl./28-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—

INDUSTRIAL HYGIENE SAMPLE Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
P.E. Negrón	11-25-85 1000	Darcy Higgins			
(Printed) JUAN E. NEGRÓN		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks * Bailer # 11-22-85
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow) Copy to Coordinator Field Files (pink)

Versar INC.

Receipt for Samples ~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME
	PTE/Puerto Rico

SAMPLERS: (Signature) Darcy J. Higgins

(Printed) D. Higgins, J. Maier, L. Buela

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	VOA-DI	POC	POX	EXT. ORG.	T. Metals	D. Metals	TOC	TCX	PARAMETERS: Phenols	CN	NH3	NO3	SO4	Cl	Dioxin	REMARKS	INDUSTRIAL HYGIENE SAMPLE Y/N
0345	11/18/85	1700		V	Trip Blank	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-		
0601	11/18/85	1400		V	Equipt Blank	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-		
0602	11/18/85	1000		V	H-W-83	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-		
0603	11/18/85	1100		V	4-W	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-		
0604	11/19/85	1030		V	Equipt Blank (bailer at 11-W)	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-		
0605	11/19/85	1030		V	Field Blank (11-W)	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-		
———	NOTHING	TO	FOLLOW	———																				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	11-19-85 1500	Darcy Higgins			
(Printed) Juan E. Negrón		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
				Note: VOA, VOA DI, POC, and POX for 0602, 0603 collected on 11/18; remainder of samples collected on 11/19/85.
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink).

Versar INC

Receipt for Samples ~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE	Y / N
	PTE/Puerto Rico		N

SAMPLERS: *(Signature)* Darcy Higgins

(Printed) D. Higgins, J. Marzi, L. Burla

PARAMETERS

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	VOADI	POC	POX	EXT ORG	Pest/Herb	Dioxin	TOC	TOX	T. Metals	D. Metals	Phenols	CN-	NH3/NO3	SO4/Cl-	REMARKS
0606	11/19/85			✓		22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	-
0607	11/20/85			✓		22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	-
0610	11/20/85			✓	Field Blank	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-
— N	O	T	H	I	NG TO	F	O	L	L	O	W	—										

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
J. E. Negron	11/24/85 1900	Darcy Higgins			
(Printed) JUAN E. NEGRON		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink)

Versar INC.

Receipt For Samples RECORD

PROJECT NO.	PROJECT NAME
	PTE/Puerto Rico

SAMPLERS: (Signature) Darcy Higgins (Printed) D. Higgins, J. Mayer, L. Buela

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: VOA	VOA-DI	ROC	ROX	EXT. ORG.	Pest/Herb.	Dioxin	T. Metals	D. Metals	TOC	TOX	Phenols	CN-	NH3/NO3	SO4/Cl-	INDUSTRIAL HYGIENE SAMPLE (Y/N)
0608	11/20/85	1700		✓	W-22	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	–
0609	11/21/85	1300		✓	18-W-85	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	–
0613	11/21/85	1100		✓	Equip. Blank/18-W-85	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	–
0612	11/21/85	1030		✓	Field Blank/18-W-85	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	–
NOTHING TO FOLLOW																						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed) Juan E. Negrón	11/21/85 1900	(Printed) Darcy Higgins	(Printed)		(Printed)
Relinquished by: (Signature)	**Date / Time**	**Received for Laboratory by:** (Signature)	**Date / Time**	**Remarks**	
(Printed)		(Printed)			

Distribution: Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink)

Versar INC.

Receipt for Ales

~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE (Y / N)
	PTE/Puerto Rico		

SAMPLERS: (Signature) Darcy Higgins

(Printed) D. Higgins, D. Paquette, J. Maier, A. Fleites, L. Bucek

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS	VOA	VOA-DI	POC	POX	EXCORG	PEST/HERB	PIOXIN	T. Metals	D. Metals	TOC	TOX	PHENOLS	CN	NH3/NO3	SOLIDS	REMARKS
0611	11/21/85			G	[redacted] 21-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0614	"	↓			G	9-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0615	↓	↓			G	9-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0660	11/22/85				G	12-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—
0663	↓	↓			G	Field Blank/12-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0664	↓	↓			G	Equipt. Blank/1-W*	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—
0609	11/22/85				G	18-W-85	22	2	2	1	1	4	2	2	1	1	1	1	1	1	N	1	—
NOTHING TO FOLLOW																						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed) JUAN E. NEGRÓN	11/22/85 1300	(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
(Printed)		(Printed)		* pump

Distribution Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink).

Versar INC.

Receipt For S[redacted]les RECORD

PROJECT NO.	PROJECT NAME
	PTE/Puerto Rico

SAMPLERS: (Signature) Darcy Higgins

(Printed) D. Higgins, J. Maier, C. Bueke, D. Baquette, A. Fleitas

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: VOA	VOA-DI	POC	POX	EXT. ORG	Herb./Ret.	Dioxin	T. Metals	D. Metals	TOC	TOX	Phenols	CN	NH3/NO3	SO4/Cl-	INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
0661	11-22-85			V	23-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—	
0662	11-23-85			V	30-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—	
0670	"			V	Field Blank/30-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—	
0671	↓			V	Equipt. Bl./26-W*	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—	
0665	11-22-85			V	29-W	20	2**	2**	1	1	4	1	1	1	1	1	1	1	1	1	1	—	
0675	11-22-85			V	PE Samples	21	2	2	1	1	4	2	2	1	—	1	1	1	1	1	1	—	
0676	↓			V	PE Blank	8	2	2	—	—	2	1	1	—	—	—	—	—	—	—	—	—	
0666	11-23-85			V	26-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—	
0667				V	26-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—	
0668				V	28-W	9	2	2	1	1	—	1	—	1	—	1	—	—	—	—	—	—	
0669	↓			V	1-W	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	—	
0344	11-24-85			V	Field Bl./28-W	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	—	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
J.E. Negrón	11-25-85 1000	Darcy Higgins			
(Printed) JUAN E. NEGRÓN		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks * Bailer # 11-22-85
(Printed)		(Printed)		

Distribution Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink).

Versar INC

Receipt for Samples ~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE (Y/N)
	PTE/Puerto Rico		

SAMPLERS: (Signature) Darcy J. Higgins

(Printed) D. Higgins, J. Maier, L. Buela

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO OF CONTAINERS	VOA	VOA-DI	POC	POX	EXT.ORG.	T.Metals	D.Metals	TOC	TCX	Phenols	CN	NH3	SO4/Cl	Dioxin	PCB
0345	11/18/85	1700		V	Trip Blank	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-
0601	11/18/85	1400		V	Equipt Blank	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-
0602	11/18/85	1000		V	H-W-83	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-
0603	11/18/85	1100		V	4-W	22	2	2	1	1	4	1	1	1	1	1	1	1	1	2	2	-
0604	11/19/85	1030		V	Equipt Blank (bailer at 11-W)	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	-
0605	11/19/85	1030		V	Field Blank (11-W)	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	
— NOTHING TO FOLLOW —																						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed) JUAN E. NEGRÓN	11-19-85 1500	(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
(Printed)		(Printed)		Note: VOA, VOA DI, POC, and POX for 0602, 0603 collected on 11/18; remainder of samples collected on 11/19/85.

Distribution: Original Plus One Accompanies Shipment (white and yellow). Copy to Coordinator Field Files (pink)

Versar INC

Receipt for Samples

~~CHAIN OF CUSTODY~~ RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE Y/N
	PTE/Puerto Rico		

SAMPLERS: *(Signature)* Darcy Higgins (Printed) D. Higgins, J. Maki, L. Burke

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	VOADE	POC	POX	EXTORG	PESTHERB	DIOX	TOC	TOX	T. Metals	D. Metals	REMARKS Arsenic	CN-	NH3/NO3	SULFATE
0606	11/24/85			✓		22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	–
0607	11/24/85			✓		22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	–
0610	11/24/85			✓	Field Blank	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	–
— NOTHING TO FOLLOW																					

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
P.E. Nelson	11/24/85 1900	Darcy Higgins			
(Printed) JEAN E. NELSON		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink)

SAIC INC

Receipt Samples RECORD

PROJECT NO.	PROJECT NAME
	PTE/Puerto Rico

SAMPLERS: (Signature) Darcy Higgins

(Printed) D. Higgins, J. Mayer, C. Buela

FIELD SAMPLE NUMBER	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS	PARAMETERS: VOA	VOA-DI	ROC	POX	EXT. ORG.	Pest/Herb.	Dioxin	T. Metals	D. Metals	TCC	INDUSTRIAL HYGIENE SAMPLE: TOX	Phenols	CN-	NH3/NO3	SO4/Cl-	REMARKS
0608	11/20/85	1700		✓	W-22	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	
0609	11/21/85	1300		✓	18-W-85	22	2	2	1	1	4	2	2	1	1	1	1	1	1	1	1	
0613	11/21/85	1100		✓	Equip. Blank/18-W-85	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	
0612	11/21/85	1030		✓	Field Blank/18-W-85	18	2	2	1	1	2	1	1	1	1	1	1	1	1	1	1	
NOTHING TO FOLLOW																						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	11/21/85 1900	Darcy Higgins			
(Printed) JUAN E. NEGRÓN		(Printed) Darcy Higgins	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow), Copy to Coordinator Field Files (pink).

APPENDIX G

CLOSURE PLAN/COST ESTIMATE FOR THE WASTE MANAGEMENT UNITS

I. CLOSURE AND POST-CLOSURE REQUIREMENTS

I-1 Closure Plans

Closure plans were not provided or reviewed for the following units listed on the facility drawing legend, page I-6 of the application:

- o Facilities listed by applicant as being nonhazardous waste facilities:
  - Number 6, Sanitary Landfill (SL)
  - Number 12, Land Treatment Area (AC-1)
  - Number 14, Land Treatment Area (AC-2)
- o Facilities listed by applicant as being hazardous waste facilities:
  - Number 1, Drum Burial Landfill No. 1
  - Number 2, Drum Burial Landfill No. 2
  - Number 3, Drum Burial Landfill No. 3
  - Number 5, Drum Burial Landfill No. 5
  - Number 8, Drum Burial Landfill No. 8
  - Number 10, Immobilization Facility (TI-1)
  - Number 11, Immobilization Facility (TI-2)
  - Number 15A, Tank Storage Area
  - Number 19, Temporary Drum Storage Area

The comments provided below are only for the other units, for which a closure plan was provided.

I-1a Closure Performance Standard: §264.111

Due to the large variety of unit types (i.e., container storage, tanks, landfills, etc.) the text included in Section I-1a of the application should be expanded to provide a brief description of how the individual closure plans provided for each type of unit, meets the closure performance standard.

I-1b Partial Closure Activities: §264.112(a)(1)

On page I-45 of the application it indicates that IM-1 and IM-2 may be closed "in segments." However, no detailed plan of how the partial closure activities are to be performed was submitted. The applicant must submit a detailed description of the partial closure activities for these units.

I-1c

Maximum Waste Inventory: §264.112(à)(2)

Based on the surface area of the rainwater basin as shown on the topography map, the estimated maximum waste volume of 100,000 gallons provided in Table I-4 appears to be low. Provide additional justification of that volume.

The maximum waste volume of 1000 drums or 55,000 gallons shown for the proposed drum storage area on page I-14 of the application is less than the computed capacity of 1088 drums or 59,840 gallons based on the figure on page D-4 of the application. Clarify this issue.

The maximum waste inventory volume provided in Table I-4 for the LF neutralization impoundment indicates a maximum capacity that is approximately 170,00 gallons in excess of the computed volume provided on page D-45 of the application (7222 cubic yards yields a maximum volume of only 1.46 million gallons). The applicant has indicated that the 168,000 gallons of waste in impoundment LC will be transferred to impoundment LF, which cannot be done if impoundment LF is full. Revise Table I-4 and page D-45 to reflect the actual maximum capacity of impoundment LF, independent of any liquid in impoundment LC.

The maximum waste quantity of 292,238 gallons provided in Table I-4 for the TI-3 immobilization facility appears low if the total capacity of the landfill is 7616 cubic yards as stated on page D-51 of the application (7616 cubic yards = about 1.5 million gallons or 375,000 gallons of waste based on a waste volume of 25% of the total volume). Justify the figures provided or revise the quantities in Table I-4.

The maximum waste volume provided in Table I-5 for the proposed immobilization facility IM-1 is almost twice the maximum capacity shown on page D-53 of the application. Clarify this issue.

Include with list of maximum waste volumes an estimation of the total volume of sludge in each impoundment, and indicate if the sludge volume is included in or separate from the total volume.

Some of the waste volumes included in the maximum waste inventory for the impoundments are marked as being nonhazardous. Since these wastes are stored in hazardous waste impoundments along with

hazardous wastes and can easily become mixed, they are considered hazardous wastes until sufficient documentation is provided to indicate that they are nonhazardous. Revise the waste volumes to reflect that all the wastes are hazardous or document that they are not hazardous.

I-1d Inventory Removal, Disposal, or Decontamination of Equipment: §§264.112(a)(3), 264.114

On page I-16 of the application it states that all equipment will be decontaminated by pressure washing "whenever possible." Indicate when it is expected that this procedure will not work and what alternative procedure(s) will be used. Considering the variety of wastes handled at this site it is likely that some other cleaning agent besides pressurized water will be needed to decontaminate the equipment. Describe the procedure and/or criteria that will be used to determine if the washwaters will be shipped offsite or treated onsite, and describe the onsite treatment procedure that will be used. Provide additional details of the decontamination trough, and any temporary decontamination troughs or pads needed at the individual units (i.e., size, method of lining, method of water collection, sump site, method used to preventing splashing onto surrounding soil, etc.), and method of collecting washwater from truck tires.

Some of the information requested below about soil and washwater testing has been provided in Section C-10 of the application; however, this data was not referenced in Section I nor is it complete. Provide the detailed information requested in complete form, and if left in Section C, provide appropriate references in Section I.

The application indicates, on page I-18, that the washwaters will be tested to assure decontamination is complete. For the washwater testing program provide a breakdown by unit of the following:

- specific parameters to be tested for,
- justification of the parameters chosen,
- specific test procedures to be used, and
- criteria (including justification for that criteria) that will be used to determine if decontamination is complete.

On pages I-2 through I-4 the applicant has provided a procedure for decontamination and sampling of surface soils at the drum storage areas, impoundments, staging areas and tanks. The following comments apply to those procedures in general, with additional specific comments as applicable in items I-1d(1), I-1d(2), and I-1d(4) below:

- Using visual observations is an acceptable first step in identifying contaminated areas. However, the applicant must also provide a procedure whereby the visually unaffected areas are tested for possible contamination. Therefore, in addition to the proposed testing frequency provided for visually affected areas, provide a testing frequency, and indicate on a plan view a proposed sampling pattern, for visually clean areas; since it is unlikely that the proposed rate of 1 sample per 100 square feet, which would result in over 150 samples for drum storage #4 alone, would be used everywhere. Provide a justification for the frequency selected.

- Provide for each specific unit where this procedure will be used, a list of the proposed test parameters, justification for those parameters, specific test procedures, criteria to be used to judge if additional soil removal is necessary, and a justification for that criteria (i.e., background or some other level).

- Provide additional justification of the depth at which the sample is to be obtained.

- Provide a detailed description of the procedures to be used to select background sample, parameters it will be tested for, and a justification of how that sample, or samples, will be representative of the soil at each specific unit.

- In light of the large surface areas covered by some of these areas and the lack of a synthetic or concrete liner (i.e., over 15,000 square yards for drum storage area, #4), justify the assumption that only 20 cubic yards of contaminated soil would require removal (assuming a removal of only one foot in depth less than 4% of the drum

storage area would be removed). While this may well be the case, the estimated value appears to be very optimistic for a facility which handles large volumes of liquid wastes.

The closure plans provided for the storage units (containers, tanks, and surface impoundments) indicate that the applicant will dispose of the waste in the onsite landfills. However, in the event that insufficient capacity were to exist in the landfills at the time of closure, or should there exist some reason whereby these wastes can not be placed in the landfill, an alternative disposal plan must be provided. Therefore, provide an alternative waste disposal plan which lists specific alternative permitted hazardous waste disposal facilities which would be used in the event offsite disposal is required. Also provide a detailed plan describing how the wastes will be transported to the alternative site.

I-1d(1) Closure of Containers: §264.178

The following comments apply to the existing drum storage area (Number 4) and the proposed drum storage area (Number 27).

As discussed in Comment D-6j, the applicant's proposed method of liquid stabilization needs additional justification. Should the proposed method be found to be unsuitable, the proposed closure procedures for the two drum storage areas will require revision. The procedure of placing bulk liquids in the landfill for mixing is no longer permitted, therefore the closure plan must be revised to change those procedures. The ban on disposal of bulk and containerized liquids in landfills also affects liquids which are treated with absorbents, therefore the use of absorbents during closure will only be permitted under the conditions set forth in Comment D-6j.

Pages I-18 and I-21 indicates that some drums may be returned to a licensed drum reconditioner. If this is the case, describe the criteria to be used to select which drums are disposed of onsite and which are reconditioned. Also describe in detail the procedures used to decontaminate the drums before they are shipped offsite or indicate why the drums do not need decontamination.

Page I-19 provides a reference to Appendix D-1 which does not contain the material referred to. Correct the reference.

Based on the discussion on page I-21 of the application it would appear that during closure corrosive wastes along with some other wastes will be treated and disposed of in a different manner than that discussed in Section D. Clarify this issue.

As discussed in Comment D-1d above, the applicant needs to provide a more detailed sampling plan for testing the surface soils at the existing drum storage area.

The closure plan for the existing drum storage area calls for the drums to be moved to the proposed drum storage, however no plan was provided in case the proposed facility is not built. Revise the plan for the existing drum storage area and provide a plan which discusses treatment and disposal of the drums and waste.

Provide a more detailed description of the proposed decontamination procedure to be used for the concrete pad at the proposed drum storage area (i.e., types of solvents to be used, order in which they are to be used, will brushing of the surface be done, etc.).

I-1d(2) Closure of Tanks: §264.197

Unless otherwise noted, the following comments apply to closure of the existing lindane storage tank (Number 15), the proposed tanks T-1 through T7 (Numbers 21 through 26 and 31), and the proposed tank storage area (Number 28).

As discussed in Comment D-6j, the applicant's proposed method of liquid stabilization needs additional justification. Should the proposed method be found to be unsuitable, the proposed closure procedures for the tanks will require revision. The procedure of placing bulk liquids in the landfill for mixing is no longer permitted, therefore the closure plan must be revised to change those procedures. The proposed method of using absorbents to contain spills may also need revision.

Page I-24 of the application contains two areas that are not completely addressed. In the first paragraph it states "Where disposal will take place..." which indicates that disposal may not take place, in which case what happens to the wastewater? In the second paragraph it indicates that drums containing spill saturated pillows

will be temporary stored without indicating how they will be disposed of. Clarify these two issues and revise the text.

After decontamination of the existing and proposed lindane tanks using sodium hydroxide is completed, the tank should be rinsed out with water to remove any alkaline residue. Provide a justification for not rinsing with water or revise the closure plan.

The applicant needs to add a statement to the closure plan for the existing lindane tank indicating that certification by an independent engineer will be provided.

The discussion provided on page I-26 dealing with treatment of the wastes contained within the tanks needs expanded. The application must provide a detailed breakdown of the treatment and disposal procedures to be used for each tank's contents and contaminated washwaters. The discussion provided is unclear and it appears, based on that discussion, that some of the wastes will not be disposed of. Also, based on the variety of wastes stored in the tanks it would appear that some cleaning agents other than steam will be needed to decontaminate the tank interiors, however, the text implies that only steam will be used, except for the lindane tank.

Provide a list of parameters and testing procedures that will be used when testing the washwaters from each tank. Also provide the criteria that will be used to evaluate the results and a justification of that criteria. The general statement provided at the bottom of page I-26 of the application is inadequate.

Based on the discussion provided on page I-27 it appears that the applicant intends to demolish the concrete and block tank storage area without decontamination in which case the demolition waste must be disposed of in a permitted hazardous waste landfill. Since it is unlikely that the applicant plans to do this, revise the application to provide detailed decontamination procedures for the tank storage area.

I-1d(4) Closure of Surface Impoundments: §§270.17(g), 264.228

Unless otherwise noted, the following comments apply to all of the impoundments at this facil-

ity, including the neutralization impoundment LC (Number 7), oil lagoon (Number 9), neutralization impoundment LF (Number 17), and the rainwater basin (Number 13).

As discussed in Comment D-6j, the applicant's proposed method of liquid stabilization needs additional justification. Should the proposed method be found unsuitable, the proposed closure plans for the impoundments will require revision. The procedures of placing bulk liquids in the landfill for mixing is no longer permitted, therefore the closure plan must be revised to change those procedures.

For all impoundments provide a procedure for stabilization of the sludges removed from the impoundments. The sludge must, as discussed in Comment D-6j, pass the paint filter test before placement in the landfill and while the sludges may pass the test it is quite possible that they will not, and will therefore require stabilization.

On page I-30 of the application it states that the sludges in the impoundments will be stabilized at the rate of one part sludge to three parts cement kiln dust. Since this is the same ratio as that provided for the liquids, it seems unlikely that the stabilized liquid will pass the paint filter test (see Comment D-6j) and in fact a higher waste to cement kiln dust ratio may be required. As discussed in other comments, this issue requires additional discussion and justification.

As discussed in Comment I-1d above, the applicant's proposed plan of soil contamination testing and removal needs to be revised. In the case of the unlined impoundments a plan which provides for both visual inspection and soil sampling and testing of the entire interior soil surface area is required (in-place soil with a permeability of 10^{-5} or 10^{-6} cm/sec is not considered a liner). Also, it is reasonable to assume that any impoundment with the soil permeabilities indicated, that has been in service for several years has had some infiltration of the liquid wastes into the soil. Therefore, it should be assumed that the entire soil surface (i.e. bottom and sides) has become contaminated and could require removal at closure. Based on the review of the proposed closure plan, the applicant has not made this assumption, but has

instead assumed that only limited areas or less than 6 inches of the overall surface soil would require removal (see Comment I-4). The applicant must provide test data to justify this approach or make revisions in their application.

The reference to Appendix D-1 on page I-29 is incorrect and needs to be revised.

When taking soil samples of the surface impoundment for contamination testing, samples must be taken both from the impoundment bottom and from the sidewalls below the high-water level.

For closure of the oil lagoon, the applicant has indicated on page I-29 that treatability studies will be needed before treatment of the wastes within the lagoon can begin. The applicant must either do a study now and provide detailed results of that study, or provide a detailed discussion of proposed study (i.e., provide test procedures, sampling procedures and frequency, and the criteria to be used in evaluating the results, etc.). Some details of a plan to test the liquids within the oil lagoon to determine if they are still hazardous was provided in Section C-8 which was not referenced in Section I. However, the applicant must expand the information provided to provide more details on evaluation of the data, and provide appropriate references in Section I.

The proposed method of "washing" the earthen sides of the oil lagoon with an emulsifying agent requires considerably more discussion. The applicant has provided no details of how the proposed operation will work. The following information, as a minimum, must be supplied:

- Detailed description of how the process will be performed. For example, is the agent pressure sprayed onto the soil and allowed to sit or is it vacuumed just after spraying?

- What is to prevent the pressure application of the agent from forcing the contamination deeper into the soil layer?

- Unless this process is carefully controlled, surface erosion could occur. How will this be prevented?

- Will the vacuum totally remove traces of the emulsifying agent or will some of it remain, which would require an additional process to remove?

- How will the washwaters from both the soil "washing" procedure and from equipment decontamination be stabilized for disposal?

- Will the vacuum also remove some of the surface soil?

- The applicant should provide case histories of the use of this procedure in the past, including data indicating its effectiveness; or provide results of a field test of the procedure.

On page I-30 of the application it indicates that the oil lagoon will contain 63,000 gallons or about 312 cubic yards of sludge at closure. However on page D-48 of the application it states that approximately 545 cubic yards of sludge accumulates in that impoundment every year. Clarify this issue.

Page I-31 the application states that if contaminated subsoil from the oil lagoon can be treated at the immobilization facility it will be disposed of on-site. Provide a detailed description of the treatability study that will be performed, including test procedures and the criteria that will be used to evaluate the results. The applicant has provided some details of treatability studies in Section C of the application; however, no references were provided to this material in Section I. Expand the material supplied to address these comments and provide appropriate references in Section I.

The oil lagoon section of the closure plan does not indicate that a certification of closure would be provided, as does the other closure sections. Indicate that it will be provided.

On pages I-34 and I-37, the application states that closure of the neutralization impoundments LF and LC are based on the assumption that the wastes within those impoundments are nonhazardous. The application does not describe any procedure for processing those liquids if they are hazardous. Unless data is presented with the application to demonstrate that liquid wastes are

nonhazardous, the applicant must provide a closure plan which treats them as hazardous wastes. A testing plan for liquids in the neutralization impoundments is provided in Section C-7 of the application; however, this information was not referenced in Section I. Provide additional details about the evaluation criteria and include appropriate references in Section I.

The closure plan for impoundment LC must discuss removal and disposal of the liquid wastes without moving the liquid to impoundment LF (i.e., if LF contains 1.45 million gallons there is no room for the additional 168,000 gallons, see Comment I-1c).

Based on a surface area of 4500 square feet, the estimated quantity of 6 cubic yards of sludge in impoundment LC, which is less than 0.5 inches of sludge, seems low. The volume of 6 cubic yards does not agree with the volume of sludge indicated in the LC closure cost estimate provided on page 10 of the March 1985 Fred C. Hart report. Provide a justification of the sludge volume.

On page I-35 of the application it states that the contingent closure plan cover for impoundment LC consists of the proposed IM-1 landfill liner; however none of the drawings provided with the application show impoundment LC being within the limits of IM-1. Therefore, how will the liner for IM-1 act as a cover for impoundment LC? Revise the layout and design of IM-1, or provide a revised contingent closure plan for impoundment LC. If IM-1 will include impoundment LC, any contaminated soil excavated from the impoundment as part of the site grading for IM-1 must be placed within a hazardous waste landfill. The applicant must also provide a contingent closure plan for impoundment LC to be used in case IM-1 is not constructed.

On page I-37 of the application it states that only about 185 cubic yards of sludge will exist in impoundment LF, and that it is nonhazardous. Later on the same page it states that there is an estimated 720 cubic yards of sludge and it implies that it is hazardous. Provide a justification of the estimated volume and provide documentation showing that the sludge is nonhazardous. Also revise the text to remove the conflicting statements.

As with the other impoundments, the application does not state what will occur should the liquids contained within the rainwater basin be untreatable using the proposed process. Provide an alternative plan. Also, as discussed in Comment D-6j, the liquids must be stabilized before placement in the landfill, therefore revise the rainwater basin closure plan to provide a procedure for stabilization of the liquids.

Justify the volume of sludge estimated for the rainwater basin (i.e., provide measurements of the sludge depth and impoundment area).

Page I-40 of the application states that the rainwater basin will be incorporated into IM-1; however, none of the drawings provided show the rainwater basin within approximately 1000 feet of the IM-1. Therefore, the applicant must provide a revised (from the one provided on page I-40) contingent closure plan for the rainwater basin.

See Comments I-1e(2) through I-1e(7) for comments concerning the cover proposed for the contingent closure plans for the impoundments.

I-1e Closure of Disposal Units: §§270.14(b)(13), 270.21(e), 264.310(a)

Unless noted, the following Comments I-1e(2) through I-1e(8) apply to immobilization facilities (landfills) TI-3, IM-1, and IM-2. As noted, these comments also apply to the contingent closure plans provided for the surface impoundments.

On page I-41 of the application it states that Appendix D-1 contains results of waste stabilization tests; however, Appendix D-1 contains design calculations for the runoff control facilities. The reference to Appendix C-6 containing testing data on the immobilized wastes is incorrect since Appendix C-6 contains sampling equipment and procedures. Finally, on page I-41, the reference to Section C-6, Table C-13 is also incorrect. Page I-42 contains a reference to Appendix D-4 which is incorrect and reference to Sections B-2(j)1 and D-5b(2) which are incorrect. As noted in the General Comments all the incorrect references need to be corrected.

I-1e(2) Cover Design: §§264.228(a)(2)(iii), 264.310(a)

The applicant has provided two proposed cover designs. The first which is to be used as contingent covers for the impoundments meets the EPA recommended cover design. The second cover proposed for closure of the landfills (TI-3, IM-1, and IM-2), does not meet the EPA recommended design since it does not include a synthetic membrane as part of the cover and the cover layer thicknesses are less than those recommended. As applicable, the applicant must supply the following detailed data for both cover designs:

- detailed drawings showing the cover layers, thicknesses, slopes, and overall dimensions;
- provide a final grading plan for TI-3 and the surface impoundment contingent closure plans;
- the common name, species, variety, and rate of application of the proposed cover crop and fertilizer (a specific crop or crops must be provided, statements of "such as malojello" on page I-44 are unacceptable);
- descriptions of the specific synthetic membrane (liner) to be used, including chemical properties, strength, and manufacturer's specifications and detailed placement specifications (manufacturer's specifications for a Water Saver 30 mil liner were provided in Appendix I-3; however, the application does not clearly state that this is the liner that will be used in all cases);
- a detailed description of the rationale used for the cover selection;
- detailed material specifications (i.e. gradation specifications, etc.) and descriptions for the drainage layer materials and filter fabric; and
- characteristics of the soil cover material, including lift sequencing and placement procedures.

In several places in Section I-2d of the closure plan the applicant refers to "calice" which is assumed to be a spelling error and the correct term is "caliche." Correct the text or provide an explanation of "calice" if that is the correct term.

For both cover designs provide a gas venting system or a demonstration that such a system is not needed.

I-1e(3) Minimization of Liquid Migration: §264.310(a)(1)

Since the proposed landfill covers, as described on page I-44 do not meet the EPA recommended design, provide detailed engineering calculations showing how the proposed covers will provide for long-term minimization of liquid migration through the cover.

I-1e(4) Maintenance Needs: §§264.228(a)(2)(iii)(B), 264.310(a)(2)

Provide additional discussion of how the cover will function with a minimal amount of maintenance.

I-1e(5) Drainage and Erosion: §§264.228(a)(2)(iii)(C), 264.310(a)(3)

Provide the following additional information for both cover designs:

- engineering calculations demonstrating that the proposed final slopes will not be subjected to significant cover erosion, including estimates of annual soil loss;
- engineering calculations demonstrating free drainage of precipitation off of and out of the cover (i.e., a demonstration of the effectiveness of the drainage layer to remove water which infiltrates the cover);
- engineering calculations demonstrating that the drainage layer of the proposed landfill cover design will not become clogged with fines from the vegetation soil layer; and
- in view of the thin vegetation layer, describe the effects of growth on the drainage layer (i.e. will roots clog the drainage layer).

I-1e(6) Settlement and Subsidence: §§264.228(a)(2)(iii)(D), 264.310(a)(4)

The applicant has indicated that settlement of the covers is not considered a problem. However, in neither case were any calculations or data provided to support that conclusion. Since the waste will be removed at closure, settlement of the impoundment covers is not likely to be very great, however with the stabilized waste and containers in the landfills, settlement of the landfills could be a major problem. Therefore, provide engineering calculations and supporting data indicating the amount of potential settlement of the cover and how the cover was designed to accommodate that settlement. Provide an analysis for both covers which address possible waste consolidation due to waste dewatering, biological oxidation, and chemical conversion of solids to liquids.

I-1e(7) Cover Permeability: §264.228(a)(2)(iii)(E)

For both covers, demonstrate that the cover system will have a permeability less than or equal to that of the liner system. For the landfill covers analyze both the liner system existing in TI-3 and the proposed double liner (as modified in accordance with the comments in Section D-6) to be installed in the proposed landfills (IM-1 and IM-2). On both pages I-32 and I-44 the applicant indicates that the caliche material will have a recompacted permeability of $1x10^{-7}$ cm/sec or less with a reference to Appendix E. The results of only one permeability test were provided in Appendix E and no details were provided as to how the test was performed. There was a reference to the tests being performed in accordance with ASTM procedures, however the only ASTM soil permeability test, D2434 is for testing of granular soils and is unsuitable for determining permeabilities that low. Provide additional information and laboratory testing data (include full details of how the samples were obtained and the testing was performed) which demonstrates that sufficient material exists for the units which will require a low permeable soil cover, including the surface impoundments. Also, since it is possible that the proposed method of placing and compacting the caliche will not yield a dense enough material to provide the required permeability, provide a construction quality assurance program meeting the requirements discussed in Comments D-6g to assure that the

constructed low permeable soil cover meets the design requirements. Finally, describe the effect of root growth on the low permeable soil in the landfill cover.

I-1f Schedule for Closure: §264.112(a)(4)

The applicant has provided a closure schedule in Section I-3a of the application which does not agree with other portions of the application. For example, Table I-3 indicates closure of the four existing impoundments will occur from October 1985 through March of 1986, while Table D-14 indicates closure from June 1986 through December 1986, while stating at the bottom of the table that closure could take a "minimum" of five years. Resolve these conflicts and present a consistent closure plan throughout the application which provides consistent starting and completion dates. As discussed in comment D-4, the surface impoundments should be closed by November 1988 unless a double liner system is installed.

No closure schedule was provided in Section I-3c of the application for the existing drum storage area or the existing lindane tank. Revise the application to include this information.

Finally, the applicant must provide an estimated date to begin closure of all the proposed units. The schedule provided on page I-51 of the application does not indicate if closure will begin in 1985 or 2085. Also, as shown, the proposed closure schedule (page I-51) does not agree with the closure plans (it implies that all units will be closed within the same 180 day period). The closure schedule must be arranged so that it shows the relationships between all overlapping and contingent activities.

I-2 Post-Closure Plan: §§270.14(b)(3), 270.17(g), 264.118, 264.228(c)(1)(ii), 264.310(b)

The applicant must supply a contingent post-closure plan for all the surface impoundments in accordance with §§264.228(c)(1)(ii). The contingent post-closure plan must include, as applicable, all items addressed in the plan provided for the landfills, plus respond to all applicable comments included in items I-2a through I-2c below.

The post-closure plan must also contain the name, address, and phone number of the person or office to contact about the facility during the post-closure period (in accordance with §§264.118(a)(3)).

I-2a Inspection Plan: §§264.118(a), 264.228(c)(1)(ii), 264.310(b)

The post-closure inspection plan should include copies of the inspection logs which will be used during the inspection. Indicate where these logs will be filed and the period of time which they will be retained.

Considering the potential for cover settlement (see Comment I-1e(6)), justify only providing semiannual inspections, at least in the first few years after closure. Also, with inspections at only six-month intervals and the proposed cover design, the depth of leachate within the leachate collection system could exceed the allowable one foot; demonstrate how the system will be operated to prevent the leachate head from exceeding one foot.

Justify not repairing the stormwater runoff control berms or dikes when cracks are first discovered.

Provide an inspection procedure for the gas venting system, if installed, and the bench marks (bench marks required by §§264.309 and 264.310(b)(6)).

I-2b Monitoring Plan: §§264.228(c)(1)(ii), 264.310(b)

The post-closure monitoring plan must address monitoring of the leachate collection and detection systems. For example, the plan must detail the sampling and testing of any leachate in the leachate detection system and provide a procedure for analyzing the quality and quantity of leachate in the leachate collection system to determine if the cover is functioning as designed or if chemical or biological reactions are occurring to generate leachate, etc.

Provide a list of materials and equipment that will be needed to perform the common maintenance items which will be required during the post-closure period (i.e., repair of fence, mowing, repair of erosion and settlement, replacement of a well, etc.).

Provide and describe a rationale that will be used to determine the need for corrective action (for example, how much settlement can occur before corrective action is taken, etc.).

In Section I-4b of the application, it is implied that the post-closure groundwater monitoring system will consist of the present network of three downgradient wells (1W-81, 2W-81, and 12W-83) and one upgradient well (11W-83). These wells have been located based on structural considerations to monitor the entire facility with a single well network. The existing well network is apparently screened in a relatively deep water-bearing zone located near the base of a massive gray mudstone unit. This zone occurs at depths of 160 to 230 feet below ground surface at the site.

The presence of a shallower groundwater zone (Zone 1) has been documented in Section E of the application. This groundwater is evidently contained within sandy lenses located in a silty unit on top of the massive gray mudstone. The applicant has proposed in Section E-2a(2) of the application to investigate Zone 1 with respect to its potential for establishing individual detection monitoring programs at the two proposed impoundments. As discussed previously in Comment E-3, similar investigations to define Zone 1 must be carried out at <u>all existing regulated land disposal units</u> (as described in Comments E-3 and E-5b) for the purpose of establishing detection monitoring systems in the <u>shallow zone</u> at <u>each</u> applicable regulated unit. The list of regulated units requiring individual monitoring networks is set forth in Comment E-5b.

In keeping with the above requirement, the applicant must propose a comprehensive post-closure monitoring plan for these facilities. As in the detection monitoring program, individual programs must be developed for each applicable regulated unit and include the following features:

- Each individual regulated unit must be monitored for an individual set of detection monitoring parameters to be chosen based on the type of wastes placed (or to be placed) in each unit and the relative mobility, stability, persistence, and detectability of the waste constituents in groundwater. As discussed in Comment E-5a, a single set of

parameters for the entire facility is not appropriate since individual units have likely accepted different wastes.

- Background values must be established relative to each individual regulated unit as discussed in Comment E-5c. In certain cases, it is possible that wells located downgradient from one regulated unit could function as background wells for other regulated units located further downgradient. Background value determination should be based on continued sampling through the post-closure period so that the source of any existing or future leakage may be identified should the presence of hazardous constituents be detected in groundwater.

- Proposed sampling and analytical methods need to be tailored to each regulated unit to account for possible differences in the types of parameters monitored at each unit (see Comments E-5d(1)(2) and (3)).

- Statistical comparisons must be performed using background and downgradient well data from the individual well networks so that the presence/absence of leakage may be defined for each applicable regulated unit (see Comment E-5d(7)).

I-2c

Maintenance Plan: §§264.228(b), 264.228(c)(1)(ii), 264.310(b)

Describe in greater detail the preventative and corrective maintenance procedures, equipment requirements and material needs for the following items in the maintenance plan.

- stormwater control system,

- groundwater monitoring system including possible well replacement,

- leachate collection/detection systems (including detailed leachate testing procedures), and

- making erosion repairs.

I-3 Notice in Deed: §§270.14(b)(14), 264.120, 264.117(c), 264.119

A copy of the actual Notice to Deed must be submitted with the permit application. It is insufficient to only state in the application that it will be prepared. A copy of the notice that will be used is required.

I-4 Closure Cost Estimate: §§270.14(b)(15), 264.142

The applicant has provided closure cost estimates in the application (pages I-61 through I-75) and in Section C-1 of the March 1985 Fred C. Hart report. The data provided is insufficient and confusing. In addition, some of the values provided do not agree. For example, page I-62 provides a cost of $156,210 for closing the oil lagoon while the Fred C. Hart report lists a cost of $127,200.

A revised cost estimate must be provided which replaces all the existing cost estimates and which addresses the cost effects of any revisions to the proposed closure plan as a result of the comments provided in this NOD. In addition, the revised cost estimate must address the following items:

- Provide a summary showing all the site units and their expected closure costs. Each summary cost must be supported by a detailed breakdown of the total cost. Some breakdown sheets were provided, however they are confusing and difficult to follow (for example, page 4 of Section C-1 of the Fred C. Hart report provides a breakdown for closure of a tank but does not indicate which tank).

- The cost estimate provided was intended to reflect the applicant's costs. However, the closure cost estimate must reflect the costs of having outside contractors perform the work (including contractor fees, administrative costs, profit, etc.).

- All labor rates must be fully burdened (i.e., include cost of insurance, taxes, etc.) and should be equivalent to costs for local construction workers.

- Each closure cost estimate must stand on its own. For example, the wastes from the existing drum storage area must be treated or disposed of, not sent to the proposed drum storage unit.

- The closure cost estimate must reflect the cost for treatment and disposal of the maximum waste volumes. For example, the cost estimate for the oil lagoon in Section C-1 of the March 1985 Fred C. Hart report only deals with about one half of the maximum waste inventory, and the lindane tank closure estimate only disposes of 7000 gallons, not the 8000-gallon maximum capacity of the tank. The closure cost estimate must also reflect the costs of removal and disposal of the maximum anticipated volumes of sludge in each impoundment.

- Provide a list of all unit costs, along with justification and supporting documentation for each. Some of the unit prices seem low considering site conditions and normal construction costs. For example, the unit price of $0.50 per cubic yard for cement kiln dust seems low when transportation costs for getting the dust to the site are included and since few, if any, cement plants give the dust away free. Also, a cost of $5.00 per cubic yard to move contaminated material seems low if burdened labor rates are used and the cost of lost production time due to the wearing of personnel protection equipment is included.

- The closure costs for the container storage areas, tanks, and impoundments must include a cost for offsite disposal of the wastes in the event onsite disposal cannot be done. For example, if TI-3 is full and the impoundments have to be closed before IM-2 is opened, the waste would have to go off site. The applicant must also provide cost estimates for shipment of the waste to a permitted hazardous waste site. These cost estimates must be documented. In addition, in light of the lack of disposal sites in Puerto Rico, the costs for off-site shipment and disposal should include a site outside of Puerto Rico. When computing the total closure cost it must also be assumed that all washwaters will also require off-site disposal.

- Detailed costs must be provided for the surface impoundment contingent closure plans. Also provide costs for closing LC and the rainwater basin assuming IM-2 is not constructed.

- While insufficient design data has been provided to verify this, normally some regrading of surface impoundments and landfills is needed to provide for positive drainage before the cover is placed. Therefore, provide a demonstration that grading is not required or include an item for site regrading before closure in the contingent closure cost estimate and in the landfill closure costs.

- On page I-16 of the application it states that some of the liquid waste in the oil lagoon can be recycled, thus reducing the closure cost. For the closure cost estimate it must be assumed that all liquid wastes are hazardous, cannot be recycled, and must be stabilized and disposed of as hazardous waste. This would include liquids in containers, all tanks, and all surface impoundments along with washwaters and liquids produced during decontamination procedures.

- The existing closure cost estimate is based on the applicant's current liquid stabilization procedures. As noted in Comment D-6j, the procedure of dumping the bulk liquids in the landfill (or immobilization facility) for mixing is no longer permitted. Therefore, the closure cost estimate must reflect the cost of stabilization of the liquids in a mixer and should include stabilization of the liquids from containers, tanks, and surface impoundments, and the washwaters.

- The applicant has not provided a breakdown of the total number of soil and washwater samples that will require testing during closure. Such a breakdown must be provided along with a documented unit price for the testing.

- While the estimated quantities of contaminated soil provided may end up being accurate, for the purposes of the cost estimate a more conservative figure should be used. See Comments I-1d and I-1d(4).

- o Based on the unusual method of decontamination to be used in the oil lagoon (washing of the soil slopes) the cost estimates should not only include a documented estimate of the soil washing proposal, but also a line item for removal and disposal of contaminated soil in case the "washing" does not work.

- o Based on the size and complexity of the site closure operations, along with a large amount of unknowns (i.e., the amount of contaminate soil could easily double) a contingency of only 10% seems low. Provide a higher contingency or justify the 10% value.

While all the revisions to the closure plan resulting from response to this NOD must be reflected in the closure cost estimate, the following items are viewed as having major cost impact:

- o the method of liquid and sludge stabilization,

- o the type of cover used on the landfills, and

- o the quantities of contaminated soil.

I-5 Financial Assurance Mechanism for Closure: §§270.14(b)(15), 264.143

I-5a Closure Trust Fund: §§264.143(a), 264.151(a)(1)

A signed copy of the closure trust fund agreement with the wording required by §264.151(a)(1) and a formal certification of acknowledgment must be provided with the permit application. Page I-76 of the application indicates that this will be provided later; however, for existing facilities it must be provided with the application. The copy provided in Appendix I-4 was illegible.

I-6 Post-Closure Cost Estimate: §§270.14(b)(16), 264.144

The post-closure cost estimate must include the post-closure costs associated with the contingent post-closure plans for the surface impoundments.

As presented in Table I-8, page I-78, the post-closure cost estimate is insufficient. The estimate must include detailed cost breakdowns

for each item including as a minimum justification for unit prices, units (i.e., how many samples will be analyzed, etc.), justification for those units and replacement costs for items which will likely require replacement, such as bench marks and monitoring wells.

As presented, the cost estimate seems low considering the site of the facility and the number of landfills (eight).

The cost estimate must also be revised to reflect 1985 costs, the estimate provided on page I-77 of the application is for September 1983.

The post-closure cost estimate must include an item for removal and disposal of leachate collected from the landfill leachate collection and detection systems. For this cost the applicant must provide a documented estimated quantity of leachate and provide a cost for offsite disposal of the leachate.

I-7 Financial Assurance Mechanism for Post-Closure Care: §§270.14(b)(16), 264.145

I-7a Post-Closure Trust Fund: §§264.145(a), 264.151(a)(1)

A signed copy of the post-closure trust fund agreement with the wording required by §264.151(a)(1) and a formal certification of acknowledgment must be provided with the permit application. Page I-77 of the application indicates that this will be provided later; however, for existing facilities it must be provided with the application. The copy provided in Appendix I-4 was illegible.

APPENDIX H

LIQUIDS IN LANDFILL TI-3

LIQUIDS IN LANDFILL TI-3

Date Disposed	Quantity	Waste
	May	
5/15/85	2200 G	D013
5/15/85	2000 G	D013
5/15/85	275 G	D008
5/15/85	2145 G	F006
6/20/85	2200 G	D013
5/20/85	193 G	D006, D007
5/23/85	25 G	D007, D008
5/23/85	100 G	D008
5/23/85	110 G	D008
6/3/85	1650 G	D013
5/23/85	55 G	D008
6/3/85	1 DM	D008, D009
6/3/85	2200 G	D013
	June	
6/21/85	2200 G	D013
7/10/85	13191 G	U151
8/2/85	2200 G	D013
	July	
8/2/85	2200 G	D013
7/10/85	1826 lbs	U154
7/10/85	458 lbs	U044
7/10/85	12434 lbs	N/A (Noted Piperacillin Liquid)
7/10/85	591 lbs	N/A (Methotrexate Liquid)
7/10/85	456 lbs	N/A (" ")
7/31/85	3080 G	D001
7/31/85	1100 G	D001
7/31/85	220 G	D001
7/31/85	2420 G	D001
8/2/85	1850 G	D013
8/2/85	165 G	D010
8/2/85	189 lbs	D010
10/ /85	3 DM	U151

Date Disposed	Quantity	Waste
	August	
10/26/85	2000 G	D013
10/26/85	2200 G	D013
9/23/85	1/8 G	U151
9/23/85	4 G	D009
10/26/85	2000 G	D013
	September	
9/23/85	660 G	D008
9/23/85	710 Kg	D008
9/23/85	275 G	D009, D00?